Note 1: These .pdf files will work best with Acrobat Reader 4.0 or newer. Older software versions may not display images properly.

Note 2: GIS data files and software are located outside the Report, on the root directory of the CD.

Note 3: All alphabetical listings of conservation areas will show Disappointment Valley after Pagosa Springs. This is due to a post-production name change for this area. Our apologies for any inconvenience.

Disclaimer

SOUTHERN ROCKY MOUNTAINS:
AN ECOREGIONAL ASSESSMENT AND CONSERVATION BLUEPRINT

September 2001

The Nature Conservancy with funding and/or technical assistance from Bureau of Land Management, Colorado Division of Wildlife, Colorado Natural Heritage Program, Natural Resource Ecology Laboratory, New Mexico Natural Heritage Program, US Forest Service, and Wyoming Natural Diversity Data Base

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Cover photograph:
Tom Andrews, www.wildlandart.com

"Aldo Leopold wrote that our most difficult task is learning to use the land without spoiling it… we have not yet learned to use the landscapes of the Southern Rocky Mountains in quite the ways that Leopold would recommend…we have great potential to do a better job than we have done in the past…let us hope that we are successful in our efforts to live gently within this very special region. The scenery, biota, history, and natural ecological processes of the Southern Rocky Mountains are unique and significant at a global scale. Hopefully, they will continue to be sources of wonder and spiritual refreshment, as well as utility, for many generations to come."

Romme et al. 2000

"In the end, our society will be defined not only by what we create but by what we refuse to destroy."

John C. Sawhill

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EXECUTIVE SUMMARY

The Southern Rocky Mountains (SRM) ecoregion extends over nearly 40 million acres and includes portions of southern Wyoming, central and western Colorado, and northern New Mexico. Elevation ranges from approximately 3,700 ft to over 14,400 ft. The ecoregion is characterized by two major mountain belts and intervening intermontane valleys and parks encompassing four broad ecological zones: alpine, subalpine, upper montane, and lower montane/foothill. The primary ecological processes maintaining the natural systems and the biodiversity are fire, hydrological regime, herbivory, insect outbreaks, snow avalanches, and wind.

Approximately 56% of the SRM is in federal ownership, 37% is privately owned, 4% is in state ownership, and 3% is tribal land. The SRM is one of the fastest growing regions in the United States, with an average growth rate of 31% from 1990 to 2000—more than double the national average for the same period. This rapidly expanding human population places increasing demands on the biodiversity of the ecoregion and is the source of a wide range of potential threats to biodiversity.

Biodiversity Status

At least 184 plants and animals are known to be endemic to the SRM. There are 100 known globally imperiled (G1-G2) species and 23 species federally listed as threatened or endangered. Another 283 are of special concern due to their vulnerable, declining, endemic, and/or disjunct status. Despite the fact that the SRM is relatively intact compared with many other ecoregions, at least three species are already extinct, 15 species are extirpated (but known from other ecoregions), and another three species are only known from historical records and may be extirpated. In general, the greatest losses in ecoregion are in some of the larger vertebrate species (e.g., bison), and particularly such predators as grizzly bear and gray wolf. In addition, several bird species have declined significantly over historic numbers and occupied area (e.g., sandhill cranes and mountain plover). The region has also experienced degradation or loss of geographic extent in plant communities and major ecosystems, such as wetlands, ponderosa pine forests, montane grasslands, sagebrush shrublands, aspen forests, and aquatic systems.

Ecoregional Assessment

A proactive approach to conservation is needed to prevent future federal listings, extinctions and extirpations of species, and further losses of communities and systems. This ecoregional assessment is a timely first step towards addressing conservation needs of the ecoregion's biodiversity using a rigorous and comprehensive process.

The Nature Conservancy convened a multi-state team in January, 2000, to compile and analyze biological and ecological data and develop an ecoregional assessment for the SRM, with funding from the U.S. Forest Service, Colorado Division of Wildlife, and the Bureau of Land Management. The objective of this assessment was to use a science-based approach to design a portfolio of conservation areas for the SRM that, with proper management, would ensure the long-term persistence of the ecoregion's species, communities, and ecological systems. The ultimate goal is to conserve the full portfolio of conservation areas identified through this assessment process.

Conservation Targets

The conservation targets, the focus of conservation efforts in the SRM, include both coarse-scale targets (39 terrestrial ecological systems and 107 aquatic ecological systems) and fine-scale targets (79 rare plant communities, 177 plants, and 206 animals). The team selected the fine-filter targets based on their imperilment, vulnerability, endemism, declining status, and the inability of coarse-scale measures to conserve them. Ecological systems, both aquatic and terrestrial, were used to represent a broader level of biological diversity across the ecoregion. We assumed that using both fine-scale and coarse-scale data would be a robust way to capture the broadest array of biodiversity in the ecoregion.

Portfolio Design

The team compiled and analyzed data from all known sources, such as Natural Heritage Programs, GAP Analysis Programs, and experts workshops. The team convened two experts workshops, with over 130 participants, to fill data gaps and obtain up-to-date information on conservation targets and places of significance. The team used biophysical models as tools to identify, evaluate, and represent the natural variability of aquatic and terrestrial systems across environmental gradients within the ecoregion. After assessing the viability of target occurrences and developing conservation goals for targets, the team used SITES, a computer software program, to select and design a portfolio of conservation areas. The team refined the modeled output through a series of interactive workshops with team members, Natural Heritage Program scientists, and other experts.

Portfolio of Conservation Areas

The resulting SRM portfolio of conservation areas consists of 19.8 million acres (50% of the ecoregion) in 188 conservation areas selected to meet conservation goals for targeted species, communities, and ecological systems. The conservation areas—140 in Colorado, 23 in Wyoming, and 13 in New Mexico (7 overlap Colorado/Wyoming borders and 5 overlap Colorado/New Mexico borders)—range from landscape-scale areas of over 1 million acres to areas of roughly 3,000 acres. Most, if not all, of the conservation areas should meet standards for functional conservation areas, as most areas include coarse-scale ecological systems and this assessment applied a rigorous viability analysis of conservation targets. Functional conservation areas could maintain targeted species, communities, and ecological systems, and support ecological processes within their natural range of variability. In addition, this portfolio represents a first effort at a functional network designed to conserve selected regional scale species across their range of variability within the ecoregion.

The portfolio of conservation areas produced during this assessment represents the current state of our knowledge using best available information about where to conserve biodiversity in the ecoregion. The assessment results consist of a series of maps and tables, the portfolio of conservation areas and different analyses of the portfolio, including levels of conservation value, threat status, activity and field verification.

The patterns of land ownership and management within the portfolio of conservation areas generally follow the overall pattern for the ecoregion. Public lands, both federal and state, make up the majority of the ecoregional portfolio, with 61% of the portfolio on federal land and 4% on state land. The two largest federal land managers of portfolio conservation areas are the U.S. Forest Service (46%) and Bureau of Land Management (12%). Private lands encompass approximately 34% of the portfolio. Only 15% of the portfolio occurs within areas already managed to promote the long-term persistence of conservation targets.

The portfolio of conservation areas contains at least one viable occurrence of the majority of the targets, including 100% of the terrestrial and aquatic ecological systems, 65% of species, and 57% of rare plant communities. Ninety percent of the terrestrial ecological systems, 92% of the aquatic ecological systems, 33% of the rare plant communities and 50% of the amphibians/ reptiles, 26% of the birds, 33% of the fishes, 17% of the invertebrates, 21% of mammals, 66% of wide-ranging mammals, and 13% of the plants met stated conservation goals. Thirty one percent of the vertebrates and 17% of the invertebrates met conservation goals. Major ecological gradients and variability are well represented across the portfolio, as evidenced by the high degree of representation of ecological systems and ecological variables (e.g., vegetation, elevation) used to represent them.

While the SRM is a relatively well-known ecoregion, 169 targets have no documented viable occurrences in the ecoregion. Future work should focus on systematic inventory of targets not represented in the portfolio or where stated goals were not met. With additional knowledge of target distributions and quality, we will further refine conservation goals in subsequent iterations of this assessment.

After identifying conservation areas, the team qualitatively evaluated key threats to the targets within each area. The threats with highest severity and urgency across the portfolio were parasites/pathogens (affecting fish, amphibians, and prairie dogs), residential development, fire management practices (i.e., fire suppression), mining practices, roads/utility corridors, and invasive plant species.

Conservation Area Activity and Field Verification Levels

Conservation of biodiversity in the ecoregion will require working at every conservation area to ensure the long-term persistence of targets. Levels and types of conservation activity will differ depending on the conservation value and the threats to the targets. The team identified three different "activity levels" for conservation areas to help land managers and conservation practitioners set priorities and make decisions regarding actions needed at particular areas. High activity level means that significant time, resources, and effort must be expended within the next 10 years to ensure conservation success. The team ranked 47 conservation areas high for activity level, 101 areas medium activity, and 40 areas low activity.

The team also examined whether, and to what extent, scientists have conducted field surveys of the conservation areas, or whether the biophysical model (used mostly for coarse scale aquatic and terrestrial systems) had predicted that the areas were of conservation importance. Areas that had been systematically inventoried ranked high for field verification; these areas are considered ready for site conservation planning and/or conservation action. Areas ranking low for field verification but high in terms of their activity level are priorities for field inventory. The team ranked 61 conservation areas high in terms of field verification, 84 medium, and 43 low.

Conservation Blueprint

The primary product of this ecoregional assessment can be considered a conservation blueprint—a vision for conservation success—to guide public land managers, land and water conservation organizations, private landowners, and others in conserving natural diversity within this ecoregion. The goal is to conserve the entire portfolio, which requires both on-the-ground action at conservation areas as well as strategies that impact multiple areas by abating pervasive threats to targets. Conservation-area specific strategies address threats, such as development and invasive species, and include modifying land management practices and conservation easements. Multiple conservation area strategies can be most efficiently addressed through policy initiatives or the creation of new far-reaching programs, such as increasing tax incentives for land and water conservation.

Recommended Actions

The following priority actions should be taken to assure conservation success within the SRM portfolio conservation areas: 1) ensure that key landowners and land managers are aware of the results of this assessment and the biodiversity significance of the lands they own and manage; 2) develop multi-area strategies to abate key threats, including residential development, fire management practices, and parasites/pathogens; 3) develop site conservation plans for conservation areas to determine site specific strategies for threat abatement; and 4) focus inventory efforts on ecological systems and species lacking sufficient occurrence information and on conservation areas with little or no field verification.

Ecoregional planning is a dynamic process and information about targets and threats is changing rapidly. This assessment should be updated periodically (every five years is recommended) to include new information as it becomes available.

INTRODUCTION

Background and Purpose

This report presents the results of an ecoregional conservation assessment of the Southern Rocky Mountains (SRM), an area that extends over approximately 40 million acres, from southern Wyoming through central and western Colorado to northern New Mexico. The overall objective of this assessment was to identify and design a portfolio of conservation areas that, with proper management, would ensure the long-term survival of the ecological systems, plant communities, and species of the SRM.

This conservation assessment was conducted at the ecoregional scale to capture ecological and genetic variation in biodiversity across a broad range of environmental gradients. An ecoregion is a relatively large area of land and water that contains geographically distinct assemblages of natural communities, shares a large majority of its species, dynamics, and environmental conditions, and functions together effectively as a conservation unit at global and continental scales (Ricketts et al. 1999, TNC 2001). This assessment used the U.S. Forest Service ECOMAP framework (Bailey 1995, 1998a, 1998b), with minor modifications. The SRM is one of 80 ecoregions in the United States (see Map 1).

The Nature Conservancy led this assessment and used the methodology outlined in *Designing a Geography of Hope: A Practitioner's Handbook to Ecoregional Conservation Planning* (TNC 2000). Participants included staff from The Nature Conservancy, Natural Heritage Programs in Colorado, Wyoming and New Mexico, Colorado State University, University of Colorado, Colorado Division of Wildlife, New Mexico State Parks, and the U.S. Forest Service, with input and assistance from many other individuals and experts (see Acknowledgements and Appendix 1).

This ecoregional conservation assessment process involved compilation and analysis of the most up-to-date biological data on the location and quality of conservation targets (e.g., species, communities, and ecological systems). It is an iterative process built around five key steps:

1. Select conservation targets (e.g., species, communities, and ecological systems) to be the focus of conservation efforts within the ecoregion.
2. Set conservation goals in terms of number and distribution of the targets to be captured in the portfolio. These goals serve as initial hypotheses about the level of effort required to conserve biodiversity.
3. Assess viability of individual target occurrences to determine the likelihood of long-term persistence.
4. Identify and design a portfolio of conservation areas that effectively meets conservation goals.
5. Identify preliminary threats to targets at conservation areas and identify action steps to conserve the portfolio.

This type of rigorous analysis employs thousands of pieces of detailed information. It requires location-specific information for conservation targets as well as the past, current, and potential future status of lands where they occur. The team used the best available information for this assessment. However, given the quantity and quality of information involved—and the reality of ecological change—our knowledge will remain incomplete. We therefore approach this assessment with the intention of clarifying and filling information gaps over time, and to periodically revisit our analysis with new information that becomes available.

The primary product of this ecoregional assessment can be considered a conservation blueprint—a vision for conservation success—to guide public land managers, land and water conservation organizations, private landowners, and others in conserving natural diversity within this ecoregion. We hope that federal, state, and local agencies will use this report in public lands planning processes, that local land trusts will use it to set their conservation priorities, and that private landowners will use the report in making decisions about how to manage their lands. The ultimate goal is to conserve the targets identified in all conservation areas within the portfolio through management and protection efforts. Reaching this goal will require focused efforts by a wide variety of partners to abate pervasive threats to ensure the long-term survival of species, natural communities, and ecological systems of the ecoregion.

With the rapid growth in the region, there is a real sense of urgency and a need to take a proactive approach to conservation of biodiversity in the SRM to prevent future federal listings, extirpations and extinctions of species, and further losses of communities and ecological systems. This ecoregional assessment effort is a timely first step towards addressing the conservation needs of the ecoregion's biodiversity using a rigorous and comprehensive process.

SOUTHERN ROCKY MOUNTAINS OVERVIEW

Description of the Ecoregion

The eastern flank of the SRM ecoregion, with a rapid elevation gain of nearly 9,800 ft (3,000 m), is an impressive sight for travelers heading west across the eastern plains. Elevation ranges from 3,746 ft (1,142 m) near Orchard Mesa in Mesa County, Colorado to 14,431 ft (4,398 m) on Mt. Elbert in Lake County, Colorado. Colorado encompasses 73.5% of the ecoregion, New Mexico 18%, and Wyoming 8.5%. Glacial activity and resulting meltwaters have shaped much of the ecoregion into high rugged mountains, plateaus, alpine cirques, glacial moraines, and broad valleys. Colorado contains the highest summits in the entire Rocky Mountain system, with 54 mountains exceeding 14,000 ft (4,267 m) and 300 peaks over 13,000 ft (3,962 m). The SRM is the highest ecoregion in North America, based on average elevation (9,670 ft or 2,947 m) and amount of land above 10,000 ft (3,048 m) (Shinneman et al. 2000). Other notable topographic features include hogbacks, mesas, and rocky outcrops where the high mountains meet the plains on the eastern front, and rugged canyons and mesas where the mountains meet the high desert country to the west (Bailey 1995, Shinneman et al. 2000). See Map 2.

Surrounding Ecoregions

The SRM ecoregion is considered a subdivision of larger landscapes defined at a sub-continental scale. Bailey (1998a and 1998b) described a hierarchy of landscapes for North America, placing the Southern Rockies *Province* within the dry, continent-scaled *Domain* and semi-arid steppe

Division. The SRM represents a southern extension of Rocky Mountain cordillera in western North America. To the west and northwest, floristically-related montane ecoregions include the Utah-Wyoming Rocky Mountains and extend further north into the Yukon Territory (Peet 2000) (see Map 1). To the southwest, the Arizona-New Mexico Mountains are considered part of the Madrean Rocky Mountains that have greater floristic affinity for ecoregions extending into Mexico. These mountainous ecoregions share similar ecological systems and species, including wide-ranging carnivores (e.g., wolf, black bear, mountain lion) and ungulates (e.g., elk, pronghorn, mule deer). To the east and southeast of the SRM lie the Central and Southern Shortgrass Prairie ecoregions, which are located in the rain shadow of the Rocky Mountains, and reflect the drier and more continental climate of the Great Plains. To the north of the SRM, the sagebrush-dominated Wyoming Basins ecoregion, located in the rain shadow of the Utah-Wyoming Rocky Mountains, reflects similar, albeit cooler, climatic patterns. To the west of the SRM, lower elevation mesas and deep canyons characterize the "red rock" semi-desert of the Colorado Plateau and Utah High Plateaus ecoregions (U.S. Forest Service 1999).

Continental Divide

The Continental Divide, the jagged backbone of the Rockies forming the geographic boundary between the Pacific and Atlantic drainage systems, is the dominant feature of the ecoregion. The SRM includes the headwater watersheds for three major rivers in North America: the Mississippi (Missouri and Arkansas Rivers), Colorado, and Rio Grande. The water that falls to the west of the Continental Divide ends up in the Sea of Cortez (via the Colorado River) and the water on the Eastern Slope flows into the Gulf of Mexico, via the Arkansas-Missouri-Mississippi system and the Pecos-Rio Grande system. Nearly two-thirds of the land area of the SRM drains eastward towards the Atlantic Ocean, yet three-quarters of the precipitation falls on the west side of the divide. The character of the rivers and streams is closely linked to elevation as well as latitude. The predominant stream type is small, high gradient, snowmelt-fed cold streams at higher elevations, although in some places large rivers are the dominant influence on the landscape. These rivers and their tributary streams have formed deep rocky gorges, narrow V-shaped canyons and wide river valleys in the ecoregion (Fitzgerald et al. 1994, Shinneman et al. 2000, Benedict 1991).

Box 1: Ecoregion Boundaries

The Southern Rocky Mountains ecoregion boundaries were updated to include more refined boundaries as established in the 1999 ECOMAP draft of the U.S. Forest Service along the borders with the Central Shortgrass Prairie and Southern Shortgrass Prairie ecoregions. The concept of the ecoregion's province and section-scaled units has not changed, but the refined boundaries more efficiently frame the ecoregion and are in use by major federal agencies. New USFS boundaries bordering the AZ/NM Mountains have not been used in this plan; they should be revisited with the second iteration of the AZ/NM Mountain plan.

The mountains consist of two great parallel ridges (or mountain belts) of primarily granitic rocks oriented roughly north south. The eastern ranges include the Laramie Mountains, Front Range, Wet Mountains, Culebra Range, and the Sangre de Cristo Range. A western chain of mountains includes the Sierra Madre, Park, Sawatch, and Mosquito Ranges. Separating the mountain belts are several large intermontane basins, including North Park, Middle Park, South Park, San Luis Valley, and Rio Grande Valley (Benedict 1991, Fitzgerald et al. 1994). Mountains west of the two granitic mountain belts include the White River Plateau, Elk Mountains, West Elk Mountains, Grand Mesa, the Uncompahgre Plateau, and the San Juan and Jemez Mountains (the San Juan and Jemez Mountains are partly volcanic in origin) (Hammerson 1999).

Climate

The topographic relief of the Rocky Mountains dominates the climatic variability of the Southern Rocky Mountain ecoregion. The climate is a temperate semiarid steppe regime with average annual temperatures ranging from 35°F (1.7°C) to 45°F (7.2°C) in most of the ecoregion, but reaching 50°F (10°C) in the lower valleys. Prevailing west winds and general north-south orientation of the mountain ranges influence the climate. Late summer monsoonal patterns also influence the southern portion of the ecoregion. Eastern slopes are generally much drier than west slopes, and more than 75% of the precipitation falls west of the Continental Divide. Winter precipitation varies considerably with elevation. In the highest mountains, a considerable part of the annual precipitation falls as snow, although permanent snowfields and glaciers cover relatively small areas. More precipitation falls as winter snow than as summer rain in the western mountains whereas winter and summer precipitation are about the same on the Eastern Slope. Annual rainfall ranges from under 10 inches (25 cm) at the base of the mountains in the San Luis Valley to over 55 inches (140 cm) at higher elevations in the Park Range (Bailey 1995, Western Regional Climate Center website). The mountain parks and valleys are cooler and drier than the surrounding mountains, as they lie in the rain-shadow of the mountains and trap cold-air masses for long periods (Fitzgerald et al. 1994).

Ecological Zones

The dramatic elevation gain within the ecoregion makes distinguishing broad ecological zones simple, and the dominant vegetation reflects these zones. The four dominant ecological zones—Alpine, Subalpine, Upper Montane, and Lower Montane-Foothill—have long been used to characterize the Rocky Mountains (Merriam 1890, Gregg 1963). A combination of elevation, latitude, direction of prevailing winds, and slope exposure, which all influence precipitation and natural disturbance processes, control the zones. Generally, the vegetation zones are at higher elevations in the southern part of the province than in the northern, and they extend downward on east-facing and north-facing slopes and in narrow ravines and valleys subject to cold air drainage. See Appendix 2 for more details on the ecological systems within each zone.

The Alpine zone lies typically above 11,500 ft (3,500 m) and includes the highest mountain peaks with snow and ice fields, fellfields, dry alpine tundra, moist to wet alpine meadows, cold alpine streams, and small cirque lakes. These are cold and wind-swept environments much of the year and receive intense ultraviolet radiation (Caldwell 1968). The Subalpine zone occurs roughly between about 9,189 ft (2,800 m) to 10,500 ft (3,200 m) elevation. Common ecological systems in this zone are bristlecone-limber pine forests, spruce-fir forests, wet meadows, subalpine-montane riparian shrublands, and high gradient streams. The Upper Montane zone lies generally between 7,500 ft (2,300 m) to 9,200 ft (2,800 m), and is characterized by lodgepole pine forest, aspen forest, mixed-conifer forests, montane grasslands, mountain sagebrush shrublands, montane riparian woodlands and shrublands, and high montane lakes and streams of high-moderate gradient. The Lower Montane-Foothill zone generally lies below 7,500 ft (2,300 m) elevation and encompasses the transition from montane ecosystems to lower-elevation systems in neighboring ecoregions. Ecological systems include Douglas-fir-ponderosa pine forests, ponderosa pine woodlands and savannas, pinyon-juniper woodlands, Gambel oak shrublands, intermontane-foothill grasslands, active and stabilized sand dunes, greasewood flats and ephemeral wetlands, foothill riparian woodland and shrublands, as well as rivers of varying size and gradient. Major disturbance patterns in the ecoregion include fire, hydrologic regime, herbivory, insect outbreaks, snow avalanches, and wind (Ricketts et al. 1999, Veblen 2000). Climatic variability may have a large role in altering disturbance regimes and vegetation patterns (Veblen 2000).

Ecoregional Subdivisions

Ecoregional Sections

The U.S. Forest Service (1999) has described five major sections within the SRM using local patterns in climate, geomorphology, soils, vegetation, surface water, natural disturbance regimes, and land-use history (see Table 1 and Map 3; McNab and Avers 1994, www.fs.fed.us/land/pubs/ecoregions/intro.html). We used these sections to stratify the ecoregion for analysis of terrestrial conservation targets. While four of the five sections share extensive alpine and subalpine zones, their differences become more pronounced at lower elevations. *The Northern Parks and Ranges* section includes the Laramie and Medicine Bow Mountains, the Colorado Front Range, Mosquito Range, Pikes Peak, North Park, Middle Park, and South Park. Extensive alpine tundra and subalpine to montane forests occur throughout this section, including large tracts of lodgepole pine, and mixed ponderosa pine with Douglas-fir. The intermontane parks include sagebrush and large expanses of montane grassland (e.g., South Park). The *South-Central Highlands* section is dominated by the San Juan Range and the Jemez Mountains, but also includes the Needle, La Garita, and La Plata Mountains, and the Uncompahgre Plateau. There, the extensive alpine and subalpine vegetation transitions into ponderosa pine and pinyon juniper woodlands at lower elevations. The *Northern-Central Highlands and Rocky Mountains* section includes the Sierra Madre, the Park, Gore, and Sawatch ranges, Elk Mountains, Maroon Bells, Flat Tops, and White River Plateau. Extensive aspen forests grade into foothill shrubland of Gambel oak and sagebrush throughout this section.

The *Southern Parks and Rocky Mountain Ranges* are dominated by the Sangre de Cristo Range, but also includes the Wet Mountains, the Spanish Peaks, Raton Mesa, and the Santa Fe Mountains. This section transitions from montane mixed-conifer forests into shortgrass prairies. The *Northern Rio Grande Basin* includes the San Luis Valley and remaining inter-montane basins and valleys extending south along the river. This section is anomalous for the SRM, and includes greasewood flats and other semi-desert shrublands, along with the Great Sand Dunes (McNab and Avers 1994, http://www.fs.fed.us/land/pubs/ecoregions/intro.html).

Table 1. U.S. Forest Service Ecoregional Sections.

Sections*	Number	% of Ecoregion
Northern Parks and Ranges	M331I	33.74
South-Central Highlands	M331G	29.42
Northern-Central Highlands and Rocky Mountains	M331H	14.87
Southern Parks and Rocky Mountain Ranges	M331F	12.44
Northern Rio Grande Basin	331J	9.48

Ecological Drainage Units

The assessment team identified seven Ecological Drainage Units (EDU, see Map 4) to distinguish system types and stratify aquatic organisms in the ecoregion. The EDUs were identified based on zoogeographic influences on fish of the three major river basins and climatic and physiographic influences as captured in the ecoregional section classification of the U.S. Forest Service (McNab and Avers 1994). The team relied on distinctions between basins identified by Hocutt and Wiley (1986) as the primary source of zoogeographic information. The EDUs represent the major natural drainage divides that separate fish species. The EDUs, grouped by major river basin, are described below.

Colorado River: Upper Colorado, Yampa/White, Middle Colorado EDUs

The Colorado River originates in the Northern Parks and Ranges section. The Colorado basin has three major aquatic settings—the small, snowmelt, high-gradient streams confined within narrow valleys, as well as low-moderate elevation river habitat, and the large river habitat. Although each mainstem river within these drainages is unique, the high-elevation streams are not particularly distinct, with the same species or near relatives occurring in adjacent drainages (Minckley et al. 1986). The team delineated three EDUs in the Colorado basin: the Upper Colorado, which contains the Gunnison and Dolores Rivers; the Yampa/White, which drains first to the Green River before reaching the Colorado; and the Middle Colorado – San Juan, which contains several high-elevation, cold streams, but mostly flows through a mid-elevation desert. The majority of the Middle Colorado EDU occurs in the neighboring Colorado Plateau ecoregion. The streams in this ecoregion are small, high elevation, and high gradient, and quickly become desert streams. The major river systems include the Animas, Piedra, and San Juan rivers.

Missouri River: Platte, Arkansas/Canadian EDUs

The Platte River watershed in the ecoregion drains the Northern Parks and Ranges section, an area of Precambrian granite, high-gradient streams in narrow valleys that are snowmelt driven. The major river systems are the North Platte, South Platte, Encampment, Medicine Bow, Cache la Poudre, and Laramie rivers. Like the Platte EDU, the Arkansas/Canadian EDU originates in high-elevation mountains and abruptly becomes a Great Plains system. This EDU is more arid than the Platte EDU. The major streams—the Arkansas, Huerfano, Purgatoire, Vermejo, Cimarron, Mora, and Canadian—originate in the Sangre de Cristo Mountains. Small streams in both the Platte and Arkansas/Canadian EDUs dry up in late summer.

Rio Grande: Rio Grande, Pecos EDUs

The Rio Grande EDU includes high-elevation streams as well as a mid-elevation valley, a feature unique to this ecoregion. The major rivers are the Rio Grande, Rio Chama, Rio Brazos, Conejos, Alamosa, Pecos, and Gallinas. The Pecos Valley occurs in a distinct EDU, the majority of which occurs outside of the ecoregion in the Pecos Valley section, which is typified by plains and valleys with few perennial streams. The headwaters of the Pecos River occur in this ecoregion in the Southern Parks and Rocky Mountains Ranges, which includes the Sangre de Cristo Mountains.

Land Ownership

Approximately 60% of the land in the SRM is publicly owned and managed (56% federal, 3.9% state), 2.8% is tribal, and 37% is privately owned (see Table 2). State lands include state parks, state wildlife areas, state land board/trust lands, and state forest lands. Federal lands include the U.S. Forest Service, Bureau of Land Management, Bureau of Reclamation, Department of Defense, National Park Service, and U.S. Fish and Wildlife Service lands. The U.S. Forest Service is the largest land manager in the ecoregion, with responsibility for approximately 43.8% of the land area. Ten National Forests occur in the ecoregion, including the Medicine Bow in Wyoming, the Routt, White, Arapaho-Roosevelt, Pike San Isabel, Rio Grande, San Juan, Grand Mesa Uncompahgre Gunnison in Colorado, and the Carson and Sante Fe in New Mexico. The next largest public land manager is the Bureau of Land Management, with 11% of the land within the ecoregion. See Map 5 for land ownership of the SRM.

Table 2. Land Ownership in the Southern Rocky Mountains Ecoregion.

Land Manager/Owner	Total Acres	% of Ecoregion
Federal	22,467,839	56.2%
U.S. Forest Service	17,508,171	43.8%
Bureau of Land Management	4,371,980	10.9%
National Park Service	515,177	1.3%
U.S. Fish and Wildlife Service	48,803	0.1%
Dept. of Defense	22,552	0.1%
Bureau of Reclamation	1,156	0.0%
Tribal Lands	1,106,477	2.8%
State	1,572,472	4.0%
Private	14,810,684	37.0%
Total	39,957,472	

Land Use History and Trends

<u>First Inhabitants</u>

Humans arrived in the region approximately 10,000 years ago and have relied on the natural resources of the ecoregion ever since. The first people in the region were Paleo-Indians, who occupied the area until approximately 7,000 years ago and were largely nomadic. They hunted now-extinct Ice Age species, such as giant bison, wooly mammoth, camels, and horses. During the Archaic Period, which lasted from roughly 7,000 years ago until 1 A.D., the native people relied on gathering plants and hunting deer, elk and jackrabbits (Shinneman et al. 2000).

During the Late Prehistoric Period, which began around 1 A.D. and lasted until just before European contact (1500 A.D.), crop farming was developed, along with the bow and arrow for hunting. The Pueblo Indians from New Mexico ventured into southern Colorado for hunting and mining beginning around 1300s. The ancestral pueblo also occupied southwestern portion of the SRM from approximately AD 900 to 1300 (Blair 1996). Portions of the SRM are considered sacred to various Indian people. The Apaches consider the Sangre de Cristo Mountain range

Buys 1985). The Tewa Pueblo and Navajos consider portions of the San Luis Valley as sacred and areas of the Jemez Mountains are sacred to the Pueblo Indians (de Buys 1985, Simmons 1999).

From the 1500s through the 1700s, the Plains Apache inhabited the region, along with the Comanche and Ute. By the early 1800s the Apache, Arapaho, and Cheyenne dominated the eastern foothills and plains, while the Ute dominated the mountain regions, relying on hunting of deer, elk, pronghorn, bison and small game. The advent of the horse enabled the inhabitants to expand their reliance on hunting. The people during this period probably set fires to drive game. These practices of hunting and burning have significantly influenced the faunal and landscape patterns within the ecoregion (Shinneman et al. 2000).

Europeans

The Spanish explorer Francisco Vasquez de Coronado led the first Europeans into the region (reached Taos Pueblo in 1540). Santa Fe was established in 1610 and Spanish colonization spread north along the Rio Grande. The Pueblos revolted in 1680, driving the Spanish out of the ecoregion for 12 years (Ubbelohde et al. 1976).

Additional attempts at Spanish settlement were more successful in the 1700's. The settlers were mostly peasants who wanted to get along with the native people (de Buys 1985). The Spanish and Mexican governments encouraged settlement into undeveloped lands by granting former Native American lands to migrants. These large tracts of land or land grants covered millions of acres in the San Luis Valley, Upper Rio Grande Basin and along the eastern flank of the Sangre de Cristo Mountains. These Hispanic communities established a communal land ethic that expanded livestock grazing and logging into surrounding systems.

The early 1800s brought Americans into the SRM. In 1806, Zebulon Pike's expedition journeyed up the Arkansas River through South Park, across the Sangre de Cristo Mountains and the San Luis Valley (Simmons 1992, Simmons 1999). Within 10 years, trappers and fur traders were trapping throughout the southern SRM (Simmons 1992, Simmons 1999). The Sangre de Cristo Mountains between Sante Fe and Taos were among the first mountains in the west to be trapped for beaver (de Buys 1985).

Mining, Timber, and Agriculture

Gold was discovered in 1859 near Central City, Gold Hill, Idaho Springs and Colorado Springs, and thus began the gold rush and mining era that had significant and long-lasting impacts on the ecoregion's ecosystems. Soon gold was found and mined in other parts of the SRM. In 1860s and 1870s, silver was discovered and extensively mined in the San Juan Mountains, South Park, and near Georgetown and Leadville, Colorado (Blair 1986, Simmons 1992, Ubbelohde et al. 1976). Copper and gold were found in the New Mexican portion of the Sangre de Cristo Mountains in 1866 (de Buys 1985). While gold, silver, and copper were the primary metals of interest, lead, zinc and coal were also mined in portions of the SRM (Blair 1986).

Placer mining for gold significantly changed the riparian and aquatic zones of some watersheds in the SRM (Knight 1994). Miners set large fires and practiced extensive logging to obtain timber for mining, fuel and building supplies. Hunting was unregulated, and miners depleted local game herds such as bighorn sheep and elk. Thousands of people migrated to the region, and within a few decades cities sprang up throughout the mountains and along the Front Range. For instance, up to 5,000 people poured into Boulder County to mine the Gold Run Creek in 1859 (Wohl 2001). Mining is still a significant economic activity, as increasing automation has enabled miners to extract small amounts of metal from large quantities of rock and to diversify to other mineral resources, such as molybdenum.

The mining boom also encouraged the expansion of transportation routes, such as wagons and stagecoach routes and later railroads throughout the ecoregion (reaching Denver in 1870 and Santa Fe in 1880). Cities sprang up and prospered along railroad lines. Improved transportation to and within the region facilitated the migration of people to the SRM. Between 1860 and 1900, Colorado's population grew from 34,277 to 539,700 (Noel et al. 1994). Paving of the region's state and federal highways during the early to mid 1900s also expanded the human impact on natural resources (Shinneman et al. 2000).

Profitable timber harvesting has been difficult in the region due to the dry, slow-growing forest conditions and steep topography. Despite this, many areas have been logged and managed for more than 100 years, resulting in networks of logging roads, fragmented forests, and depletion of low-elevation old-growth forests, particularly ponderosa pine and Douglas-fir forests. Commercial logging rose steadily after the Second World War and clear-cut and other even-age harvest techniques were used on the Southern Rocky Mountain's upper montane and subalpine forests. These logging activities have had serious ecological impacts on forest systems (Shinneman et al. 2000).

Pueblo Indians first practiced irrigated agriculture in the ecoregion in the upper Rio Grande Valley of New Mexico. Later, irrigated agriculture by EuroAmericans transformed many natural areas in the region. Small Hispanic communities in the southern part of the ecoregion expanded in the 1700's and 1800's. Water needs expanded by the late 1800s, and trans-mountain water diversions and storage projects were built to bring water from the Western Slope to the Eastern Slope to provide farms and growing cities along the Front Range with a reliable water supply. Today there are more than 1,000 dams and diversions that have a significant impact on fragmentation of the aquatic systems of the ecoregion (Shinneman et al. 2000). Croplands expanded through the 1900s. Ranching also began with the first Spanish settlers in northern New Mexico and southern Colorado, with grazing of horses, cattle and sheep. Over-grazing led to ecological damage in some areas. Cattle ranching became more dominant and widespread than sheep ranching. Uncontrolled grazing practices led to heavy over-grazing, until the Taylor Grazing Act, passed in 1934, began to regulate cattle grazing. Livestock numbers peaked in the 1920s but cattle ranching continues to be widespread today.

Current Economy

The ecoregion has experienced rapid population growth and drastic changes in land use over the past 100 years. The current economy is highly diverse, and has largely moved away from a dependence on traditional resource extraction industries. Economic growth has occurred primarily as a result of industries such as manufacturing, retail, government offices, military bases, high-tech business, health, recreation and tourism (Riebsame et al. 1997, Shinneman et al. 2000). Most of the diversification has occurred along the Front Range, but other communities have also experienced rapid economic expansion, resulting from tourism and ski industries (e.g., downhill ski resorts, vacation home development, resort and retirement communities) (Riebsame et al. 1997, Shinneman et al. 2000).

According to a recent U.S. Commerce Dept. study (Denver Post 2001), Colorado and its western neighbors drove the nation's economic boom time of the 1990s. Colorado ranked 4th (tied with Idaho) among all states with a 6.6% average annual growth rate of its gross national product from 1992-1999. New Mexico ranked 6th (the national average was 4%). In Colorado, communication industries−including telephone, satellite and multimedia services−contributed significantly to growth (Denver Post 2001).

Population Growth and Development

The population of the region has grown rapidly since the turn of the century, but particularly in recent decades. In 1900, there were approximately half a million inhabitants. By the end of World War II, the population had grown to about three-quarters of a million people. By 1970, the population had nearly doubled to 1.4 million, and doubled again to the 1998 level of 2.9 million people (the 2000 census put the population at approximately 3.1 million). Projections assume the pace of growth will slow slightly but still suggest another million residents in the SRM by the year 2020 (U.S. Census 2000, Riebsame et al. 1997, Shinneman et al. 2000). See Appendix 3 for more detail.

While none of the states in the SRM have particularly large populations compared to other states, the population is growing at an alarming rate, roughly three times faster than the rest of the United States (Baron et al. 2000). The average growth rate of counties within the ecoregion was 31% from 1990-2000—2.3 times the U.S average of 13% for the same time period. Douglas County, Colorado, was the fastest growing county in the U.S., with a population increase of 191% from 1990-2000. In fact, seven of the top 20 fastest growing counties within the U.S. lie within the SRM, three of them—Douglas, Park, and Eagle—in Colorado (U.S. Census 2000). This large and rapidly expanding human population places increasing demands on the ecoregion's natural resources and open spaces. The population growth rate is the source of a wide range of threats to the biodiversity, such as development (e.g., residential, commercial), ski area expansion, and increased water storage and transfers (Travis, personal communication).

These daunting population growth rates may in fact underestimate the magnitude of human influence because they are tied to primary residences. Housing density has had a greater relative impact on the landscape than the population growth per se, especially because of the high proportion of vacant and second homes in the SRM. The vacancy rate averaged 29% in 1990 (compared to 14% in the US), and is as high as 83% in some counties (Eagle County, Colorado) within the ecoregion. Home construction is primarily concentrated on the eastern border of the ecoregion along the Front Range, along major transportation corridors, but is also occurring at a rapid rate in the mountain valleys and parks. Theobald (personal communication) developed a "build out" analysis that projects likely future housing density given current/likely zoning and rates of housing construction; this is an estimate of how soon build out will be reached within the ecoregion (see Appendix 3 and 4). Of particular concern is the increase in low-density housing throughout the ecoregion. Theobald (2000) estimates that by 2020 nearly 25% of the total land area in the SRM will be replaced by urban and suburban landscapes modified by exurban and "ranchette" development.

Biodiversity Status

At least 184 species and subspecies are known to be endemic to the ecoregion, meaning they occur in the SRM and are not known from anywhere else in the world. The richest known groups of species are plants (118 endemics) and invertebrates (51 endemics), followed by mammals (12 endemics), birds (2 endemics), and amphibians (1 endemic). Examples of these endemic species include the Penland penstemon (*Penstemon penlandii*), Uncompahgre fritillary butterfly (*Boloria improba acrocnema*), Goat Peak pika (*Ochotona princeps nigrescens*), Jemez Mountains salamander (*Plethodon neomexicanus*), and brown-capped rosy finch (*Leucosticte australis*). The relative ecological isolation of the SRM, significant climate changes in the recent geological past, and the ecoregion's complex topographic and geologic features provide fertile ground for evolutionary change that often results in high endemism. The area is known for its high species richness in butterflies and moths, mammals, birds, and several plant groups (e.g., *Penstemon*, *Eriogonum*, and *Astragalus*) (Opler, personal communication, Armstrong 1972, Andrews and Righter 1992, Weber and Wittmann 1992). In the lower 48 states, only southeast Arizona has a higher species diversity for invertebrates, particularly butterflies and moths, than the lower foothills of Colorado's Front Range (Opler, personal communication). There are also a large number of disjunct boreal species at the southern end of their range in the SRM, such as Greenland primrose (*Primula egaliksensis*) (Hogan, personal communication). New taxa are still being described from the ecoregion, e.g., the Gunnison sage grouse (*Centrocercus minimus*, Young et al. 2000) and several moths (*Grammia, Gazryctra, Lycia*). Scientists believe that there are a number of other species not yet described, particularly invertebrates and fungi (Stucky-Everson 1997).

Although the ecoregion contains largely intact or functional landscapes, a number of species in the SRM are either extinct or extirpated. At least three vertebrates of the SRM are known to be extinct: the yellowfin cutthroat trout (*Oncorhynchus clarki macdonaldi*), which formerly occurred in the upper reaches of the Arkansas River; Carolina parakeet (*Conuropsis carolinensis*), which formerly occupied Colorado's Great Plains and foothills as far west as Salida; and the New Mexico sharp-tailed grouse (*Tympanuchus phasianellus hueyi*) (The Nature Conservancy and Colorado Natural Heritage Program 1999, Andrews and Righter 1992, Shinneman et al. 2000). Several invertebrate species are believed to be extinct (Kondratieff and Opler, unpublished data), including what was once one of the most abundant insects, the Rocky Mountain locust (*Melanoplus spretus*) (Capinera and Sechrist 1982).

In addition, a number of species have been extirpated from the ecoregion, including seven mammal species: grizzly bear (*Usus arctos*), gray wolf (*Canis lupus*), wild populations of bison (*Bison bison*), black-footed ferret (*Mustela nigripes*), lynx (*Felis lynx canadensis*), wolverine (*Gulo gulo*), and river otter (*Lutra canadensis*). Black-footed ferret, lynx, and river otter have recently been brought back into the ecoregion through restoration efforts. Eight fishes are extirpated from the ecoregion, including the Rio Grande bluntnose shiner (*Notropis simus simus*), Rio Grande silvery minnow (*Hybognathus amarus*), American eel (*Anguilla rostrata*), freshwater drum (*Aplodinotus grunniens*), shovel nose sturgeon (*Scaphirhynchus platorynchus*), blue sucker (*Cycleptus elongatus*), Rio Grande shiner (*Notropis jemezanus*), and speckled chub (*Extrarius aestivalis*) (Nesler, personal communication, New Mexico Experts Workshop).

Other species once spent time at least seasonally in the SRM and may be extirpated. The harlequin duck (*Histrionicus histrionicus*), merlin (*Falco columbarius*), marbled godwit (*Limosa haemastica*), and ring-billed gull (*Larus delawarensis*) historically bred in the SRM (Andrews and Righter 1992). Several species, such as the Crandall's wild hollyhock (*Iliamna crandalii*), Colorado watercress *(Rorippa coloradensis*), and the lost ethmid moth (*Ethmia monachella*), might be extirpated, as they are only known from historical records (Colorado Natural Heritage Program 2000). Some of the species or subspecies listed above only occurred marginally in Colorado. In many cases their ecological roles will never be known. We highlight them here not because of the possible significance they may have had, but because their absence precludes our understanding of their roles.

Twenty-three species in the ecoregion are currently listed as threatened or endangered (and candidates or petitioned for listing) by the U.S. Fish and Wildlife Service, e.g., Preble's jumping mouse (*Zapus hudsonius preblei*), greenback cutthroat trout (*Oncorhynchus clarki stomias*), Holy Ghost ipomopsis (*Ipomopsis sancti-spiritus*) and Penland's alpine fen mustard (*Eutrema edwardsii* ssp. *penlandii*). At least 100 species are considered globally imperiled (ranked G1-G2) by Natural Heritage Programs in Wyoming, Colorado, and New Mexico, e.g., Gunnison's sage grouse (*Centrocercus minimus*), Great Sand Dunes tiger beetle (*Cincindela theatina*), and Chama blazing star (*Mentzelia conspicua*). By comparison the Central Shortgrass Prairie to the east of the SRM supports only 54 globally imperiled species.

Another 283 species are of special concern because they are vulnerable, declining, endemic, or disjunct in the ecoregion, e.g., greater sage grouse (*Centrocercus urophasiansus*), northern leopard frog (*Rana pipiens*), and round-leaf sundew (*Drosera rotundifolia*). A number of species are currently known only from a small percentage of their historic range. For example, the Colorado River cutthroat trout (*Oncorhynchus clarki pleuroticus*) occurs in less than 5% of its historic range in the ecoregion (Young 1995). Other species are considered vulnerable because of their relatively small ranges or population sizes, e.g., Rocky Mountain columbine (*Aquilegia saximontana*).

The region has also experienced degradation and/or loss in geographic extent of plant communities and major ecosystem types. Approximately 50% of the wetlands in the ecoregion have been destroyed in Colorado alone (Dahl 1990). Other major system types of particular concern include old-growth ponderosa pine, montane grasslands, sagebrush shrublands, aspen forests, alpine meadows, and most aquatic systems. Many free-flowing rivers have been dammed or diverted, impacting aquatic systems and particularly low-elevation riparian ecological systems. At least 80 years of fire suppression and/or logging have altered the structure and composition of several forested systems, such as ponderosa pine, aspen, mixed-conifer and lodgepole pine forests (Veblen and Lorenz 1991, Bailey 1998). Sagebrush systems have been severely altered in parts of the ecoregion, primarily due to incompatible livestock grazing, alteration of fire regimes, invasion by cheatgrass, and direct sagebrush removal (Rondeau, personal communication). Approximately 200 of the 411 plant associations recorded for the ecoregion are ranked as globally imperiled or vulnerable by Natural Heritage Programs.

ECOREGION ASSESSMENT PROCESS

Steps of the Ecoregion Assessment Process

The process used in developing this ecoregional conservation assessment was largely based on *Designing a Geography of Hope: A Practitioner's Handbook to Ecoregional Conservation Planning* (TNC 2000). The ecoregional assessment process involves compilation and analysis of the most up-to-date biological data on the location, quality, and threats to conservation targets. It is an iterative process built around five key steps (see Table 3 for SRM timeline):

1. Select conservation targets (e.g., species, communities, and ecological systems) to be the focus of conservation efforts within the ecoregion.
2. Set conservation goals in terms of number and distribution of the targets to be captured in the portfolio. These serve as initial hypotheses about the effort required to conserve biodiversity.
3. Assess viability of conservation targets to determine the likelihood of long-term persistence.
4. Identify and design a portfolio of conservation areas that most effectively meets conservation goals.
5. Identify preliminary threats to targets at conservation areas and identify action steps to address conservation of the portfolio.

Once the portfolio is produced and results (regarding targets, threats, land ownership, etc.) are analyzed, an important next step is to develop strategies to abate crosscutting threats and to take conservation action towards conserving the entire portfolio of conservation areas. This step was beyond the scope of this ecoregional assessment, but needs to be undertaken in the near future.

Table 3. Timeline of the Southern Rocky Mountains Ecoregional Assessment.

Key Step	Month and Year
First Core Team Meeting	January 2000
Expert Workshops, CO and NM	May-June 2000
Viability Guidelines	July-October 2000
Set Conservation Goals	October 2000-January 2001
Compile/Analyze Data	November 2000-April 2001
Site Selection and Design	March-May 2001
Threats Assessment and Next Steps	May-June 2001
Draft Final Report	June-July 2001
Peer Review and Final Assessment	July-August 2001
Finalize Report	September 2001

Data Sources and Management

The Nature Conservancy's Colorado Field Office led data management for the SRM ecoregional plan, with support from the Conservancy's Western Resources Office and Freshwater Initiative, and the Colorado Natural Heritage Program (CNHP). The data management team created a Microsoft Access database for compiling, analyzing, and distributing data for the ecoregional assessment. Spatial data were managed and maps produced using ArcView 3.2 and Arc/Info, both ESRI geographic information system (GIS) software products.

Numerous data layers were obtained from a variety of sources for the project. Examples of basic data included transportation, hydrography, digital elevation models, ecoregional and political boundaries, land ownership, and geology. Biodiversity information layers included, but were not limited to, conservation target locations, vegetation coverage, and habitat models. Threat layers included, but were not limited to, city growth projections, locations of mines, dams and Superfund sites, land protection status, and fire condition.

The Colorado Natural Heritage Program, New Mexico Natural Heritage Program, and Wyoming Natural Diversity Data Base provided information on conservation target occurrence location, quality, and threat status. The team also used data collected during two experts workshops (see below), and from interviews with experts. Also, the Southern Rockies Ecosystem Project provided data from their recent assessment project (Shinneman et al. 2000). See Map 6a for Natural Heritage Program target occurrences within the SRM. A total of 4,968 occurrences were compiled and available for the SRM analysis; 2,972 occurrences were used in the SRM analysis (for fine-filter analyses).

The team obtained Gap Analysis Project (GAP) vegetation coverages of Colorado, New Mexico, and Wyoming to supplement the plant community occurrence data and provide the basis for the ecological system map (See Map 7) (Merrill et al. 1996, Schrupp et al. 2000, Thompson et al. 1996). The team reconciled differences in the three states' classifications. Staff from CNHP conducted brief ground-truthing of the systems map to verify the ecological systems. The ecological systems map was also refined at the experts workshops.

Experts Workshop

Two experts workshops were held: one in Breckenridge, Colorado on May 9-10, 2000, with over 86 participants, and one at the offices of the U.S. Forest Service, Southwestern Region, in Albuquerque, New Mexico on June 28, 2000, with 46 participants primarily from the southern end of the ecoregion. Another smaller meeting was held in August 2000, in Ft. Collins, Colorado with entomologists Dr. Paul Opler and Dr. Boris Kondratieff to obtain additional information for invertebrates. The goals of the experts workshops were to:

1. Review and refine the preliminary lists of conservation targets;
2. Identify and gather information for areas that contain populations/occurrences of the conservation targets, and obtain information about viability of the targets and threats to the conservation areas or targets;

3. Obtain expert opinion for use in developing conservation goals for the targeted species, communities, and ecological systems;
4. Identify gaps and inventory/research needs for conservation targets and geographical areas.

Participants were organized around the following taxonomic and/or ecological areas of expertise: amphibians and reptiles, aquatic systems/fish, birds, invertebrates, mammals, plants, and terrestrial communities/ecological systems.

The products of the workshops included the following:
1. Refined list of conservation targets;
2. Set of specific preliminary conservation areas with viable examples of target species and communities and key information regarding threats and viability;
3. List of data gaps for the ecoregion.

Following the workshops, the GIS manager and volunteers created the spatial attribute databases for further analysis by the team. The information included locations of species and communities as well as a comprehensive set of ancillary information for all data collected (e.g., the field forms). See Appendix 1 for list of participants who attended the workshops (maps and notes from these workshops are on file at The Nature Conservancy of Colorado). See Map 6b for expert workshop target occurrences.

Protected Areas Assessment

The protected areas assessment identified those lands that are designated and managed for maintenance of biological diversity or natural values—GAP Analysis Program Land Status Categories 1 and 2. These areas may include Nature Conservancy preserves, national parks, national wildlife refuges, wilderness areas, wilderness study areas, state parks and natural areas, research natural areas, and areas of critical environmental concern. The protected areas assessment identified the current status of protection of biodiversity in the ecoregion, and was used to design the portfolio of conservation areas, and will help with development of conservation strategies.

The team completed an assessment of the protected areas within the SRM with help from the land managers, the core team, other Conservancy staff, and others familiar with land management throughout the ecoregion. The team initially ranked each existing managed or protected area following the system described in *Designing a Geography of Hope* (2000), based on interviews with land managers at each organization or agency responsible for managing the land. Team members and other Conservancy field program and Natural Heritage staff reviewed and refined initial ranks. Information on the land management and protection for State Parks and State Wildlife Areas was especially difficult to obtain, so those rankings should be considered preliminary.

The conservation protection ranks are the categories used in and defined by the U.S.G.S. Handbook for Conducting GAP Analysis (available at http://www.gap.uidaho.edu/handbook/). The ranking system consists of four categories that relate to the strength of designation with respect to maintenance of biodiversity values (see Table 4). Category 1 areas are typically Congressionally designated areas that afford a high level of biodiversity protection, and that are managed to mimic natural processes as closely as possible (e.g., research natural areas). At the other end, Category 4 areas are those with no known protection, including lands with intensive human activity. A dichotomous key, written and used by GAP experts to categorize protected/managed areas, is available on the GAP website.

See Table 5 for a summary of total land area within GAP Analysis Program Land Status Categories, and Appendix 5 for details of the protected area assessment and results. Only 0.6% of the total ecoregion occurs in Category 1, 10.5% occurs in Category 2, 2.4% in Category 3, and 86.4% in Category 4. The vast majority of the ecoregion falls into Category 4. Approximately 11.1% of the ecoregion is protected within Category 1 and 2 areas defined by the GAP Analysis Program. See Map 8 for results of the protected areas analysis.

Table 4. Land Status Categories of the GAP Analysis Program.

GAP Category	Definition
Category 1	An area having permanent protection from conversion of natural land cover and a mandated management plan in operation to maintain a natural state within which disturbance events (of natural type, frequency, intensity, and legacy) are allowed to proceed without interference or are mimicked through management.
Category 2	An area having permanent protection from conversion of natural land cover and a mandated management plan in operation to maintain a primarily natural state, but which may receive uses or management practices that degrade the quality of existing natural communities, including suppression of natural disturbance.
Category 3	An area having permanent protection from conversion of natural land cover for the majority of the area, but subject to extractive uses of either a broad, low-intensity type (e.g., logging) or localized intense type (e.g., mining). It also confers protection to federally listed endangered and threatened species throughout the area.
Category 4	There are no known public or private institutional mandates or legally recognized easements or deed restrictions held by the managing entity to prevent conversion of natural habitat types to anthropogenic habitat types. The area generally allows conversion to unnatural land cover throughout.

Table 5. Total Land Area within GAP Analysis Program Land Status Categories.

GAP Land Status Category	Acres in Ecoregion	% of Ecoregion
Category 1	250,133	0.6%
Category 2	4,196,313	10.5%
Category 3	965,667	2.4%
Category 4	34,545,360	86.4%
Total	**39,957,472**	

CONSERVATION TARGETS

A key early step in the ecoregional assessment was to identify conservation targets to be the focus of planning efforts. Conservation targets were used to identify conservation areas across the ecoregion. While there were potentially an enormous number of conservation targets, it was important to select a subset that would effectively represent all biological diversity of the ecoregion. Box 2 includes the primary categories used to establish ecoregional conservation targets, as described in *Designing a Geography of Hope* (TNC 2000).

For practical purposes, we aimed to represent three levels of biological or ecological organization among potential conservation targets: *ecological systems*, *communities,* and *species.* Selecting targets from each of these levels provided an initial step towards representing all biodiversity.

As these categories indicate, we employed an ecosystem-based approach. This reflects a "coarse filter" hypothesis that the conservation of multiple, high-integrity examples of all ecological systems will support the viability of most native species. This approach required development and refinement of classifications for terrestrial and aquatic ecological systems. In developing these classifications, the team addressed the conceptual and spatial scales of the resulting ecological systems so that they will be most useful for conservation action (e.g., mapping, land management, monitoring).

Species that ecosystem-based approaches cannot reliably conserve require additional attention. Some of these species may be conserved as members of recurrent communities, or species assemblages (e.g., migratory bird stopovers, bat colonies), while others require individual attention (e.g., globally rare and imperiled, narrowly endemic, or wide-ranging species).

Technical team members drafted terrestrial and aquatic classifications and initial target lists using these criteria, then refined them through expert review. The team finalized the target lists after expert review via expert workshops (See Appendices 6-10).

In addition, species technical teams examined the need to establish a list of species that were not targeted, but will remain on a "watch list" for future declines (see Appendix 7). Subsequent analysis of the final portfolio is needed to evaluate the inclusion of viable occurrences or adequate habitat for these "watch list" species.

Box 2: Categories of Conservation Targets

Ecological Systems (146)
- Terrestrial Ecological Systems (39)
- Aquatic Ecological Systems (107)

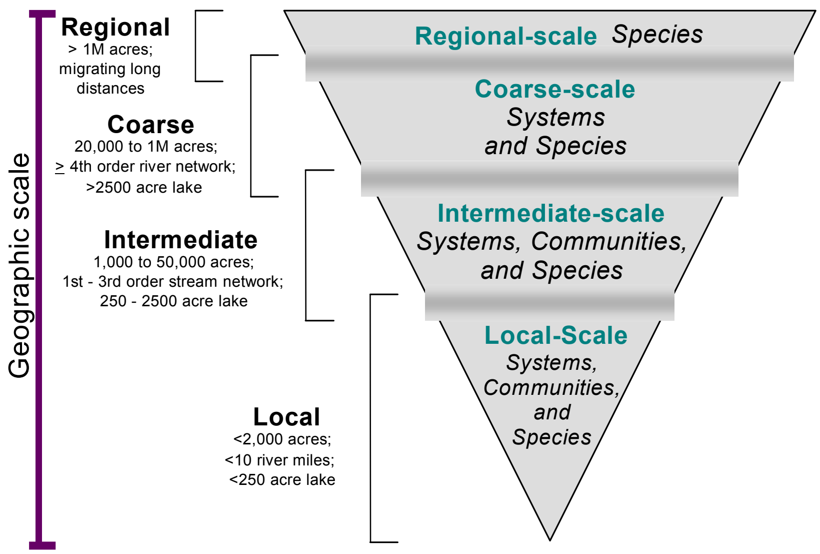
Rare Plant Communities (79)

Species (383)
- Imperiled species (G1-G2 ranked)
- Federally Listed Threatened or Endangered
- Species of Special Concern (G3-G5)
  - Declining Species
  - Endemic Species
  - Disjunct Species
  - Vulnerable Species
  - Focal Species: Wide-ranging

Total (608)

Once the target lists were established, additional descriptive information was gathered for each target. Characteristic spatial patterns for ecosystems and species habitat often reflect key ecosystem processes and important life-history traits. Each species, community, or ecological

Box 3: Categories Representing Geographic Scale of Conservation Targets. Areal ranges are approximate and overlapping (Poiani et al. 2000).



system type was evaluated according to its presumed spatial character, as it has occurred in recent centuries without significant human alteration. Four spatial scales were used— *local, intermediate, coarse,* and *regional*—with each scale corresponding to a characteristic range in area or stream length (acreage and river miles/stream order are estimates) (Poiani et al. 2000). The final target list for the ecoregion included representatives from all spatial scales. See Box 3.

Terrestrial Ecological Systems

Ecosystem-based conservation approaches require the development of ecological classifications. A classification provides a structure to state assumptions about the composition, structure, and key ecological processes at work.

Terrestrial and aquatic ecological systems are characterized by both biotic and abiotic components. Terrestrial ecological systems are groups of plant and animal communities that:

1. Occur together on the landscape resulting from similar ecological processes (e.g., fire, hydrology), underlying environmental features (e.g., landforms, soils) or environmental gradients (e.g., elevation, hydrologically-related zones); and
2. Form readily identifiable units that serve practical needs for mapping, land management, and monitoring.

The team incorporated all native terrestrial ecological systems in the ecoregion as conservation targets (see Table 6). See Appendix 8 for a full list of ecological systems and the rare plant associations included in each system. Examples of SRM ecological systems include Alpine Tundra Dry Meadow, Aspen Forests, and Montane Grasslands. Some ecological systems, such as Wet Meadow and Freshwater Marsh, occur across all elevation zones. Existing knowledge of characteristic spatial pattern (see Table 7 for definitions), environmental setting, and driving ecological processes for plant associations formed the basis for defining terrestrial ecological systems. The team used 411 documented plant communities from the National Vegetation Classification (Association for Biodiversity Information 2001) to organize and describe terrestrial ecological systems. While dominant vegetation is commonly used to name these systems, they represent an integration of vegetation, environment, and disturbance regimes. For example, the team distinguished between Montane Grasslands, which occur throughout the ecoregion in intermediate size patches of 10s to 100s of acres, and the South Park Montane Grassland, which occurs as a matrix-forming, or coarse-scale, grassland system. In South Park, Colorado, this inter-montane parkland historically supported landscape-scale fire regimes and a resultant grassland "matrix" that is distinct from other montane grasslands in terms of both plants and animals (Rondeau, personal communication).

Table 6. Terrestrial Ecological Systems: summary descriptive statistics and spatial representation in analysis.

Ecological System (39)	Spatial Pattern (see Table 7 for definitions)	Total # Plant Communities (# Rare Community Targets)	Minimum Size/Length of Occurrences (ha/km)	Estimated % Change in Extent Since 1850	Spatial Representation in Analysis
Alpine Zone					
Alpine Substrate/Ice Field	Large Patch	4 (0)	50	<10	polygon
Alpine Tundra Dry Meadow	Matrix	20 (2)	1,000	<10	polygon
Alpine Tundra Fell-Field	Small Patch	2 (0)	50	<10	polygon
Alpine Dwarf Shrubland	Large Patch	3 (0)	300	<10	polygon
Subalpine Zone					
Alpine/Subalpine Wet Meadow	Small Patch	27 (2)	10	<10	polygon
Bristlecone-Limber Pine Forest-Woodland	Large Patch	10 (2)	100	<10	polygon

Ecological System (39)	Spatial Pattern (see Table 7 for definitions)	Total # Plant Communities (# Rare Community Targets)	Minimum Size/Length of Occurrences (ha/km)	Estimated % Change in Extent Since 1850	Spatial Representation in Analysis
Dry-Mesic Spruce-Fir Forest	Matrix	11 (0)	10,000	<10	polygon
Moist-Mesic Spruce-Fir Forest	Matrix	8 (1)	10,000	<10	polygon
Upper Montane Zone					
Lodgepole Pine Forest	Matrix	6 (0)	10,000	<10	polygon
Aspen Forest	Matrix	20 (4)	10,000	<10	polygon
Moist-Mesic Montane Mixed Conifer Forest	Matrix	10 (0)	10,000	<10	polygon
Dry-Mesic Montane Mixed Conifer Forest	Matrix	6 (0)	10,000	<10	polygon
Montane Grassland	Large Patch	15 (8)	50	- 10	polygon
South Park Montane Grassland	Matrix	2 (2)	10,000	- 10	polygon
Mountain Sagebrush Shrubland	Matrix	17 (4)	10,000	- 10	polygon
Montane Fen	Small Patch	4 (3)	N/A	N/A	point
Upper Montane Riparian Woodland	Linear	21 (4)	2 km	Modeled	line
Subalpine-Montane Riparian Shrubland	Linear	53 (0)	1 km	Modeled	line
Lower Montane-Foothills Zone					
Douglas-fir-Ponderosa Pine Forest	Matrix	20 (0)	10,000	+ 20	polygon
Montane / Foothill Cliff and Canyon	Small Patch	6 (0)	30	- 10	polygon
Ponderosa Pine Woodland	Large Patch	9 (1)	300	- 20	polygon

Ecological System (39)	Spatial Pattern (see Table 7 for definitions)	Total # Plant Communities (# Rare Community Targets)	Minimum Size/Length of Occurrences (ha/km)	Estimated % Change in Extent Since 1850	Spatial Representation in Analysis
Ponderosa Pine Savanna	Large Patch	2 (1)	100	N/A	point
Pinyon – Juniper Woodland	Matrix	14 (2)	10,000	+ 10	polygon
Juniper Savanna	Large Patch	14 (6)	30	+ 10	polygon
Lower Montane-Foothills Shrubland	Large Patch	15 (10)	300	- 10	polygon
Gambel Oak-Serviceberry Shrubland	Large Patch	10 (3)	300	- 10	polygon
Sagebrush Shrub Steppe	Large Patch	4 (1)	100	- 10	polygon
Winterfat Shrub Steppe	Large Patch	3 (0)	100	- 10	polygon
San Luis Valley Winterfat Shrub Steppe	Matrix	2 (0)	10,000	- 20	polygon
Inter-Mountain / Foothill Grassland	Large Patch	16 (8)	300	- 20	polygon
Active Sand Dune and Swale Complex	Large Patch	4 (2)	3,000	<10	polygon
North Park Sand Dune Complex	Large Patch	2 (0)	50	<10	polygon
Stabilized Sand Dune	Large Patch	4 (2)	3,000	<10	polygon
Lower Montane Riparian Woodland	Linear	24 (6)	2 km	Modeled	line
Foothills Riparian Woodland/Shrubland	Linear	15 (5)	1 km	Modeled	line
Greasewood Flats and Ephemeral Meadow	Large Patch	14 (2)	3,000	- 10	polygon
Cross-Zone Systems					
Wet Meadow	Small Patch	15 (0)	N/A	N/A	point

Ecological System (39)	Spatial Pattern (see Table 7 for definitions)	Total # Plant Communities (# Rare Community Targets)	Minimum Size/Length of Occurrences (ha/km)	Estimated % Change in Extent Since 1850	Spatial Representation in Analysis
Freshwater Marsh	Small Patch	16 (0)	N/A	N/A	point
Terrestrial Cave	Small Patch	1 (0)	N/A	N/A	point

Table 7. Spatial Pattern Used to Describe Ecological Systems and Plant Communities (from Anderson et al. 1999)

Spatial Pattern	Definition
Matrix	Communities or systems that form extensive and contiguous cover, occur on the most extensive landforms, and typically have wide ecological tolerances. Typical occurrences range in size from 2,000 to 500,000 ha.
Large Patch	Communities or systems that form large areas of interrupted cover. Typical occurrences range from 50-2,000 ha.
Small patch	Communities or systems that form small, discrete areas of vegetation cover typically limited in distribution by localized environmental features. Typical occurrences range from 1-50 ha.
Linear	Communities or systems that occur as linear strips and are often ecotonal between terrestrial and aquatic systems.

This classification provided the basis for biophysical modeling (see Biophysical Modeling section below) and for integrating all mapped information on the occurrence of terrestrial ecological systems (see Map 7). For example, decisions for comparing vegetation types shown on various maps, labeling Natural Heritage community occurrences, and gathering new expert-derived occurrences all used this common structure. The classification also provided the structure for establishing which rare plant communities would be targeted individually (see Rare or Imperiled Plant Communities section below).

In terms of relative distribution of major terrestrial ecological systems within the SRM determined through biophysical modeling (systems were grouped by major species), spruce-fir forests have the highest percent land area (14%) within the ecoregion, followed by ponderosa pine woodlands (12%), pinyon-juniper woodlands (10%), aspen forests (8%), mountain sagebrush shrublands (8%), lodgepole pine forests (7%) and intermontane foothill grasslands (5%). Other systems have less than 5% cover within the ecoregion.

Rare or Imperiled Plant Communities

Plant communities have similar floristic composition, vegetative structure, and habitat conditions. In the SRM, terrestrial plant communities are defined using the finest level of vegetation classification, the "plant association" level of the U.S. National Vegetation

Classification—a taxonomic, hierarchical, and geographically comprehensive classification developed by The Nature Conservancy and the Natural Heritage Network (Grossman et al. 1998). Even though communities are classified based upon dominant species, it is assumed that conservation of these communities includes both a biotic component and the abiotic or environmental structure and function that support the biota. Terrestrial ecological plant communities were used to describe terrestrial ecological systems (see Appendix 8).

Out of the 411 total plant communities in the SRM, roughly 200 plant communities are ranked G1-G3 by the Natural Heritage Network. Of the G1-G3 communities, 79 were targeted individually due to their rarity or imperilment (see Appendix 8). Given that occurrences of these communities represent truly rare environmental settings, they were unlikely to be represented adequately in an assessment of terrestrial ecological systems. The team did not specifically target the other G3-G5 communities, based on the assumption that the coarse-filter ecological systems approach would capture them.

Freshwater Aquatic Ecological Systems

Aquatic ecological systems describe the patterns or sequences of stream types across whole drainages. These units also describe the influence of physiography on the distribution of aquatic organisms/communities at a coarse scale.

The team defined 107 aquatic system types—33 general types differentiated by EDU—for the SRM. The factors that distinguish these system types include: Ecological Drainage Unit (EDU), elevation, gradient, geology of the contributing area, size, and the presence of lakes (see Table 8 for the variable classes, Appendix 9 for list of aquatic ecological systems, and Map 9 for distribution of aquatic ecological systems). The most common physical types were montane, headwater and creek systems in sedimentary bedrock and montane creek systems whose headwaters are in the alpine zone in granitic bedrock. For example, the montane-moderate/low gradient-headwater, creek-shale/sandstone limestone system encompassed 13% of the ecoregion, and is common in all EDUs except the Pecos, and the alpine/montane-moderate/low gradient-headwater/creek-granite/volcanic system encompassed 12% of the ecoregion, and is common in five EDUs.

The systems were delineated in ArcView based on observed patterns of fine-scale reach-level attributes. The team assigned values to individual stream reaches for each of the key driving variables (size, geology, gradient and elevation) and used this information to group streams together as systems. The team typically looked for sets of stream reaches in the same geology that showed repeating patterns in terms of their sequence. For example, we grouped all the headwater and small river streams, draining to the east out of the Rocky Mountains on granitic bedrock into one system type.

Table 8. Aquatic Ecological Systems Classification Framework.

Factor	Class Description	Class Value	% Stream Length in this Class
Elevation	Alpine only	>9,000 ft	8
	Alpine to montane	>6,000 ft	37
	Montane only	Between 6,000 and 9,000 ft	45
	Montane and foothills	Below 6,000 ft	10
Gradient	Steep and very steep only	>4%	18
	Very steep to low	Mixed gradients	82
Size	Headwaters and creeks	Link* 1-50	70
	Small river	Link 50-450	25
	Large river	Link > 450	5
Geology	Granite/volcanic	1	43
	Shale/sandstone/limestone	2	40
	Alluvium (wide channels and basins)	3	17
Connectivity	Lakes in headwaters	1	8

* Link is the number of first order streams upstream of a point and estimates stream size.

This classification formed the basis for selecting aquatic priorities beyond areas identified to protect target species. Had the team relied only on the species targets to set aquatic priorities, selection of conservation areas would have been biased toward the highest elevation, small streams supporting native trout, as there are more occurrences of these fishes in the SRM than other species. In addition to providing a tool to capture diversity above the species level, these ecological units allowed the team to predict the locations of all aquatic ecological system types, providing a means of representing key environmental gradients across the ecoregion. Thus, this classification allowed us to represent all of the aquatic ecosystem types within each EDU in the conservation portfolio. Because this classification was largely based on abiotic factors, one important follow-up step to the ecoregional assessment is to field verify the aquatic ecological systems.

Species

A list of the criteria used to select species targets for the SRM is below. See Appendix 6 for list of species targets and explanation of G ranks, and Table 9 for a summary of species targets.

- **Imperiled species** are species (or subspecies) that have a global rank of G1-G2 (T1-T2), meaning that they are recognized as imperiled or critically imperiled throughout their ranges by Natural Heritage Programs/Conservation Data Centers. Regularly reviewed and updated by experts, these ranks take into account number of occurrences, quality and condition of occurrences, population size, range of distribution, threats and protection status.
- **Endangered and threatened species** are federally listed or proposed for listing under the Endangered Species Act (also includes proposed and petitioned species).
- **Species of Special Concern** are species or subspecies ranked G3-G5 by Natural Heritage Programs/Conservation Data Centers, but fit one or more of the following criteria:

- *Declining species:* Declining species exhibit significant, long-term declines in habitat/and or numbers, are subject to a high degree of threat, or may have unique habitat or behavioral requirements that expose them to great risk. Determination of which species were declining was based on Partners in Flight ranks, Breeding Bird Survey trends, expert opinion, and data from the Natural Heritage Program Network.
- *Endemic species:* Endemic species are restricted to the ecoregion (or a small geographic area within an ecoregion), depending entirely on the ecoregion for survival, and are therefore may be more vulnerable than species with a broader distribution.
- *Disjunct species*: Disjunct species have populations that are geographically isolated from other populations.
- *Peripheral species*: Species that are more widely distributed in other ecoregions but have populations in the SRM at the edge of their geographical range.
- *Vulnerable species:* Vulnerable species are usually abundant and may or may not be declining, but some aspect of their life history makes them especially vulnerable (e.g., migratory concentration or rare/endemic habitat). For example, sandhill cranes are vulnerable because a large percentage of the entire population aggregates during migration along a portion of the Platte River in Nebraska (outside the ecoregion).
- *Focal species*: Focal species have spatial, compositional, and functional requirements that may encompass those of other species in the region and may help address the functionality of ecological systems. Focal species may not always be captured in the portfolio through the coarse filter. Several types of focal species can be considered, including wide-ranging and keystone species. Wide-ranging species are regional-scale species that depend on vast areas. These species often include top-level predators (e.g., wolves, wolverine, grizzly bear, pikeminnow), wide-ranging herbivores (e.g., elk), and wide-ranging omnivores (e.g., black bear) but also migratory mammals, anadromous fish, birds, bats and some insects. Wide-ranging species can be especially useful in examining the need for linkages among conservation areas and creating a functional network of areas.
- *Species aggregations: These* are unique, irreplaceable examples for the species that use them, or are critical to the conservation of a certain species or suite of species.
  - *Globally significant examples of species aggregations* (i.e., critical migratory stopover sites that contain significant numbers of migratory individuals of many species).
  - *Major groups of species share common ecological processes and patterns*, and/or have similar conservation requirements and threats (e.g., freshwater mussels, forest-interior birds).

Table 9. Summary of Species Targets in the Southern Rocky Mountains Ecoregion (listed by taxon group).

Taxon Group	Total Number
Amphibians/Reptiles	8
Birds	23
Fish	9
Invertebrates (including mollusks)	132
Mammals (including 6 selected wide-ranging species)	34
Plants	177
Total	**383**

Taxon Groups

A total of 383 species and subspecies that met the criteria of being globally imperiled, federally listed, declining, endemic, disjunct, vulnerable, or wide-ranging, were selected as conservation targets for the SRM (Table 9). A complete list of all species conservation targets with scientific names and ranks is in Appendix 6. See Appendix 19 for brief descriptions of species targets. Another 68 species considered for inclusion on the target list were assigned to a "watch list" (see Appendix 7); these species are of concern but the team assumed they would be covered through the coarse-filter analysis (e.g., ecological systems). These watch list species need to be addressed through conservation planning for functional landscapes, networks of areas, and conservation areas identified in the SRM portfolio.

Amphibians/Reptiles

The amphibian and reptile technical team incorporated all globally imperiled species and subspecies known to occur in the SRM as conservation targets. In addition, several species were included that are known to have disjunct populations (e.g., Great Plains toad and wood frog), limited populations, or widespread populations that are known or believed to be in decline (e.g., northern leopard frog). The short-horned lizard warrants additional explanation, as this species occurs broadly along the edges of the ecoregion. A single large population found in the San Luis Valley of Colorado and New Mexico is of particular conservation interest as a population of "dwarf" individuals, a phenomenon also occurring in the San Luis Valley population of the Great Plains toad (Hammerson 1999). The team concluded that eight species warranted target status. Extensive review suggested that other species would be captured adequately through the coarse filter approach (ecological systems) and did not need to be specifically targeted.

Birds

The bird technical team incorporated all globally imperiled bird species and subspecies as targets (e.g., southwestern willow flycatcher, and mountain plover). The bird team also selected the two endemic species known from the ecoregion, the brown-capped rosy finch and Gunnison sage grouse, as targets. Species federally listed as endangered or threatened were also included (e.g., Mexican spotted owl). The sandhill crane was considered for two reasons: 1) limited, but important breeding populations in the northern part of the ecoregion, and 2) very limited areas of staging during migration. After reviewing an extensive list of species, the team chose 23 birds as conservation targets. The final list of species resulted from examination of Natural Heritage ranks, Partners in Flight scores, Colorado Division of Wildlife scores (COVERS), expert opinion, and other sources (e.g., Kingery 1998) that indicated species were exhibiting long-term declines or otherwise believed to be vulnerable. Thirteen species considered for inclusion on the target list were assigned to the "watch-list" (see Appendix 7). Twelve species were considered to be worthy of including as indicators to measure conservation success in the SRM. Conservation of these species should be addressed during site conservation planning (See Appendix 7).

Fish
The fish technical team incorporated all globally imperiled species and subspecies known to occur in the SRM as targets (e.g., the Colorado River cutthroat trout, Colorado pikeminnow, and greenback cutthroat trout). Several species considered vulnerable (G3 or T3) were also selected as conservation targets. Several of these species are already federally listed as threatened or endangered by the USFWS or considered sensitive species by BLM and the USFS. The team selected nine fish as conservation targets (Appendix 6).

Invertebrates
The invertebrate technical team focused its attention on species that are of global concern, i.e., ranked as globally imperiled by the natural heritage programs (G1-G2 or T1-T2), listed as threatened or endangered by the U.S. Fish and Wildlife Service, endemic to the SRM, peripheral, or disjunct. Several invertebrate groups are well known (e.g., dragonflies, damselflies, butterflies, skippers, and tiger beetles) and there is a relatively high level of confidence in the target selection for those groups. Other groups (e.g., spiders and aquatic snails) are generally poorly known. The team determined that the coarse filter approach would be necessary to address most invertebrate species until better data become available. The team identified 132 invertebrates, including 11 mollusks, as conservation targets (Appendix 6).

Mammals
The mammal technical team incorporated all globally imperiled species and subspecies known to occur in the SRM as targets (e.g., the *rubidus* subspecies of Botta's pocket gopher). In addition, those taxa listed by the U.S. Fish and Wildlife Service as endangered or threatened were also included (e.g., Preble's meadow jumping mouse). The team also included many endemic or vulnerable subspecies, especially of small mammals (e.g., the *sanluisi* subspecies of the silky pocket mouse). Several species were identified as targets due to known declines or significant threats, in particular the Gunnison's prairie dog. The white-tailed prairie dog was selected as a conservation target as a peripheral species. Both species of prairie dogs were also considered for their focal species values. The team chose 32 mammals as conservation targets (see Appendix 6). Six mammals were assigned to the wide-ranging category and are discussed below.

A subset of mammals, termed wide-ranging mammals for the purposes of this report, includes species that range broadly in order to meet seasonal needs for food, territory, etc. Many of these species use a number of vegetation types or ecological systems, often moving among them seasonally. For example, the wolverine exhibits low densities and large home ranges, moving from higher to lower elevation seasonally. Movements occur over 10's or 100's of miles. Such species are best considered at greater than landscape scales. The team selected six species from among the wide-ranging mammals considered as conservation targets: bison, grizzly bear, gray wolf, lynx, wolverine, and Wyoming populations of bighorn sheep (selected due to their declining status). Note that several of the identified wide-ranging mammals are not currently found in the ecoregion in the wild (e.g., gray wolf, grizzly bear, and bison). The team considered other wide-ranging mammals: black bear, mountain lion, Rocky Mountain elk, mule deer, bobcat, and bighorn sheep (in CO and NM). In each case the team assumed that the portfolio assemblage of ecological systems would adequately capture these and hence did not select them as conservation targets. In general these species are adaptable, relatively numerous, and are often considered game species. Even though these species may demonstrate local declines, their populations are believed to be secure in the ecoregion since they are generally managed by the fish and game agencies (with the exception of the bobcat). Migratory birds and bats are considered wide-ranging species during the migrating season, but the team decided that the question of migration was best addressed through a process that identified networks of conservation areas among ecoregions, a step to be considered after all ecoregional plans are completed. See Appendix 20 for more detail regarding the natural history and suitable habitat of the targeted wide-ranging mammals.

Plants

The plant technical team included all globally imperiled species and subspecies (G1-G2 and T1-T2) known to occur in the SRM as targets. The team only included globally secure (G4 or G5) species if they are endemic to the ecoregion or occur as significant disjunct populations. The team considered species to be endemic to the ecoregion only if they are strictly endemic to the SRM (and not known from any locations outside the SRM). All G3 ranked plant species were reviewed on a case by case basis to determine if they should be included on the target list. The team decided not to include 35 (ranked G3 and endemic) species on the target list because they are considered sufficiently abundant and secure in the ecoregion. The team felt that these species would be captured in the portfolio via the coarse filter approach. Follow-up research is needed to determine the accuracy of this assumption (see Appendix 7 for list of watch list species). The team chose 177 plants as conservation targets (Appendix 6).

CONSERVATION GOALS

Conservation goals represent a working hypothesis about the number and distribution of our conservation targets that would secure their viability. Conservation goals allow us to evaluate success of conservation efforts for targeted species, communities, and ecological systems. They provide the quantitative basis for identifying and prioritizing areas that contribute to the portfolio of potential conservation areas.

Establishing conservation goals is among the most difficult scientific questions in biodiversity conservation: How much is enough? How many discrete populations and in what spatial distribution are needed for long-term viability? These questions cannot be answered by theory, but require an empirical target-by target approach and a commitment to monitoring and continual re-evaluation over the long-term (Noss 1996, Soule & Sanjayan 1998). For example, a given plant species may be found with certain uncommon soils. Natural isolation may have led to genetic variation that resulted in this unique species occurring in three discrete populations. The survival of these three populations over several thousand years certainly might allow us to conclude that the species remains viable with this small number of populations. We would not, however, want to extrapolate the same reasoning to another once-common plant species that has declined to three populations due to habitat alteration. The latter three populations may reflect a down-sloping trend, and the species could be rapidly facing extinction. Rarity alone makes both of these species highly vulnerable to loss over time. As we learn more about the distribution and status of each conservation target over time, we will need to re-assess and adjust our conservation goals.

This example is intended to illustrate of the complexity of establishing conservation goals. Unfortunately, in addition to this complexity, knowledge of the ecology for each of our conservation targets is typically quite limited. We can wait until adequate information is in hand—risking substantial biodiversity loss—or we can use the best existing knowledge to develop some empirical generalizations to serve as guiding principles.

Following Conservancy standards, we defined a viable species or population as one that has a high probability of continued existence in a state that maintains its vigor and potential for evolutionary adaptation over a specified period of time. We would like to have a 95% certainty of survival over 100 years or ten generations. We would also like to ensure that the species or population has sufficient genetic variation to adapt by natural selection to changing environmental conditions within a predicted range of frequency and amplitude of disturbance and change. This quantitative statement, although nearly impossible to calculate with existing data, is useful in that it specifies a level of risk we are willing to accept, and provides some initial focus towards creating a working hypothesis that could be tested. The team therefore stated conservation goals with these quantitative measures in mind.

As a general rule, conservation of multiple examples of each target, stratified across its geographic range, is necessary to represent the variability/integrity of the target and its environment, and to provide some level of replication. Replication is needed to ensure persistence in the face of environmental stochasticity and likely effects of climate change. It is also required to allow for comparative study—to better understand our targets—and to detect change reliably.

As the team developed and refined conservation goals, we made assumptions about the expected land use that occurs in the landscape *outside* of the conservation areas. To the extent that we can identify ecosystem and species targets that are relatively more vulnerable to current and future land uses, we can anticipate an increased probability of future losses. It may then be prudent to build a greater degree of replication into goals for affected targets. Although difficult to generalize, targets with limited distributions, especially those found in historically altered, low-elevation ecosystems, tend to be more vulnerable than other conservation targets in the Southern Rocky Mountains ecoregion.

Conservation Goals for Ecological Systems/Communities and Species

While the concept of viability applies to all targets, in practice we use several closely related, though distinct, groups of targets. It is important to distinguish *species* targets from *community* and *ecosystem* targets in terms of conservation strategies. Species-based strategies appropriately emphasize recovery and evolutionary adaptation of individual species. In addition to species viability, community and ecosystem-based strategies emphasize the conservation of ecosystem services (e.g., air, water, nutrient cycling, etc.), perhaps better characterized as *ecological integrity* at an ecoregional scale (Noss 2000). These differences may result in different approaches for setting conservation goals. While conservation goals for species emphasize genetic fitness and the functional roles of species in ecosystems, goals for communities and ecosystems focus more on representation of ecological variability and environmental gradients. The following discussion is therefore organized by these target categories.

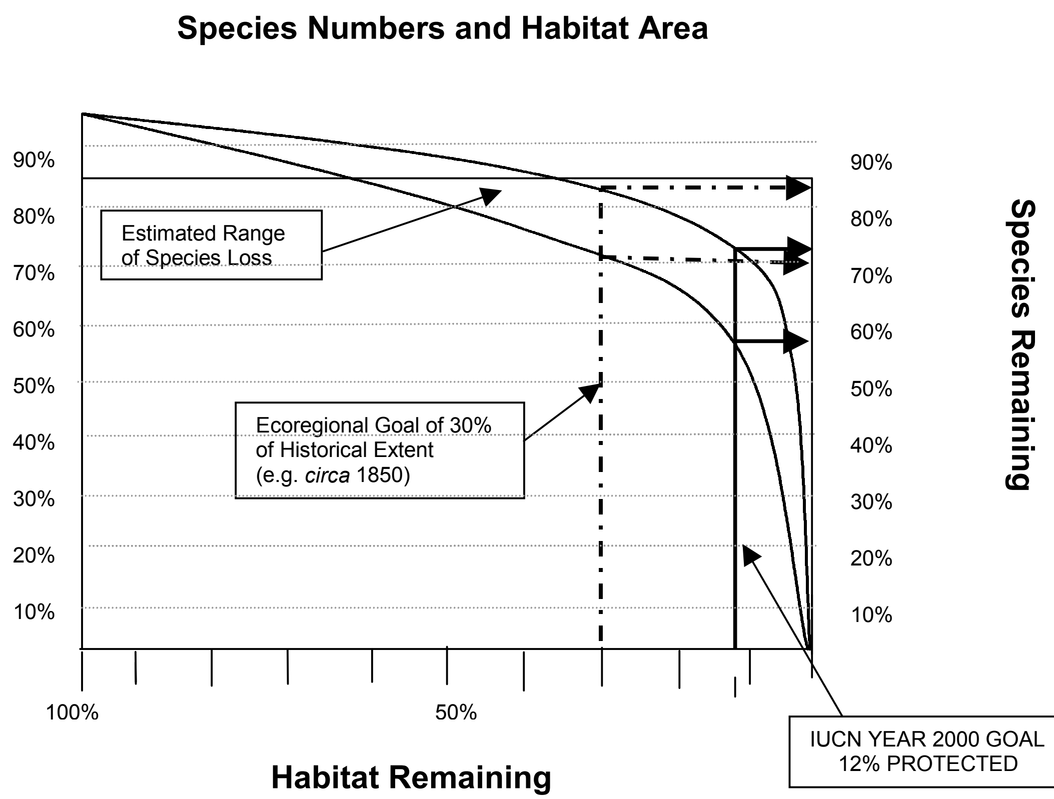
<u>Ecological Systems and Communities: Coarse Filter Approach</u>
The team considered the spatial pattern and distribution of ecological systems relative to the ecoregion (Anderson et al. 1999). Conservation goals were expressed in different forms, depending on the typical spatial pattern of the target occurrences. See Table 10 for a summary of conservation goals for both terrestrial and freshwater aquatic systems (see Appendix 14 for more detail). For matrix-forming, large-patch, and linear ecological systems, we expressed conservation goals as a percentage of estimated historic extent (*circa* 1850), while small-patch types were expressed as numbers of occurrences. All goals were stratified across the ecoregion, either by sections (for terrestrial targets) or ecological drainage units (for aquatic targets).

Table 10. Conservation Goals for Terrestrial and Aquatic Ecological Systems in the Southern Rocky Mountains Ecoregion.

Distribution Relative to the Ecoregion	Conservation Goal		
	Matrix Forming, Large Patch, and Linear	Small Patch	
	Goal per Section/Ecological Drainage Unit	Total # of Occurrences	Goal per Section/Ecological Drainage Unit
Endemic	Minimum of 30% of historic distribution (proportionally representing major gradients as expressed with Ecological Land Unit & aquatic macrohabitat modeling)	25	2
Limited		15	2
Widespread		10	2
Peripheral		3	2

In the context of identifying a portfolio of conservation areas, expressing goals as an areal extent had several advantages. Matrix-forming systems dominate the landscapes of the ecoregion. Areal measures commonly have been applied to portfolio design goals at national scales using island biogeography theory (MacArthur and Wilson 1967, Wilcox 1980) and working hypotheses on the role of species diversity in ecosystem function (e.g., see Hart et al. 2001). A well-established model relationship exists between habitat area and the number of species that an area can support (e.g., Wilcox 1980). Loss of habitat tends, over time, to result in the loss of species within an approximate range. This relationship formed the basis for international conservation goals (12% of country area) set by the World Conservation Union (IUCN) for member countries (WCED 1987). However, one could argue that the goals set by IUCN were far too low. For instance, it is estimated that with an 88% decrease in habitat extent (e.g., conservation goal = 12%), one could expect a decrease over time of 25-45% of species supported by the habitat (Wilcox 1980). This idea is graphically represented below as adapted from Cincotta and Engleman (2000) (Box 4). Regardless of future land use outside of conservation areas, the species/area relationship suggests that our ecoregional goals generally should be set above 12%, where ecological diversity remains relatively intact or restorable.

Box 4: Estimated Species Loss with % Area of Habitat Loss over Time (modified from Dobson 1996).



To establish initial objectives for ecological systems, the team coupled inferences from this relationship with the fact that several hundred of the most vulnerable species and communities had been targeted individually. The team also considered the likelihood of intensive development occurring on less disturbed lands remaining outside of conservation areas, and then selected an initial goal of 30% of historic extent for most ecological systems in the ecoregion.

Areal estimates were placed in historic context by expressing the desired extent as a percentage of estimated area *circa* 1850, the time immediately prior to widespread European-American settlement in the SRM. Ecosystems are dynamic and change at varying rates, with short-term cycles and long-term trajectories. In many places, however, human land use has abruptly altered the cycles and trajectories and has had an obvious impact on native biodiversity (Wilson 1992). Our first task is to understand natural dynamics, and then to evaluate human alterations and mitigate their effects. Although water diversion and hunting historically supported Native American cultures, most rapid and widespread change to the upland matrix of the SRM has been a result of improper grazing, alterations in the fire cycle, and introduction of non-native plants (Veblen and Lorenz 1991). While 1850 marks the approximate beginning of the most extensive and rapid human/technology-driven changes to SRM ecosystems, it is recent enough to reflect vegetation patterns under modern climatic conditions and therefore provides a useful and important reference point.

The potential extent for linear aquatic and riparian systems was modeled, thus providing a direct estimate of historic extent. For all other terrestrial systems, percent change for each ecological system was estimated by 10% intervals using current land use/land cover data, as well as specific studies (e.g., Veblen and Lorenz 1991; Miller and Wigand 1994; West 1999; Kaufmann et al. in press). For example, we estimated 10% loss of mountain sagebrush shrubland extent, a 20% loss of ponderosa pine woodland (conversion to Douglas-fir-ponderosa pine forest), and a 10% increase in pinyon-juniper woodland, since 1850. The team then added (or subtracted) area from the current mapped extent to approximate extent *circa* 1850. The team used current extent of terrestrial systems where change was estimated to be less than 10%.

In addition to setting a goal for areal extent, the team used two approaches to represent proportionally all large-patch, linear, and matrix-forming systems across all major physical gradients. First, all systems were represented in each of the ecoregional sections or ecological drainage units of their natural distribution. Second, the team programmed the site selection software (see Portfolio Design Methods section) to apply percent goals to vegetation/ecological land unit combinations and aquatic system/macrohabitat combinations. This ensured that the major physical gradients of each system would be represented in the portfolio in proportion to their modeled occurrence for the ecoregion as a whole.

As noted above, conservation goals for the ecological systems that exhibit small-patch and linear spatial patterns are expressed as a number of known occurrences. These goals follow similar assumptions and numerical estimates described by Anderson et al. (1999). To capture a system's variability, goals included representation among the sections/EDUs in which it naturally occurs.

<u>Species</u>

There is little empirical research that addresses conservation goals of species, though minimum viable population theory, metapopulation theory, and population viability analyses (PVA) offer some insights into this issue (Morris et al. 1999). In general, experience with PVA suggests that we need to conserve multiple examples of larger populations, and in some cases, a combination of core interconnected populations along with outlying unconnected populations. The relative emphasis on interconnected or isolated populations may vary depending on the species, life history characteristics, vagility, and population size. Population viability can be assessed using information on: 1) the quality of each population; 2) the correlation of the fates of separate populations; and 3) the degree of movement between each pair of populations. For example, with species that typically occur in small isolated habitats, such as some rare plants, protecting additional, healthy, though naturally isolated populations should significantly increase the probability of long-term survival of the species. Conversely, conserving a few additional, low-quality occurrences of species with high degrees of movement between sub-populations may contribute relatively little to species survival.

Unfortunately, in most instances we have too little information on population quality, correlated fates (i.e., the degree to which the viability of one population is correlated with the viability of other populations), or population movements to establish more rigorous species-specific goals. We are left to establish initial conservation objectives for our target species, and over time to gather appropriate data for future refinements.

In order to establish initial goals, the team used the target's conservation status and distribution relative to the ecoregion as primary factors. We assumed that species targets with imperiled conservation status (G1/T1 and G2/T2) warrant the conservation of all potentially viable occurrences. Future inventory and research focused on these targets is needed to establish more suitable goals. In a few instances, the team used published recovery plans to establish species-specific conservation goals. For all species targets, replicated examples are required throughout the SRM, and in most cases, within each ecoregional section where they naturally occur. Goals for aquatic species were similarly stratified using Ecological Drainage Units (EDUs). The relative quality or health of individual occurrences was also used to select occurrences (see Viability/Integrity section). Table 11 summarizes conservation goals for species targets in the SRM (see Table 12 for definitions of target distribution categories). The team customized conservation goals for selected species based on available expert knowledge about the distribution of the species. Additional analysis of population viability will be done as dynamic models become available for testing. See Appendix 14 for more details.

Table 11. Conservation Goals for Species Targets in the SRM Ecoregion.

Conservation Targets	Conservation Goal	Conservation Goal by Section/EDU (for Geographic Stratification)
G1-G2/T1-T2	All viable and restorable occurrences up to 25	All occurrences per section/EDU
Endemic Distribution G30-G5/T3-T5	At least 20 viable occurrences	At least 3 per section/EDU
Limited Distribution	At least 20 viable occurrences	At least 3 per section/EDU
Disjunct Distribution	At least 15 viable occurrences	At least 3 per section/EDU
Widespread Distribution	At least 10 viable occurrences	At least 2 per section/EDU
Peripheral Distribution	At least 5 viable occurrences	At least 2 per section/EDU
Regional-Wide-ranging Species	At least 1 viable population Case by case evaluation	Initial focus on core habitat and landscape linkages (one population for the ecoregion)

Table 12. Definitions of Target Distribution Categories.

Category	Distribution within Ecoregion
Endemic	>90% (except 100% for plants)
Limited	50-90%, typically global distribution is limited to 2-3 ecoregions
Widespread	10-50% (and > 3 ecoregions)
Disjunct	Distribution within ecoregion likely represents significant genetic differentiation from populations within the main range due to historic isolation; roughly >2 ecoregions separate this ecoregions target distribution from the main part of it's range.
Peripheral	<10%

These goals reflect theoretical work applied to species viability (e.g., Quinn and Hastings 1987) as well as the experience of the Natural Heritage Network in ranking the conservation status of each target. In general, a given target is ranked G3 by the Natural Heritage Network when it is known from 20 – 100 high-quality examples across its known distribution (Stein et al. 2000). A G3 rank signifies that, while the target remains quite rare, it is often considerably less imperiled, due to its rarity and apparent threat, than those types ranked G1-G2. This range-wide criterion was used to establish a minimum number for targets considered endemic to the SRM ecoregion. In these cases, if at least 25 examples are included in potential conservation areas, we assume that the biodiversity that they represent is likely to be retained within the ecoregion over the next 100 years. Of course there are instances, such as substrate-specific endemic plant species, that historically maintained viability with fewer than 25 populations. These species included: Pikes Peak spring parsley (*Oreoxis humilis),* frosty bladderpod *(Lesquerella pruinosa*), skiff milkvetch *(Astragaglus microcymbus),* Osterhout's milkvetch *(Astragalus osterhoutii*), North Park phacelia *(Phacelia formosula),* Brandegee wild buckwheat *(Eriogonum brandegei),* Degener beardtongue *(Penstemon degeneri),* Penland penstemon *(Penstemon penlandii)*, and Royal Gorge stickleaf (*Mentzelia densa)*. Numerical goals for the SRM decrease as the target's distribution extends into other ecoregions, where these targets should also be conserved.

Regional-scale species present another set of challenges for establishing conservation goals. For many wide-ranging mammals and birds, the Bailey (USFS) ecoregion-based planning unit may be an inappropriate scale of analysis, as these species may inhabit or traverse several ecoregions. Given the high degree of uncertainty with these targets, initial emphasis was placed on identifying core habitat and landscape linkages for these targets that are complementary to other target occurrences. The conservation goal for the six wide-ranging mammals in the SRM was at least one viable population, which was provided as a placeholder until further information is available. By a fortunate coincidence, in the SRM the pattern of land ownership fosters many landscape linkages. Simulation models may be used in the future to further evaluate the portfolio with regards to regional scale species viability (Carroll, personal communication).

BIOPHYSICAL MODELING

A goal of this ecoregional conservation assessment was to design an interconnected network of landscapes and waterscapes that represent all major environmental gradients. This approach aids in conserving ecological processes and species habitats within their natural range of variability. By conserving environmental variability and gradients, we provide a buffer against a changing environment, either through changes in climate, or through other agents. When evaluating an ecoregional portfolio, we need to ask if this set of conservation areas represent the ecoregion as a whole. The team used several biophysical models of the SRM ecoregion as tools to represent the natural variability of SRM terrestrial and aquatic ecological systems. These models allowed the team to better evaluate and represent environmental gradients throughout a network of conservation areas.

Terrestrial Ecological Land Units

A variety of factors, such as insulation, temperature, soil moisture, and nutrients, are considered driving abiotic variables influencing vegetation patterns. A model depicting these variables (or indirect measures) can then be combined with a vegetation map to characterize and assess biophysical variation in terrestrial ecological systems. Given available spatial data on elevation, landform, and substrate characteristics, the team mapped terrestrial ecological land units (ELUs) for the ecoregion. ELUs are mapping units used in large-scale conservation planning projects that are defined by two or more environmental variables such as elevation, geological types, and landform. Variables used to develop ELUs were derived from documented knowledge of driving ecological factors within the ecoregion (e.g., Weaver 1970, DeVelice et al. 1986, Kaufman et al. 1992, Dick-Peddie 1993, Peet 2000). Appendix 11 provides a full description of the process used for developing these units.

The team produced a comprehensive vegetation map (Map 7) for the SRM by combining existing data from the GAP Analysis programs of Wyoming, Colorado, and New Mexico (Merrill et al. 1996, Schrupp et al. 2000, Thompson et al. 1996). Map classes were reconciled across state borders and re-coded appropriately to represent terrestrial ecological systems for the SRM. The refined vegetation map was then overlaid on the ELUs across the entire ecoregion. Several ecological systems naturally occur as small patches and could not be depicted accurately on the vegetation map, because systems were represented by Heritage and expert-derived data. With additional smoothing that eliminated minor combinations (<1 % of total the system's vegetative extent), a total of 410 vegetation/ ELU combinations remained as the tool to represent variability within the dominant terrestrial ecosystem targets, and to capture the major physical gradients for the ecoregion. See Appendix 26 for list of ELUs in the SRM.

In order to represent the four major riparian ecological systems (e.g., Upper Montane Riparian Woodland), the team modeled riparian features using hydrography and elevation zones, as depicted in the ELUs. The models were validated using point locations from riparian vegetation classification and inventory efforts in Colorado and New Mexico. The modeling process resulted in a comprehensive distribution map for matrix forming and linear ecological systems to use as conservation targets for portfolio design. Selected large patch and all small patch ecological systems were represented as points derived from experts and Natural Heritage Program records.

Aquatic Ecological Systems and Macrohabitats

The team applied similar biophysical analyses to freshwater aquatic ecological systems. A comprehensive map of aquatic ecological units was developed and applied at ecological system and macrohabitat levels, in the same manner as vegetation/ELU combinations were used for terrestrial ecological systems. See Map 9 for aquatic systems and Map 10 for aquatic macrohabitats (and Appendices 9-10 for lists of systems and macrohabitats). Macrohabitats are the finest-scale biophysical classification unit used as conservation targets. Examples include specific types of lakes and stream/river segments that are delineated, mapped, and classified according to the local environmental factors that determine the types and distributions of aquatic assemblages.

The variables used to delineate stream macrohabitats in the SRM include elevation, gradient, size, geology of contributing area, and connection to alpine lakes, and were derived from spatial data layers including hydrography at 1:100,000, geology, and digital elevation using automated classification techniques in a GIS. Macrohabitat types were defined for the SRM as unique combinations of the four classification variables described above. In the SRM, 106 unique macrohabitat types occurred out of a possible 256 combinations (four size x four hydrologic x four elevation x four gradients). The most common macrohabitats types were headwaters and surface-flow-dominated streams, at montane elevations and ranging from low to steep gradients. See Appendix 11 for details.

VIABILITY/INTEGRITY

Viability is the ability of a species to persist for many generations, or the ability of an ecological community or system to persist over some time period (for our purposes this is 100 years). Each occurrence in the portfolio must be viable or feasibly restorable. The team evaluated and ranked the viability of species occurrences and integrity of community/system occurrences using three key criteria: size, quality or condition, and landscape context.

Criteria for Evaluating Viability/Integrity of Conservation Targets

Characterizing the size, condition, and landscape context of a viable occurrence provides the basis for assessing stresses—the destruction, degradation, or impairment—of conservation targets. This characterization also aids in the development of threat-abatement strategies. To rate biodiversity health of targets, we identified the primary ecological factors (processes, disturbance regimes, keystone species, composition or structure, etc.), that drive the *size*, *condition*, and *landscape context* for each target. Once these were identified, the team determined their natural ranges of variation and assessed whether the conservation target is within those ranges or requires significant management in order to be maintained or restored to its desired condition. Considering the status of these critical factors, each of these biodiversity health categories (size, condition, and landscape context) was rated for each target as *Very Good*, *Good*, *Fair*, or *Poor*. These ratings were used, in lieu of more detailed viability information, to indicate the overall health of an ecosystem, and to measure conservation practitioner's progress toward the goal of maintaining and improving the biodiversity health of all conservation targets at a site. Definitions of these criteria are below.

> **Size** is a measure of the area or abundance of the conservation target's occurrence. For ecological systems, size may simply be a measure of the occurrence's patch size or geographic coverage. *Minimum dynamic area,* another aspect of size, is the area needed to ensure survival or re-establishment of a target after natural disturbance.
>
> **Condition** is an integrated measure of the composition, structure, and biotic interactions that characterize the occurrence. This includes factors such as reproduction, age structure, biological composition (e.g., presence of native vs. exotic species; presence of characteristic patch types), physical and spatial structure (e.g., canopy, understory, and groundcover in a forested community; spatial distribution and juxtaposition of patch types or seral stages in an ecological system), and biotic interactions that directly involve the target (e.g., competition, predation, and disease).
>
> **Landscape context** measures two factors: the dominant environmental regimes and processes that establish and maintain the target occurrence, and connectivity. *Dominant environmental regimes* include hydrologic and water chemistry regimes (surface and groundwater), geomorphic processes, climatic regimes (temperature and precipitation), fire regimes, and natural disturbances. *Connectivity* includes such factors as species targets having access to habitats and resources needed for life cycle completion, fragmentation of ecological communities and systems, and the ability of any target to respond to environmental change through dispersal, migration, or re-colonization.

The team used current scientific literature and expert review to update viability guidelines for 59 plant species, 18 animal species, and 39 terrestrial ecological systems (Spackman et al. 2000, Schorr et al. 2000, and Rondeau 2001). (See Appendices 22-24 for viability specifications for animals, plants and terrestrial systems; full reports are on file at the Colorado Field Office of The Nature Conservancy and the Colorado Natural Heritage Program). The new viability guidelines for ecological systems include an analysis of minimum dynamic area, evaluation of disturbance patch dynamics, and habitat requirements for associated area-sensitive species. The element-occurrence ranks given by state Natural Heritage programs were used for determining occurrence viability of species targets when available. Occurrence ranks of A (excellent), B (good), C (fair), E (extant) were considered viable, and ranks of D (poor) were considered non-viable.

As the team gathered new and updated occurrence information, experts reviewed and commented on the status of each occurrence with the viability criteria in mind. A relative ranking of very good, good, fair, or poor in each of these categories, along with specific comments, provided useful information. When no viability information was available for extant occurrences, the team assumed they were viable rather than non-viable.

The team addressed potential viability for the six wide-ranging mammal targets in the ecoregion differently. In general, little viability data were available for these species. The team developed habitat suitability models for these species, using information available from other sources (Merkle, unpublished data, Carroll, personal communication, Wyoming Natural Diversity Database, Colorado Division of Wildlife, and Colorado Natural Heritage Program). Viability was assessed through the number of extant occurrences and availability of suitable habitat as revealed through the habitat models. See Map 11 for potential habitat of selected wide-ranging mammals.

A suitability index was also used as an initial, indirect measure of target viability or integrity. The index provides an indication of conditions on the landscape. It integrates land use factors for a given geographic area, and was based on 15 factors, such as road density, dams and mines. This index was useful for assessing the integrity of aquatic systems; one of the only target groups with no field documented viability/integrity information. See Portfolio Design Methods section below, Map 12, and Appendix 12 for more details.

The team lacked field data to assess the viability of the aquatic systems, but did conduct a preliminary measure of aquatic integrity (or quality) using the suitability index. The results of this analysis (Appendix 25) provide: 1) an estimate of total length of each system by conservation area that falls within a given quality category; 2) the total number of areas where that system type is found; and 3) whether a better quality example can be found at any other area. (A "yes" to best example indicates that no other site in the EDU contains a higher quality example, though other sites may contain equal quality examples.) This information will be useful for site conservation planning.

PORTFOLIO OF CONSERVATION AREAS

Portfolio Design Methods

The overall goal of this assessment was to identify a portfolio of conservation areas that, with proper management, would ensure the long-term survival of the species, plant communities, and ecological systems, and the ecological processes needed to maintain them, of the Southern Rocky Mountains ecoregion.

The team used the following principles, based on guidelines outlined in *Designing a Geography of Hope: A Practitioner's Handbook to Ecoregional Planning* (TNC 2000), to assemble the portfolio.

- Coarse-scale focus: Represent or capture in conservation areas all coarse-scale targets that exist in the ecoregion or are restorable followed by targets at finer scales.
- Representativeness: Capture multiple examples of all conservation targets across the diversity of environmental gradients appropriate to the ecoregion (e.g., ecoregional section, ecological land units, and ecological drainage units).
- Efficiency: Give priority to occurrences of coarse-scale ecological systems that contain multiple targets at other scales.
- Integration: Give priority to areas that contain high-quality occurrences of both aquatic and terrestrial targets.

- Viability/Integrity: Ensure that all areas in the portfolio are functional or feasibly restorable to a functional condition. Functional areas maintain the size, condition, and landscape context within the natural range of variability of the conservation targets.
- Completeness: Capture all targets within functional landscapes.

Conservation areas were identified using the most reliable and up-to-date information through a combination of computer-assisted and manual processes that evaluated the following data:

1. Element-occurrence and site information from Natural Heritage Programs of Colorado, New Mexico, and Wyoming (only viable records and records since 1985);
2. Occurrence and area information from experts workshops;
3. Existing and nominated conservation areas;
4. Additional spatial data sets depicting distributions of ecological systems;
5. Habitat-suitability models for selected wide-ranging mammals;
6. Indices of biophysical variation from biophysical models; and
7. Land conservation status along with indices of landscape integrity and conservation suitability.

<u>Selection of Conservation Areas</u>

The SRM ecoregional data set was compiled and analyzed with the goal of developing a comprehensive and strategic conservation blueprint. Because of the large number of conservation targets, the relatively large data set, and the complexity of the ecoregion, the SRM team decided to use SITES (Andelman et al. 1999), a site-selection software program developed by the National Center for Ecological Analysis and Synthesis, University of California at Santa Barbara, specifically for ecoregional assessment. The SITES program enabled the team to assemble and compare alternative portfolios. See Appendix 12 for more details regarding the portfolio design methods.

The overall objective of the portfolio selection process is to minimize the cost of the portfolio while ensuring that all conservation goals have been met. SITES selects areas to meet goals for conservation targets while balancing objectives of efficiency, defined as the greatest number of goals met for the lowest cost or least amount of suitable land. This set of objectives is summarized in the following equation (Andelman et al. 1999):

Total Portfolio Cost = Cost of Selected Areas + Target Penalty + Boundary Length

where *Total Portfolio Cost* is the objective (see below) to be minimized, *Cost of Selected Areas* is the number of hectares in all units of analysis selected for the portfolio (see suitability index discussion below), *Target Penalty* is a cost of not meeting conservation goals for each target, and *Boundary Length* is a cost of spatial dispersion of the selected sites as measured by the total boundary length of the portfolio. The algorithm seeks to minimize the *Total Portfolio Cost* by selecting a set of conservation areas which covers as many targets as possible as cheaply as possible in as compact a set of areas as possible. The solutions depend on how site cost is measured, on the target levels, on the penalty cost for each target, and on how heavily the boundary lengths are weighted. The modeling program compares millions of possible portfolio designs to determine the most efficient or "optimal" portfolio.

The team developed a suitability index, an integration of 15 major land use factors, such as road density, mines, dams, natural land cover, projected future urban development, and minimum land area, to represent the cost associated with conserving an area (see Map 12; Appendix 12 for full list of factors used). The suitability index was used as a comprehensive, albeit indirect, measure of environmental conditions on the landscape. While not a direct measure of ecological integrity, it provided a useful complement to ranked occurrences in determining which areas might be most suitable for meeting conservation goals. The team also set different levels of perimeter in an attempt to reduce fragmentation of the portfolio and increase clustering of the conservation areas (boundary length).

The team selected 2,965 acre (1,200 ha) hexagons derived from a uniform grid as the unit of analysis for running the SITES site selection program. Each hexagon was populated by overlaying GIS data layers with points or polygon information for targeted species, communities, and ecological systems. All conservation targets, threats, and goals were analyzed based on hexagons.

The team used GAP Analysis Program Category 1 and 2 protected areas as an initial "seed" and ran the SITES program multiple times before selecting the most efficient portfolio results which met greatest number of conservation goals for the targets. The team, with assistance from experts from heritage programs, then reviewed and revised the initial portfolio in a series of interactive (with information projected on-screen) workshops to develop a final portfolio. The team made only rough adjustments to site boundaries, as fine-level boundary modifications will be made during site conservation planning.

Portfolio of Conservation Areas

This portfolio of conservation areas represents a rigorously established vision for biodiversity conservation with the best available data, which has met established minimum standards. The iterative nature of ecoregional assessment requires that we interpret results carefully. While the team compiled substantial new information, no amount of effort, within the timeframe of this project, could produce a "complete" data set. We intend to clarify and fill information gaps over time, and to revisit/refine the portfolio as new information becomes available.

Nearly all conservation targets are represented in the portfolio, and many had sufficient numbers to meet conservation goals. Others will require additional field inventory and research in order to finalize and/or meet conservation goals. Many previously undocumented occurrences will undoubtedly be found with further field survey work within portfolio conservation areas.

The total area encompassed by the portfolio areas is 19.8 million acres, 49.6% of the total area of the SRM ecoregion. The seemingly large portfolio size can be attributed to several factors: 1) the types of conservation targets selected, which included matrix-forming ecological systems and wide-ranging mammals; 2) the existing natural variability and the desire to represent variability across all environmental gradients within the ecoregion; and 3) manual over-rides of the original SITES output based on additional knowledge about conservation areas. The team completed several different analyses of the portfolio, including relative conservation value, threat status, activity level, and field verification. The results of these analyses provide guidance on the types of potential conservation strategies needed to achieve conservation of these areas (see Threats Assessment and Conservation Area Activity Levels and Field Verification sections below). See Map 13a (overview) and 13b (locator map) for the portfolio of conservation areas.

Conservation Areas

The SRM portfolio, based on the SITES site selection program output that was refined by team members and experts, consisted of 188 conservation areas. Most, if not all, of the conservation areas should meet standards for functional conservation areas as defined by Poiani et al. (2000), as most areas include coarse-scale ecological systems and this assessment applied a rigorous viability analysis of conservation targets (see above). Functional conservation areas could maintain targeted species, communities, and ecological systems, and support ecological processes within their natural range of variability.

This portfolio is a first attempt at the design of a functional network, as it took into account habitat suitability of six wide-ranging mammals (i.e., wolverine, lynx, gray wolf, bison, grizzly bear, and bighorn sheep in Wyoming). While the portfolio provides for at least one viable population for four of the six targeted wide-ranging mammals (with the exception of grizzly bear and gray wolf), this is not based on extant populations but rather on the availability of habitat suitable for potential restoration. Further research is needed to complete the design of the portfolio to support viable populations of these species.

Of the 188 conservation area in the portfolio, 140 are in Colorado, 23 are in Wyoming, and 13 are in New Mexico, while 7 conservation areas overlap Colorado/Wyoming borders and 5 overlap Colorado/New Mexico borders. See Table 13 for a summary of portfolio conservation areas and targets captured and Appendix 13 for more detailed information (e.g., total number of targets, targets listed by taxon and system group, acres, and percent area protected within existing Gap Category 1 and 2 areas). Please note that reviewers added some targets known to be present and that the SRM ecoregional database has not yet been updated to include these targets.

The conservation areas ranged in size from 2,965 acres (a minimum size based on the area within a single hexagon) to over 1,000,000 acres. Of the 188 conservation areas, 13 conservation areas were between ca. 400,000 and 1,000,000 acres, 32 were between 160,000 and 400,000 acres, and 143 were smaller (from 2965 acres to ca. 140,000 acres). The largest conservation areas are roughly 1.0 million acres (Vermejo Park/Upper Purgatoire) and 870,892 million acres (Jemez Mountains). There are 141 conservation areas greater than 10,000 acres and 47 conservation areas less than 10,000 acres. Of these, 35 conservation areas are 2,965 acres. The effective size of a conservation area may be considerably larger as many of the areas are directly adjacent (i.e., connected) to other conservation areas or other managed lands such as U.S. Forest Service.

While these conservation areas were designed with knowledge of the size requirements of conservation targets, these areas do not necessarily include the specific lands/waters needed to maintain each target at that location. Site conservation planning is needed to determine what lands and waters are actually necessary to ensure conservation of the targets at any particular area. For example, protecting a 200 acre shale outcrop may conserve a rare plant, but the conservation area chosen in this portfolio was approximately 3,000 acres. Also, because of the way in which portfolio conservation areas were assembled, it may be appropriate to join conservation areas at a later time. Similarly, it may be necessary to segregate individual conservation areas from larger ones. This refinement will be completed during later analyses that consider site-specific targets, threats, and goals. Thus the current boundaries are starting points for further analyses.

Table 13: Summary of Conservation Areas and Associated Targets

Area #	Conservation Area	Acres	Total # of Targets	Amphibians/ Reptiles	Aquatic Systems	Birds	Fish	Inverts.	Mammals	Plants	Plant Communities	Terrestrial Systems
1	Agua Caliente	17,792	9	0	1	2	2	0	0	1	1	2
2	Animas River	201,636	22	2	5	2	1	1	0	4	1	7
3	Archuleta Creek	14,826	4	0	2	0	0	0	0	0	0	2
4	Baldy Chato	2,965	4	0	1	0	0	2	0	0	0	1
5	Baldy Cinco	2,965	3	0	1	0	0	1	0	0	0	1
6	Beaton Creek East	2,965	3	0	1	0	0	0	0	1	0	1
7	Beaver Creek-Lone Cone	14,826	7	0	2	0	0	0	0	1	0	4
8	Bennett Creek South	5,931	7	0	1	0	1	0	0	1	1	2
9	Berthoud Pass	83,027	18	1	2	0	1	4	0	3	1	6
10	Big Dominguez River	47,287	8	0	1	1	0	0	0	2	0	4
11	Billy Creek Uplands	5,930	2	0	0	0	0	0	0	2	0	0
12	Black Mountain	11,861	5	0	3	0	0	0	0	0	0	2
13	Box Elder Creek	162,998	7	1	1	1	0	0	0	0	0	4
14	Brush Creek at Cannibal Point	8,895	5	0	1	0	0	0	0	1	0	3
15	Burning Mountain	2,965	2	0	1	0	0	0	0	1	0	0
16	Butler Creek	6,221	3	0	1	0	1	0	0	1	0	0
17	Butterfly Haven	2,965	5	0	0	0	0	4	0	0	0	1
18	Canyon Largo	1,477	0	0	0	0	0	0	0	0	0	0
19	Carnero Creek	212,557	32	0	3	1	3	1	3	3	5	13
20	Castle Peak	252,046	26	0	7	2	1	0	2	1	4	9
21	Cattle Creek	2,965	2	0	1	0	1	0	0	0	0	0
22	Chacon Canyon	21,701	3	0	1	0	0	0	0	0	0	2
23	Cheesman	319,954	24	0	5	4	0	3	0	5	1	6
24	Cimarron River	8,896	3	0	1	0	0	0	0	1	0	1
25	Colona Mountain	2,966	2	0	1	0	0	0	0	1	0	0
26	Conejos River	65,236	15	0	2	2	1	1	0	4	0	5
27	Conundrum	50,409	10	0	2	1	0	0	0	1	0	6
28	Corral Creek	25,487	8	0	1	1	0	0	0	0	0	6
29	Cottonwood Crks San Juans	115,645	12	0	3	0	1	0	0	0	1	7
30	Cottonwood Pass	474,441	44	1	6	1	1	2	1	17	3	12
31	Coyote Creek	120,272	11	0	2	2	0	0	1	0	0	6
32	Crested Butte	396,313	23	0	4	0	1	1	2	6	1	7
33	Cross and Fall Creeks	50,409	13	1	3	1	1	0	0	1	1	5
34	Crown	71,165	8	0	3	0	0	0	0	1	1	3
35	Crystal Lake Creek	2,965	3	0	1	1	0	0	0	0	0	1
36	Culebra Range	46,250	30	1	5	1	3	0	1	4	1	14
37	Cumbres Pass Link	14,827	7	0	3	0	1	0	1	0	0	2
38	Dark Canyon	50,410	11	1	2	0	0	0	0	2	1	5
39	Dawson Draw Canyon East	2,965	3	0	1	0	0	0	0	0	1	1
40	Death Valley Creek	2,965	2	0	1	0	0	0	0	0	0	1
41	Debeque Canyon	11,177	5	0	2	0	0	1	0	0	0	2
42	Debeque South	158,236	15	0	4	0	1	0	0	4	0	6
43	Dry Laramie River	7,863	4	0	2	0	0	0	0	0	0	2
44	Eagle River at Gypsum	92,869	13	0	3	2	1	2	1	1	0	3
45	East Divide Creek	2,965	2	0	1	0	0	0	0	1	0	0
46	East Mancos River	2,965	1	0	0	0	0	0	0	0	0	1

Area #	Conservation Area	Acres	Total # of Targets	Amphibians/ Reptiles	Aquatic Systems	Birds	Fish	Inverts.	Mammals	Plants	Plant Communities	Terrestrial Systems
47	East Rifle Creek	2,965	3	0	1	0	0	0	0	1	0	1
48	Elk Ridge	23,722	6	0	4	0	0	0	0	0	0	2
49	Endlich Mesa Basin	2,965	3	0	1	0	0	0	0	1	0	1
50	Escalante River	110,304	15	0	3	0	0	0	0	1	2	9
51	Estes Park	318,171	39	1	3	2	2	3	2	10	4	11
52	Fall Creek	2,965	2	0	1	0	0	0	0	0	0	1
53	Flat Tops	462,580	28	0	11	4	1	1	1	1	0	9
54	Florida Creek	8,553	3	1	1	0	0	0	0	0	0	1
55	Forbes/Sheep Mountain	26,521	4	0	2	0	0	0	0	0	0	2
56	Fossil Ridge	177,912	9	0	2	0	0	0	1	4	0	2
57	Frying Pan River	5,931	3	0	1	0	10	0	0	0	0	1
58	Garden Park	119,852	15	0	3	2	0	0	1	1	2	6
59	Glenwood Canyon	160,123	24	0	5	2	1	3	1	2	1	9
60	Golden Gate Canyon	52,591	20	0	1	1	0	5	1	3	4	5
61	Gore Range	192,742	17	0	4	0	1	1	0	3	0	8
62	Gray Mountain	14,826	9	0	1	0	0	0	0	5	0	3
63	Grays/Torrey	180,881	30	1	5	2	1	2	1	10	1	7
64	Great Sand Dunes/San Luis Lakes	240,182	39	2	1	4	2	10	8	1	5	6
65	Green Mountain	17,792	4	0	1	0	1	0	0	1	0	1
66	Greenhorn Mountain	288,106	26	1	5	4	1	0	1	2	1	11
67	Greenie Mountain	139,367	13	0	2	3	0	0	3	1	1	3
68	Grizzly Peak	2,965	3	0	1	0	0	0	0	1	0	1
69	Guanella	68,050	20	1	1	1	0	3	0	5	2	7
70	Gunnison Basin	561,045	20	0	2	2	1	1	1	3	1	9
71	Harden Creek	2,966	4	2	2	0	0	0	0	0	0	0
72	Hardscrabble	2,965	3	0	1	0	1	0	0	0	0	1
73	Hermit Park	2,965	3	0	1	0	0	0	0	1	0	1
74	Highway Spring	2,965	2	0	0	0	0	0	0	0	0	2
75	Hondo Creek, Rito	2,965	3	0	1	0	0	0	0	1	0	1
76	Horseshoe Creek	95,061	13	2	3	0	0	0	1	2	0	5
77	Huerfano Grasslands	7,894	6	0	3	0	1	0	0	0	0	2
78	Hunter	14,826	5	0	2	0	1	0	0	1	0	1
79	Huston Park	176,600	17	1	4	0	1	0	1	3	0	8
80	Iron Creek	2,965	1	0	0	0	0	0	0	1	0	0
81	Jemez Canyon Reservoir	16,296	5	0	1	0	0	0	0	0	0	4
82	Jemez Mountains	870,385	40	1	8	5	3	2	5	4	0	12
83	Kenosha	121,575	9	0	2	0	0	0	0	0	0	7
84	La Bonte Creek	7,686	4	0	1	0	0	0	0	0	0	3
85	La Garita	237,220	32	1	4	1	1	1	1	5	4	14
86	La Veta Pass Link	32,617	7	0	1	0	1	0	1	0	0	4
87	Laramie Foothills	161, 865	22	0	1	0	1	3	2	4	7	4
88	Laramie River	57,381	16	0	7	0	0	0	0	1	2	6
89	Lawhead Gulch	7,778	4	0	2	0	1	0	0	0	0	1
90	Lion Creek	2,966	1	0	1	0	0	0	0	0	0	0
91	Little Coal Creek	11,860	3	0	1	0	1	0	0	0	0	1
92	Lizard Head	44,479	11	0	3	1	0	0	0	3	0	4
93	Long Gulch	2,965	2	0	1	0	0	0	0	1	0	0
94	Lower Dolores River	25,300	8	0	2	2	0	1	0	0	0	3

Area #	Conservation Area	Acres	Total # of Targets	Amphibians/ Reptiles	Aquatic Systems	Birds	Fish	Inverts.	Mammals	Plants	Plant Communities	Terrestrial Systems
95	Lower Poudre	77,776	21	0	1	3	0	5	1	1	5	5
96	Lynx Links B	11,861	6	0	2	0	1	0	2	0	0	2
97	Lynx Links 3	11,862	7	0	2	0	0	1	2	0	0	2
98	Martin Link A	23,722	6	0	3	0	1	0	0	0	0	2
99	McClure Pass	240,363	21	0	3	2	1	0	1	4	0	10
100	Middle Arkansas River	221,921	25	0	7	2	0	0	3	5	2	6
101	Middle Fork Powderhorn Creek	2,965	2	0	1	0	0	0	0	0	0	1
102	Mill Creek	11,861	4	1	1	0	0	0	1	0	0	1
103	Montezuma Creek	11,861	5	0	2	0	0	1	0	0	0	2
104	Morrison Creek	14,587	7	1	4	0	0	0	0	0	0	2
105	Mosquito Range	123,840	33	0	7	0	1	0	1	16	2	6
106	Mount Callahan	13,233	6	0	1	0	3	0	0	0	0	2
107	Mount Falcon North	13,998	5	0	0	1	0	1	0	0	0	3
108	Mount Massive	2,965	4	0	1	0	0	0	0	2	0	1
109	Mount Zirkel	648,886	53	2	17	4	1	2	2	14	0	10
110	Muddy Creek	41,513	9	0	5	0	0	0	0	2	0	2
111	Mule Creek	11,721	4	0	1	0	0	0	0	0	0	3
112	Naturita Creek	23,722	5	0	1	0	1	0	0	0	0	3
113	North Boulder Creek	29,653	13	0	1	0	1	0	1	1	1	7
114	North Cameron Pass	226,260	25	1	3	1	1	0	2	6	0	11
115	North Laramie River	103,093	12	0	2	0	0	0	0	2	0	8
116	North Park	260,647	23	0	3	5	0	9	0	1	0	5
117	North Park Sand Dunes	8,896	4	0	2	0	0	1	0	0	0	1
118	North Platte River	2,209	3	0	1	0	0	0	0	0	0	2
119	North St Vrain	109,771	21	0	1	3	1	1	2	1	6	6
120	Oak Ridge	14,826	5	0	2	1	0	0	0	0	0	2
121	Ojo Caliente	542,642	23	1	6	2	3	0	0	1	0	10
122	Ouray	23,722	6	0	1	1	0	1	0	0	1	2
123	Pagosa Springs	207,567	22	1	4	2	1	0	1	5	1	7
124	Disappointment Valley	77,589	8	0	3	1	0	0	0	0	0	4
125	Pass Creek	29,103	5	0	1	0	0	0	0	0	0	4
126	Pennock Mountain	56,607	8	1	3	0	0	0	0	0	0	4
127	Piedra River	85,993	15	1	3	0	2	0	0	1	0	8
128	Pikes Peak	258,807	36	0	8	2	1	3	3	8	2	9
129	Platte River	53,801	14	1	3	1	0	0	3	1	0	4
130	Pleasant Valley Creek	5,930	1	0	0	0	0	0	0	0	1	0
131	Pryor Creek	27,872	7	0	2	0	1	0	0	1	0	3
132	Punche Valley	474,441	30	1	6	3	3	0	5	1	1	10
133	Questa	14,826	5	0	0	0	0	1	0	1	0	3
134	Rajadero Canyon	199,782	21	0	3	0	3	1	3	2	0	9
135	Red & White Mountain	100,819	13	0	5	1	1	0	1	1	0	4
136	Red Buttes	2,766	3	0	1	0	0	0	0	1	0	1
137	Rifle Hogback	9,685	2	0	1	0	0	0	0	1	0	0
138	Rifle Reach/Colorado River	67,416	13	0	2	2	3	0	0	2	0	4
139	Rio Chama	518,341	33	1	12	3	4	1	0	2	0	10
140	Rio Grande	50,409	17	1	3	5	1	0	0	1	3	6
141	Rio Grande Gorge	5,930	3	0	0	1	0	1	0	0	0	1
142	Rio Grande Pyramid	2,965	4	0	1	0	0	2	0	0	0	1

Area #	Conservation Area	Acres	Total # of Targets	Amphibians/ Reptiles	Aquatic Systems	Birds	Fish	Inverts.	Mammals	Plants	Plant Communities	Terrestrial Systems
143	Rio Hondo	44,479	12	0	1	0	1	1	1	2	0	5
144	Roan Cliffs	31,559	17	0	2	1	4	0	0	5	0	5
145	Rock Mountain	23,221	4	0	1	0	0	0	0	0	0	3
146	Rocky Fork Creek	2,965	2	0	1	0	1	0	0	0	0	0
147	Rodgers Unit	2,965	3	0	2	0	0	0	0	1	0	0
148	Romley	2,965	2	0	1	0	0	1	0	0	0	0
149	Roubideau	75,659	12	0	2	0	1	0	0	1	1	7
150	SLV Greasewood	240,185	19	0	4	2	1	0	5	1	1	5
151	Sage Creek	367,834	20	0	7	2	3	0	1	0	0	7
152	San Juan River	2,965	4	0	2	0	0	0	0	0	1	1
153	San Miguel River	326,972	32	0	6	3	1	0	1	8	3	10
69	Sangre de Cristo Mountains	554,349	52	0	11	2	3	5	3	7	7	14
155	Sapello/Mora Valleys	10,852	6	0	1	0	0	1	0	0	0	4
156	Sharkstooth Trail	2,966	1	0	0	0	0	0	0	0	0	1
157	Shell Creek	3,277	3	0	1	0	0	0	0	0	0	2
158	Slater Park	400,651	23	2	4	2	1	0	1	2	1	10
159	Snowmass Creek	17,792	7	0	2	0	1	0	0	0	0	4
160	Snowy Range	22,976	10	2	1	1	0	0	1	4	0	1
161	South Arkansas River	35,583	8	0	3	0	1	0	0	1	0	3
162	South Cameron Pass	344,110	30	2	6	2	2	4	1	3	1	9
163	South Cottonwood Creek	2,966	2	1	1	0	0	0	0	0	0	0
164	South Fork Bear Creek	95,000	7	0	1	0	0	0	1	0	0	5
165	South Park	474,474	41	0	8	2	0	3	0	14	3	11
166	South San Juan	302,456	32	0	5	4	2	0	1	6	1	13
167	Southern Sangre de Cristo Mountains	371,326	25	0	5	1	1	2	0	8	0	7
168	Squaw Creek	23,722	8	0	2	0	0	0	0	1	1	4
169	Squirrel Creek	60,897	9	2	3	1	0	0	1	1	0	1
170	St Charles River	5,852	4	0	2	1	0	0	0	0	0	1
171	Taos Pueblo	14,826	7	0	2	0	0	1	0	0	0	4
172	Tipperary Creek	2,966	1	0	1	1	0	0	0	0	0	0
173	Tomichi Creek	2,965	1	0	1	0	0	0	0	0	0	0
174	Trickle Mountain	349,900	28	0	6	1	3	0	1	1	3	13
175	Troublesome Creek	32,618	7	0	4	0	0	0	0	2	0	1
176	Troublesome Headwaters	263,907	17	1	9	0	1	0	0	0	0	6
177	Turtle Rock	83,027	17	2	0	1	0	1	1	7	0	5
178	Unaweep	21,687	6	0	2	0	0	2	0	0	0	2
179	Uncompahgre/Red Cloud	228,325	25	0	3	3	1	6	0	4	0	8
180	Upper San Luis Valley	139,367	23	0	4	1	1	1	3	1	2	10
181	Ute Trail	11,859	5	0	1	0	0	0	0	1	0	3
182	Vermejo Park/Upper Purgatoire	1,067,879	36	1	4	3	1	3	4	4	2	14
183	Wallrock Creek	6,682	7	0	2	2	0	0	0	1	0	2
184	West Dallas Creek	17,792	7	0	3	0	0	0	0	2	0	2
185	West Lake Creek	2,931	4	0	2	0	1	0	0	0	0	1
186	Wolf Creek	26,687	13	0	3	1	2	0	0	4	0	3
187	Woody Creek Headwaters	44,479	8	0	1	0	1	0	0	2	0	4
188	Yampa River	49,771	10	1	4	3	1	0	0	0	0	1

Target Representation and Conservation Goals

Given that our conservation goals represent an initial working hypothesis on species viability and ecosystem integrity, we chose to report portfolio results at two different levels. One level simply reports on the degree to which the portfolio of conservation areas provides some level of representation for each conservation target (e.g., at least one viable occurrence). The second level indicates the degree to which the stated conservation goals (in terms of number and distribution) were met within the portfolio of conservation areas.

Overall, the portfolio captured at least one of all of the terrestrial and aquatic ecological system targets and at least one viable occurrence of 57% of the rare plant community targets and 66% of the species targets. Fifty percent of the amphibians and reptiles, 89% of the fish, 55% of the invertebrates, 61% of the mammals, 66% of the wide-ranging mammals (potential suitable habitat), and 69% of the plants were represented in the portfolio with at least one viable occurrence.

A high percentage of available target occurrences for all targets were captured in the portfolio: 48% of terrestrial systems, 79% of aquatic systems, 98% of rare plant community occurrences, and 95% of the species occurrences (see Table 14). Out of a total of 4,968 occurrences for fine-filter targets (rare plant communities and species), 2,972 were used in the SRM analyses, and 2,748 occurrences were captured in the final portfolio.

Major ecological gradients and variability are well represented across the portfolio of conservation areas, as evidenced by the high degree of representation of ecological systems and the ecological variables used to represent them (vegetation, elevation, landform, riverine characteristics, geologic substrate, etc.). This should help buffer the conservation targets against the impacts of climate change. Terrestrial and aquatic systems were represented using expert-derived occurrences and spatial models. Additional field verification is needed for occurrences of terrestrial and aquatic ecological systems, emphasizing the evaluation of their quality and condition. Additional data collection will likely refine the classification of freshwater aquatic ecological systems.

Table 14. Summary of Targets and Occurrences Captured (at least once) within the Portfolio. Note that kilometers and hectares were used to indicate the presence of aquatic and terrestrial systems.

Target Group	# Targets in Portfolio/ Total # of Targets in Ecoregion	% Targets in Portfolio	# Occurrences in Portfolio/ Total # Occurrences or Hectares/Kilometers in Ecoregion	% Target Occurrences in Portfolio	# of Targets with no Documented Viable Documented Occurrences in Portfolio
Terrestrial Systems	**39/39**	**100%**	**7,323,432/ 15,126,479 ha**	**48%**	**5**
Aquatic Systems	**107/107**	**100%**	**43,958/ 55,781 km**	**79%**	**0**
Rare Plant Communities	**45/79**	**57%**	**387/396**	**98%**	**32**
Species					
Amphibians/ Reptiles	4/8	50%	368/378	97%	2
Birds	23/23	100%	220/268	82%	0
Fish	8/9	89%	241/260	93%	1
Invertebrates	73/132	55%	277/319	87%	61
Mammals	17/26	61%	164/182	90%	9
Wide-Ranging Mammals*	4/6	66%			5
Plants	123/177	69%	1,091/1,169	93%	54
Species Total	**252/383**	**66%**	**2,361/2,576**	**92%**	**132**
Total(species and plant communities only)	**443/608**	**73%**	**2,748/2,972**	**92%**	**169**

*Occurrences include potential suitable habitat for wide-ranging mammals.

Ninety percent of the terrestrial ecological systems, 92% of the aquatic ecological systems, 33% of the rare plant communities, and 18% of the species met stated conservation goals. For the species groups: 50% of the amphibians/reptiles, 26% of the birds, 33% of the fishes, 17% of the invertebrates, 21% of mammals, 66% of wide-ranging mammals, and 13% of the plants met stated conservation goals. Thirty one percent of the vertebrates and 17% of the invertebrates met conservation goals (see Table 15). See Appendix 14 for conservation goals for all targets.

The team determined that the conservation goals should be sought in a final conservation strategy for the SRM recognizing that the goals were both ambitious and conservative. Additionally, our knowledge remains incomplete given the quantity of information needed for a rigorous assessment. A number of plants and rare plant communities are currently only known from one to five occurrences and therefore the goal could not be met until further inventories reveal more occurrences. Another group of 169 targets (78 animals, 54 plants, 32 plant communities, and 5 terrestrial systems) has no documented occurrences or data are lacking regarding the distribution and viability (see Appendix 15 for list of these targets). Future work should focus on systematic inventory of these conservation targets not meeting goals or with no representation in the portfolio. With additional knowledge of target distributions and quality, we will further refine conservation goals for conservation targets.

Table 15. Summary of Targets Meeting Conservation Goals.

Target	Total # of Targets	Number of Targets that Met Conservation Goals	Percent of Targets that Met Conservation Goals
Terrestrial Systems	**39**	**35**	**90%**
Aquatic Systems	**107**	**98**	**92%**
Rare Plant Communities	**79**	**26**	**33%**
Species			
Amphibians/ Reptiles	8	4	50%
Birds	23	6	26%
Fish	9	3	33%
Invertebrates	132	23	17%
Mammals	28	6	21%
Wide-ranging mammals*	6	3	50%
Plants	177	23	13%
Species Total	**383**	**68**	**18%**
Total	**608**	**227**	**37%**

***Goals met include potential suitable habitat for wide-ranging mammals.**

<u>Conservation Targets</u>

Aquatic Ecological Systems

All aquatic systems were captured at least once in the portfolio and 92% of aquatic systems met goals. The portfolio captured 79% of the total available aquatic area. While goals for aquatic systems were set at 30%, it is likely that more area was captured largely due to aquatic systems being swept into the portfolio with other targets selected to meet goals.

The conservation areas in the portfolio all contain aquatic systems of varying importance for representing the system types. Thirteen conservation areas contain aquatic ecological systems that are only known from one conservation area within the EDU and have good or very good aquatic integrity (see Appendix 25). Of a total of 188 conservation areas, 157 areas contain aquatic systems with very good or good quality scores that are known from more than one conservation area; 50 areas have three or more aquatic systems ranked very good or good quality; and 19 conservation areas have five or more aquatic systems ranking very good or good. The latter include: Animas River, Castle Peak, Cottonwood Pass, Crested Butte, Debeque South, Flattops, Glenwood Canyon, Greenhorn Mountains, Jemez Mountains, Mt. Zirkel, North Cameron Pass, Ojo Caliente, Punche Valley, Red and White Mountains, Rio Chama, Sage Creek, Sangre de Cristo Mountains, South Cameron Pass, and Troublesome Headwaters. Only two system types are limited to a poor or very poor example. The remaining 112 have at least one example that is fair or better.

We also assessed the conservation areas in terms of the total length of stream of relatively good integrity (see Viability/Integrity section above). At 34 conservation areas, over 90% of the total stream length is of fair, good, or very good integrity. At 13 of the conservation areas, the total length of stream in poor or very poor quality exceeds the amount that is fair or better. These conservation areas include: Agua Caliente, Coyote Canyon, Dark Canyon, Eagle River at Gypsum, Golden Gate Canyon, La Bonte Creek, Pikes Peak, Rifle Hogback, Rifle Reach/Colorado River, Roan Cliffs, Squirrel Creek, and Taos Pueblo. Only aquatic systems that were ranked fair, good and very good are included as targets listed in the conservation area summaries (Appendix 13). Because aquatic systems were identified using abiotic factors and the model, they should be field verified.

Terrestrial Ecological Systems
All terrestrial systems were captured at least once in the portfolio and 90% percent of the terrestrial systems met conservation goals in the portfolio. Roughly 48% of the total available area containing terrestrial ecological systems was captured in the portfolio. While goals for terrestrial systems were set at 30%, it is likely that more area was captured largely due to additional systems being swept into the portfolio with other targets selected to meet goals. In addition, large-patch and matrix-forming communities had to meet a minimum size to be considered meeting goal.

The distribution of major terrestrial ecological systems within the portfolio of conservation areas, based on the biophysical model, closely followed trends within the ecoregion: spruce-fir forests had the highest percent land area (18%), followed by ponderosa pine woodlands (11%), pinyon-juniper woodlands (10%), aspen forests (9%), mountain sagebrush shrublands (8%), lodgepole pine forests (7%) and intermontane foothill grasslands (5%). Other systems had less than 5% cover within the portfolio.

Plant Communities
The portfolio captures 57% of the rare plant community targets at least once and 33% of the targets met conservation goals. The latter number is largely due to lack of inventory of plant communities. A number of the plant communities, particularly the G1 and G2 communities, are only known (and documented as viable) from a handful of locations. Additional inventory should clarify the true extent of these communities and target-specific conservation goals will be developed.

Species
While 66% of the species targets were captured at least once in the portfolio, at least 92% of the available viable species occurrences were captured in the portfolio. However, only 18% of species met conservation goals. A number of species are only known from a few occurrences. Additionally, many endemic species are not tracked by Natural Heritage Programs but are suspected to have viable occurrences throughout the portfolio; further inventories are recommended and will help refine goals and goals met.

Wide-ranging Mammals

Core areas and some linkages between conservation areas for three wide-ranging mammals were included in the portfolio based on habitat suitability models (using ecological systems and size criteria). The portfolio includes areas for the bighorn sheep populations in Wyoming (e.g., Platte River), the habitat for bison (Great Sand Dunes/San Luis Lakes), and much of the area currently inhabited by recently transplanted lynx in the San Juan region of Colorado. Several conservation areas in the portfolio (Theobald, personal communication) have high conservation value for lynx should the reintroduced population expand or be transplanted into other regions of the state. Several conservation areas link known or potential lynx populations (e.g., Cumbres Pass, Lynx Link B, and Lynx Link 3). Further refinement of the need and creation of linkages for lynx should await the determination of success in their transplantation. The effectiveness of the portfolio for wolverine remains uncertain and warrants more detailed analyses. This species' need for large, remote areas may make future viability a serious challenge.

The current landscapes of the SRM present difficulties for the incorporation of a free-ranging bison herd(s) in the portfolio. For example, the largest SRM example of montane grasslands occurs in South Park and would appear to make a suitable area for the existence of a semi-wild herd of bison. However, the current level of development, subdivision of large properties, and key transportation corridors create extremely difficult conditions for conservation of bison. Instead, we chose the Great Sand Dunes conservation area as the most likely place conserve bison in the Southern Rocky Mountains. While the criteria for a free-ranging, wild herd cannot entirely be met there, there are large landholdings that combined, would create a conservation area of over 300,000 acres. Such an area could contain a genetically sustainable herd of bison and is likely the best remaining conservation area available for the species in the ecoregion.

The two remaining wide-ranging mammals are currently extirpated from the ecoregion. Conservation areas were not chosen for the gray wolf or the grizzly bear. The viability of grizzly bears in the Southern Rocky Mountains under existing or perceived future conditions is poor at best. The team concluded that this species is unlikely to exist in the area in the foreseeable future. The gray wolf was reintroduced into the Yellowstone area and appears to be highly successful. The team did not select specific conservation areas for the gray wolf, in part because of the current debate over whether or not the species should be reintroduced to the SRM. However, because of the broad ecological tolerances of wolves, we believe that the existing portfolio would support at least one viable population should the citizens of Wyoming, Colorado, and or New Mexico decide to support the re-introductions. Our confidence in this conclusion is supported by preliminary viability analyses for gray wolves in the Colorado portion of the SRM.

Species Aggregations

The portfolio captured a number of significant species aggregations—sandhill crane staging areas, bald eagle wintering areas, and waterbird staging concentration areas. For example, Greenie Mountain, Rio Grande, and Yampa River contain major staging areas for sandhill cranes. Rio Grande and Conejos River are important winter roosting areas for bald eagle. North Park, Rio Grande, and Greenie Mountain contain significant waterbird staging areas (flocking waterfowl and wading birds).

Experts Workshop Nominated Sites

There was a high degree of overlap in the experts workshop nominated sites and the final portfolio of conservation areas: 88% of the nominated occurrences were captured in the portfolio, 95% of the experts workshop aquatic sites (drawn as linear stream reaches), and 77% of the proposed sites (drawn as polygons) were included in the final portfolio. This overlap was expected as the two experts workshops were important sources of information for the assessment project. Other information from experts workshops was not included for various reasons: 1) degree of precision, 2) occurrence did not meet viability criteria, 3) not all occurrences were needed to meet the conservation goal, 4) taxa or communities were not selected as final targets, or 5) data fell outside of the ecoregion.

Patterns of Land Ownership

The patterns of land ownership and management within the portfolio of conservation areas generally follow the overall pattern for the ecoregion (see Table 16, Map 14). Public lands, both federal and state, make up the majority of the ecoregional portfolio; 61% percent of the portfolio is federal land and 4.1% is state land. The two largest federal land managers of the portfolio conservation areas are the U.S. Forest Service (46%) and BLM (12%). Private lands encompass approximately 34% of the portfolio conservation areas. Only 1.3% of the portfolio consists of tribal lands.

Table 16. Land Ownership within the Portfolio of Conservation Areas.

Owner	Acres in Ecoregion	% of Ecoregion	Acres in Portfolio	% of Portfolio
Federal				
U.S. Forest Service	17,508,171	43.8%	9,230,669	46.5%
Bureau of Land Management	4,371,980	10.9%	2,319,025	11.7%
National Park Service	515,177	1.3%	478,084	2.4%
U.S. Fish and Wildlife Service	48,803	0.1%	41,720	0.2%
Department of Defense	22,552	0.1%	14,707	0.1%
Bureau of Reclamation	1,156	.0%	420	0.0%
Total Federal	**22,636,839**	**56.6%**	**12,084,625**	**60.9%**
Tribal	**1,106,477**	**3.0%**	**257,200**	**1.3%**
State	**1,572,472**	**3.9%**	**814,085**	**4.1%**
Private	**14,810,684**	**37.0%**	**6,676,451**	**33.7%**
Total	**39,957,472**		**19,832,361**	

Protected Areas

Existing protected areas (GAP Category 1 and 2) encompass 2,933,142 acres or 15% of the portfolio. Of the 188 conservation areas, 103 contain either or both Category 1 or 2 protected areas (see Table 17). The lands within the portfolio encompass 92% of Category 1, 64% of Category 2, 70% of Category 3 and 47% of Category 4 lands within the SRM. See Map 15.

Table 17. Protected Areas within the Portfolio of Conservation Areas.

GAP Category	Acres in Ecoregion	% of Ecoregion	Acres in Portfolio	% of Portfolio
Category 1	250,133	0.6%	229,088	1.1%
Category 2	4,196,313	10.5%	2,704,054	13.6%
Category 3	965,667	2.4%	675,386	3.4%
Category 4	34,545,360	86.4%	16,195,320	81.6%
Total	**39,957,472**		**19,832,361**	

Climate Change

The team addressed potential climate change impacts in this assessment by ensuring that the portfolio as a whole spanned the full range of climatic gradients in the ecoregion and that individual conservation areas spanned the greatest possible altitudinal range within contiguous natural areas. This was accomplished by: 1) classifying terrestrial and aquatic ecosystems and mapping their current distributions in a near-comprehensive manner; 2) establishing minimum size thresholds for each system type to account for a wide potential range of variation in natural disturbance regimes; 3) using USFS sections and Ecological Drainage Units to ensure sub-ecoregion-scale climatic variation was well represented among both terrestrial and aquatic systems; and 4) using ELUs and aquatic macrohabitat models to represent local-scale variability within and among ecological systems in contiguous portfolio areas. The ELUs/macrohabitat models addressed factors of elevation, slope/aspect, hydrologic gradient, stream size, landscape position, geologic substrate, and soil moisture regime. This ensured the inclusion of contiguous ecological gradients, and likely habitat "refugia" with climate changes we have yet to measure. Additionally, as evidenced by major vegetation types, most portfolio areas include wide elevational gradients, many from alpine to foothills.

Threats Assessment

The objectives of the preliminary threats assessment were to: 1) identify threats to conservation targets at each portfolio conservation area; and 2) assess and describe patterns across multiple portfolio conservation areas. Threats analyses at the level of site conservation planning typically include evaluation of both the *stress* (something that impairs or degrades the size, condition and landscape context of a target, resulting in reduced viability) and the *source of stress* (activity or factor causing the stress). However, for purposes of this broad-brush ecoregional threats analysis, the team decided the most meaningful factor to evaluate threats to species, communities and systems at conservation areas was the source of stress—the cause of destruction, degradation, fragmentation, or impairment of conservation targets at a site.

Understanding the threats to targets at specific conservation areas and patterns of threats across multiple areas helps to determine which conservation areas are in urgent need of conservation attention, and to inform the development of multi-site strategies. This threats assessment was based on site-specific knowledge of the conservation targets at each of the portfolio conservation areas, both from Conservancy staff and Natural Heritage Programs, experts at Experts Workshops, and interagency data, with further review and refinements by core team members and peer reviewers. Comprehensive assessment of all threats (i.e., stresses and sources of stress) at all conservation areas was beyond the scope of this project. Further work through site conservation planning is needed to update and refine threats to targets at the portfolio conservation areas. See Appendix 16 for details and Map 16 for results of the threats assessment.

Severity and Urgency

Degree of threat was considered to be a function of the severity and urgency of the threat to the conservation targets at a site. Using the best available information on a site or smaller nested conservation area, the core team identified and refined the key threats to each portfolio site (where known) and ranked them according to their severity and urgency. Definitions and ranks are provided below.

Severity: What level of damage to the target(s) at a site can be expected within 10 years under current circumstances?

- High: stress is likely to seriously degrade, destroy or eliminate the target over some portion of the target's occurrence at the site
- Medium: stress is likely to moderately degrade the conservation target over some portion of the target's occurrence at the site
- Low: stress is likely to slightly impair the conservation target over some portion of the target's occurrence at the site

Urgency: How urgent is the critical threat (site or a portion of the site imminently threatened)?

- High: threat exists now or is likely to exist within next 2-4 years
- Medium: threat is likely to exist within 5-10 years
- Low: threat is not likely to exist within 10 years

Data for portfolio sites were gathered from Natural Heritage Program databases for all identified conservation areas, sites, and/or element occurrences nested within the conservation areas. Additional information for threats, using selected factors from the suitability index discussed above to coarse-scale aquatic and terrestrial ecological systems, was also utilized. The current fire condition map (www.fs.fed.us/fire/fuelman) of the U.S. Forest Service (Fire Sciences Lab, MT) was used as an indicator of the severity of the fire management threat to the targets at each conservation area. Degree of urgency was determined based on knowledge of the fire return interval of the dominant ecological systems and applying the above criteria. In only a few cases does fire management have to be changed in fewer than five years. The fire map delineates the degree of departure from the historic fire regime (high: missed multiple return intervals; medium: moderately altered, missed one or more return intervals; and low: near historic return intervals).

Results of Threats Assessment

> *"Human-wrought changes threaten nearly every corner of the Southern Rocky Mountains — we trample, build roads, clear-cut, overgraze, bulldoze, drain, fill, flood, poison with reckless abandon. Even the once remote, pristine watersheds of our highest mountains are beginning to see the effects of acid rain. Sadly, we need to be as wary of the impacts of recreation and all its accouterments as we are of the effects of unregulated logging or mining. Every habitat has been altered or destroyed, whether through unwitting overuse or through careless disregard, makes every remaining habitat exponentially more important—and with it the crucial web of life strung through all parts."* (Benedict 1991)

It is important to understand the major threats or stressors to the conservation targets occurring within the portfolio conservation areas. While further documentation, research, and analysis of threats to targets at each site are needed, the results of this preliminary threats assessment represent a good starting point for addressing issues that cross site and political boundaries (e.g., invasive species). This analysis was not intended to be exhaustive but represents the knowledge, experience, and observations of field scientists who participated in the two experts workshops, Natural Heritage Program field ecologists, and team members. Other new threats not identified here may also have an impact on the targets. See Table 18 and Map 16 for a summary of major threats to targets at conservation areas (by number of areas with high severity and urgency). See Appendix 17 for a summary of multi-area threats and threats to conservation areas.

Table 18. Summary of Threats to Conservation Targets at Portfolio Conservation Areas (ranked high for both severity and urgency).

Threat	# of Areas with High Severity & Urgency	% of Areas with High Severity & Urgency	# of Areas Impacted by Threat	% of Areas Impacted by Threat
Parasites/Pathogens	54	29%	56	29%
Development-Residential	39	21%	81	43%
Fire Management Practices	33	18%	148	79%
Mining Practices	19	10%	95	51%
Road/Utility Corridors	12	6%	67	36%
Invasive/Alien Species-Plants	11	6%	71	38%
Management of/for Certain Species	10	5%	40	21%
Recreational Use	8	4%	104	55%
Incompatible Forestry Practices	8	4%	43	23%
Ditches, Dikes, Drainages, Diversions	7	4%	46	24%
Invasive/Alien Species-Animals	7	4%	24	13%
Development-Commercial	6	3%	11	6%
Incompatible Grazing Practices	3	2%	78	41%
Dam/Reservoir Operation	3	2%	67	36%
Recreational Vehicles	3	2%	38	20%
Development-Recreational	3	2%	13	7%
Oil or Gas Exploration	3	2%	8	4%

The analysis reflects the widespread nature of the major threats impacting targets across sites within the ecoregion. It is important to look at both how pervasive a threat is, i.e., how many areas have targets that are threatened, as well as the urgency and severity of the threats. The most pervasive threats were identified as fire management practices, recreational uses, mining practices, residential development, grazing practices, and invasive plant species. The threats with highest severity and urgency across the portfolio are parasites/pathogens, residential development, fire management practices, mining practices, roads/utility corridors, invasive plant species, and management of/for certain species. Fire management practices (activities that significantly change the natural fire regime) are a threat to many ecological systems and species at most portfolio areas within the SRM. Parasites/pathogens (whirling disease threatening native cutthroat trout and chytrid fungus threatening boreal toad) ranked high in terms of urgency and severity at 29% of the areas and were observed at 31% of conservation areas. While recreational use was observed at many sites, it did not rank as high as other threats in terms of urgency or severity at the vast majority of areas. While water management did not rank high in terms of frequency or severity/urgency, it is also an important threat to aquatic systems in the ecoregion (dam operation, ditches, dikes, and diversions, and groundwater manipulation). These threats or sources of stress are interrupting fundamental ecological processes needed to maintain the conservation targets in the SRM. A brief description of the pervasive and urgent/severe threats is below (listed in alphabetical order).

Fire Management Practices

Fire management practices, activities that significantly change the natural fire regime, were identified as a threat to the targets at most portfolio areas (79% of areas) and ranked high for both severity and urgency at 18% of the areas. The majority of the ecological systems in the SRM have missed at least one fire interval (http://www.fs.fed.us/fire/fuelman). Front Range forests, especially those dominated by ponderosa pine, and some sagebrush systems, are under the most urgent and severe threat from historic and some current fire management practices. Fires are common wherever fuels and ignition sources (i.e., lightning) are sufficient and where grazing does not diminish fuels significantly (Knight 1994). Fire suppression has altered the fuel accumulation and structure of millions of acres of ponderosa pine and other forests in the region, which can lead to the potential for large, unusually intense fires (Sousa 1984, Knight 1994). Many of these areas are also located in the urban interface, making accidental fires more common and the restoration of natural fire regimes more difficult. Since the early 1900s, fire suppression and logging have led to increased density in ponderosa pine woodlands and the proliferation of other conifers, and to mixed conifer stands dominating what were once Douglas-fir forests (Benedict 1991). Fire suppression has had a less significant impact on lodgepole pine and spruce/fir forests because of the long fire return interval of these forests (Knight 1994).

Fire management practices interact with several other threats to conservation targets at portfolio areas. Successful elimination of periodic fires can lead to forests that are more prone to insect and disease impact (Stark 1987). Less frequent fires in aspen forest have lead to old stands with little regeneration that are more susceptible to diseases and browsing by elk (Knight 1994).

Incompatible Forestry Practices
Forestry practices were identified as a threat to the conservation targets at 23% of the areas (ranked as high severity and urgency at 4% of the areas). Historical and current logging practices have eliminated most low-elevation, old-growth forests, particularly of ponderosa pine, Douglas-fir, and mixed coniferous forests (Shinneman et al. 2000). In addition, forest logging practices often create different temporal and spatial patterns than natural disturbances such as wind throw and fire (Sousa 1984).

Incompatible Grazing Practices
Grazing practices were identified as a threat to the conservation targets at 41% of the areas, but were ranked with a high urgency and severity at only 2% of the areas. Improper grazing can significantly degrade the quality of sensitive systems such as riparian areas, but grazing alone rarely destroys a conservation target. Grazing has impacted natural fire regimes by reducing fuel accumulation in grassland and woodland, and has altered the natural hydrology as well. Pinyon-juniper woodlands have expanded into many grasslands in the southeastern part of the ecoregion in the last 200 years in response to heavy livestock grazing, which prevented fires from spreading throughout these areas (Arno 1984). Management of livestock can also contribute to several other threats including the introduction of invasive species through intentional planting for forage, and by being accidentally transported on the animals or hay, habitat fragmentation from associated roads and some trails, and the extermination of competing (i.e., prairie dogs) and predatory (i.e., wolves) animals.

Invasive Species
Invasive exotic plants and animals were identified as a threat at 38% of the areas for plants (ranked with high severity and urgency at 6%) and 13% of the areas for animals (ranked with high severity and urgency at 4% of the areas). Some plants such as Canada thistle (*Cirsium canadensis*), yellow toadflax (*Linaria vulgaris*) and dalmatian toadflax (*Linaria genistifolia* ssp. *dalmatica*), and animals such as nonnative trout are widespread in the SRM. These invasive species often out-compete native species or disrupt natural processes native species need for survival. Non-native trout, introduced for sport fishing, out-compete and hybridize with native cutthroat trout, degrading the genetic purity of native trout populations (Oelschlaeger 1995). Invasive species, especially plants, often have a difficult time establishing in pristine, unfragmented areas. These species often arrive following disturbances or stresses to the landscape such as residential development, roads, utility corridor development, or long-term improper grazing.

Management of/for Certain Species
Management of certain species was identified as a threat at 21% of the areas (ranked with high severity and urgency at 5% of the areas). Ecosystem management, leading to the long-term viability of all native species, is often the goal. However, management of individual species is a reality and often a necessity, when species are especially rare or have very specific habitat requirements. Management to increase or decrease one species may be detrimental to an ecological system or another species. For example, management favoring exotic salmonids (e.g., brook trout, brown trout, and rainbow trout) negatively impacted or even eliminated the various subspecies of native cutthroat trout from streams (Oelschlaeger 1995). In some extreme cases,

such as with predator control of gray wolves, management has caused extirpations of SRM species.

Mining Practices

Mining practices were identified as a threat to the conservation targets at 51% of the areas, and ranked high for both severity and urgency at 10% of the areas. Mining—including hard rock mining, gravel mining, and quarrying—historically and currently occurs throughout the SRM. There are greater than10,000 active or abandoned mines in the SRM, many of which have degraded downstream aquatic, and riparian systems. Leaching of toxic chemicals and heavy metals has destroyed or seriously degraded aquatic systems downstream of release areas. Gravel mining destroys riparian vegetation and alters hydrology. Historic peat mining in South Park has significantly degraded and destroyed globally rare extreme rich fens (Sanderson and March 1996). While mining activities are a direct threat to aquatic targets, the associated fragmentation and weed invasion along roads impact many large-scale ecological systems.

Oil and Gas Exploration

Oil and gas exploration was identified as a threat to the conservation targets at 4% of conservation areas (ranked as high severity and urgency at 2% of the areas) based on observations made in the field over the past decade. This, however, does not reflect the current state of oil and gas exploration and development in the ecoregion. There is a great deal of new activity in the southwestern part of the ecoregion, particularly in the area south of Montrose, including San Miguel County, but it is also occurring in Jackson, La Plata, and Las Animas counties (Lahr, personal communication). Further work is needed on the current status and distribution of oil and gas activity and permitting.

Parasites and Pathogens

Parasites and pathogens were identified as a threat to the conservation targets at 31% of the areas (ranked as high urgency and severity at 29% of the areas). A chytridomycete fungus may be causing significant declines in the boreal toad and other anurans in the SRM ecoregion (Erin Muths, personal communication, Livo and Yeakley 1997). Another disease agent of serious concern in amphibians is the bacterium *Aeromonas hydrophila* (Alford and Richards 1999). Whirling disease is an urgent threat to all the native trout in the SRM and has significantly impacted salmonids in the United States and abroad (Granath 2000). Sylvatic plague is a serious disease that threatens the viability of populations of prairie dogs (USFWS 2000). Gunnison's prairie dog and the black-tailed prairie dog exhibited nearly 100% mortality when exposed to plague (Barnes 1993, Cully 1993), and the white-tailed prairie dog is likely susceptible to plague as well.

Recreational Use

Recreational use was identified as a threat to the conservation targets at 55% of the portfolio areas and was ranked with a high severity and urgency at 4% of the areas. Recreational vehicles were identified as a threat to the conservation targets at 20% of the areas (ranked with high severity and urgency at 2% of the areas). Recreational use, especially off-road vehicles, can degrade or destroy small populations of rare plants, disturb wildlife, modify habitat, spread invasive species, and fragment large-scale ecological systems (Knight and Gutzwiller 1995, Knight 2000). Recreational use—particularly motorized vehicle use—of the region's resources is expected to increase over the coming years (Shinneman et al. 2000). In Rocky Mountain National Park, exotic plant species were found to be significantly related to recreational use, specifically distance from trail edge, trailheads, and campgrounds, and level of trail use (Benninger-Truax et al.1992). Recreational activities are expected to increase significantly in the future (Flather and Cordell 1995).

Residential Development
Residential development was identified as a threat to the targets at 43% of the conservation areas. Additionally, commercial development was identified as a threat at 6% of areas, recreational development at 7% of areas, and general development at 1% of areas. Residential development was ranked with a high urgency and severity at 21% of the areas; commercial development was ranked at 3% of areas, and recreational development at 2% of areas. The majority of the portfolio areas are on public land, but a significant portion of low-elevation valleys and woodlands, riparian areas, and montane grasslands are in private ownership and susceptible to development.

Urban sprawl and expansion of low-density residential areas into natural landscapes are among the most significant threats to conservation targets in the SRM. Residential development is occurring at a faster rate than population growth, due to low-density suburban growth and a boom in exurban and rural “ranchette” development (tracts of land approximately 35 acres in size) (Theobald 2000). This low-density residential development is causing fragmentation and significant changes in land use with the conversion of forested and agricultural lands to development. Residential development and associated infrastructure and development (e.g., roads, commercial development, ski area expansion) cause fragmentation and habitat loss, remove and alter native vegetation, degrade wetlands and aquatic systems, increase human activity and recreation, inhibit wildlife movement, spread invasive species, and increase the need for water storage and transfers (Theobald 2000, Riebsame et al. 1997, Travis, personal communication). Residential development is scattered throughout the SRM, but much of the development is concentrated at mid- to low-elevation riparian zones (e.g., along the Front Range) and in high mountain valleys. The close proximity of forests to private developable lands restricts options for prescribed burning on nearby public lands and nearly 80% of forested land in Colorado is within three km of private land (Theobald 2000, Shinneman et al. 2000). According to one estimate, by 2020 nearly 25% of the total land area in the SRM will be replaced by urban and suburban landscapes, modified by exurban and “ranchette” development (Theobald 2000).

Roads and Utilities
Roads and utilities were identified as a threat to targets at 36% of the conservation areas (ranked with high urgency and severity at 6% of the areas). Road building is often associated with other threats including residential development and recreational use. Road building is one of the most damaging threats to intact landscapes, particularly regarding hydrological function and habitat fragmentation. Roads are corridors for dispersal of invasive species, inhibit some wildlife movement, and can cause elevated mortality of wildlife species (Baker and Knight 2000). An assessment of transportation effects on biodiversity in the SRM ecoregion found that numerous rare or imperiled species, including thirteen plants, boreal toad, mountain plover, four endangered Colorado River fish, and the Great Basin silverspot butterfly, as well as seven

significant plant communities, had occurrences that are vulnerable to impacts from construction and maintenance activities in transportation corridors within the SRM (CNHP 1999).

Trails
Trails were identified as the source of threats to conservation targets at 12% of the conservation areas (ranked high severity and urgency at less than 1% of areas). Recreational trails can fragment landscapes, inhibit wildlife movement and can serve as conduits for invasive species (Knight 2000). Impacts are variable in scope, severity, and scale (Forman and Alexander 1998, Miller et al. 1998, Trails and Wildlife Task Force 1998). Much of the variability of impacts is probably due to trail size, trail location, trail use, trail density, and species or community-specific responses to the above factors. As density increases, the effects of trails may be exhibited at the landscape scale. The effects of trails may act directly on species (e.g., direct disturbance or killing) or indirectly on systems and species (e.g., chasing away food species or transporting invasive exotic species into the area). Most "wildland" activities are supported by trails, including hunting, fishing, hiking, walking pets, riding horses, backpacking, skiing, climbing, mountain-biking, and some off-road vehicle use. With the increased demand for recreational access, trail numbers, density, and even widths are increasing, especially in riparian areas and near urban centers or special natural features (e.g., waterfalls, geological formations, and wildflower displays).

Water Management Practices
Water management practices were identified as a threat to the conservation targets at a total of 120 areas (dam/reservoir operation at 36% of the areas; ditches, dikes, drainages and/or diversions at 24% of the areas; groundwater manipulation at 4% of the areas; water quality impairment at 14% of the areas). Water-related threats that ranked with a high urgency and severity were dam/reservoir operation at 2%, ditches, dikes, etc. at 4%, and groundwater manipulation at 1% of the areas. There are greater than 1,000 dams in the SRM and numerous diversions, ditches, and tunnels, which have altered hydrologic functions and reduced water flows and quality, impacting aquatic and riparian systems and flooding natural wetlands and small ponds used by amphibians (Shinneman et al. 2000, Hammerson 1999). Human modification of watersheds and stream systems can lead to severe impacts on aquatic systems (Sousa 1984). Water quality impairment was documented as an issue for 25 areas (data from State 303d programs) but was not ranked. While the specific source of impairment is not known, accelerated sedimentation can result from timber harvest activities, road construction, and maintenance (Stednick 1987). Roads are thought to be the primary source of sediment in subalpine forests (Stednick 1987).

Conservation Area Activity Levels and Field Verification

Activity Levels
Every conservation area in the portfolio is important for conserving the full suite of biodiversity in the SRM. Because we have limited time and resources, it is important to identify the relative investment in time and energy needed in the next 10 years for each conservation area, or "activity level." This information will help land managers and conservation practitioners make decisions regarding the types of actions needed at particular areas and the timing of those activities. Conservation of biodiversity in the ecoregion requires some level of effort at every

conservation area, using both at the multi-site and local-level strategies, to ensure the long-term persistence of its targets. Proposed levels of conservation activity in the next 10 years will differ depending on the conservation value and the urgency of threats to the targets at an area. The type of activity will also vary from area to area. For example, if the conservation area is ranked low in the field verification assessment (see below) then the first activity might well be a biological inventory. Conservation of the entire portfolio is the goal; therefore, some level of conservation action should be taken at all areas. The activity level serves primarily to indicate how much effort should be devoted to an area relative to others and may be used to infer which areas require significant attention sooner as opposed to later.

The team determined activity level by ranking conservation areas (with a high, medium and low) using two factors: conservation value and threat, based on information gathered from natural heritage programs, experts workshops, and team member expertise. These factors are defined below.

- *Conservation value* consists of a combination of the uniqueness of the conservation area (number of globally imperiled targets at the site) and the landscape integrity (rough estimate of viability of targets using a modified suitability index-see Portfolio Design Methods section in Appendix 12). Uniqueness was given twice the weight of landscape integrity to emphasize the need to work on irreplaceable areas, areas that might be lost forever if threats are not abated. Priority was given to areas with multiple imperiled targets with high landscape integrity. Lower priority was given to areas with no imperiled targets and low landscape integrity.

- *Threat* refers to both the urgency and severity of threat (see Threats Assessment section above) to the targets at a conservation area. Urgency of threat was weighted twice as high as severity to help inform the timing of specific conservation action needed. Priority was given to areas with a high threat rank for urgency. Conservation areas ranked high for threats may need more immediate and/or intensive amount of conservation action, although all areas should receive some level of action.

Each conservation area was assigned an activity level indicating the amount of conservation effort needed in the short-term to abate threats and to ensure the long-term persistence of targets. This is based on the assumption that areas with high conservation value and high threat need a higher level of activity to prevent loss of targets than do areas ranked low. Many of these areas likely need more intensive action over a shorter time period. Definitions of the activity levels are below.

Activity Level 1: Areas ranking high for conservation value and/or threats. These areas need effective conservation results within the next 10 years. They may need a higher level of effort, time, and resources within the next 10 years, relative to other areas, given current level and trend in threats.

Activity Level 2: Areas ranking moderate for conservation value and/or threats. These areas need monitoring of the threats and status of conservation targets. These areas need a moderate level of effort, time, and resources within the next 10 years, relative to other areas, given current level and trend in threats.

Activity Level 3: Areas ranking low for conservation value and/or threats. These areas need monitoring of the threats and status of conservation targets, but a lower level of effort, time, and resources within the next 10 years, relative to other areas, given current level and trend in threats.

See Map 17 for the portfolio of conservation areas categorized by conservation value (with occurrences of G1-G2 targets) and Table 19, Map 18, and Appendix 18 for conservation areas categorized by activity level. Of the 188 total portfolio conservation areas, 47 (25%) ranked as Activity Level 1, 101 (54%) ranked as Activity Level 2, and 40 (21%) ranked as Activity Level 3 in this assessment. Please note that these ranks may change as new information becomes available; this analysis should be updated periodically to reflect new information.

Field Verification

In addition to activity level, the team assessed conservation areas to determine the amount of land within the area that has been field verified vs. identified using the predictive model (mostly for coarse-scale targets such as aquatic and terrestrial systems). Each hexagon (planning unit of analysis) within the conservation area was ranked according to the degree it was field verified. Field verified sites often have specific location and viability information regarding the targeted species and communities, based on field inventory. Areas with high degree of field verification of the targets are considered ready for site conservation planning and/or conservation action to abate critical threats. Areas ranking low for field verification of targets were identified based largely on modeled, predictive and/or remotely sensed information. Areas with little or no field verification but ranked high for activity level are priorities for field inventory and validation of model predictions (and to ground-truth system type, distribution and viability). This methodology was developed by Theobald (personal communication) and modified by the team for this assessment. Definitions of categories of field verification are below.

High: Areas with high degree of field verification. Areas are considered ready for more detailed site conservation planning and/or conservation action.

Medium: Areas with some field verification. Some inventory needs to be done to verify presence of predicted or modeled ecological systems and other conservation targets prior to site conservation planning and/or conservation action. Portions of the area may be ready for conservation planning and/or conservation action.

Low: Areas with little or no field verification. Extensive inventory is needed to verify presence of predicted or modeled ecological systems and other conservation targets prior to site conservation planning and/or conservation action.

Of the 188 total portfolio conservation areas, 61 areas (32%) have a high degree of field verification, 84 areas (45%) have some field verification and 43 (23%) have little or no field verification. See Table 19 and Map 19 for the results of this analysis. Twelve sites ranked high for both activity level and field verification: Cross and Fall Creek, Estes Park, Great Sand

Dunes/San Luis Lakes, Harden Creek, Mill Creek, Morrison Creek, Mt. Callahan, North Park Sand Dunes, Roan Cliffs, San Miguel River, Snowy Range, and Unaweep.

Table 19. Conservation Area Activity Levels and Field Verification.

Site #	Site Name	State	Field Verification Level
	Activity Level 1		
9	Berthoud Pass	CO	Medium
23	Cheesman	CO	Medium
31	Coyote Creek	NM	Medium
32	Crested Butte	CO	Medium
33	Cross and Fall Creeks	CO	High
36	Culebra Range	CO, NM	Medium
51	Estes Park	CO	High
53	Flat Tops	CO	Medium
59	Glenwood Canyon	CO	Medium
64	Great Sand Dunes/San Luis Lakes	CO	High
66	Greenhorn Mountain	CO	Medium
70	Gunnison Basin	CO	Low
71	Harden Creek	WY	High
76	Horseshoe Creek	WY	Low
79	Huston Park	WY	Medium
82	Jemez Mountains	NM	Medium
87	Laramie Foothills	CO, WY	Medium
88	Laramie River	CO, WY	Medium
96	Lynx Link B	CO, WY	Low
100	Middle Arkansas River	CO	Medium
102	Mill Creek	WY	High
104	Morrison Creek	CO	High
105	Mosquito Range	CO	Medium
106	Mount Callahan	CO	High
114	North Cameron Pass	CO	Medium
109	Mount Zirkel	CO, WY	Medium
117	North Park Sand Dunes	CO	High
119	North St Vrain	CO	Medium
127	Piedra River	CO	Medium
128	Pikes Peak	CO	Medium
138	Rifle Reach/Colorado River	CO	Medium
144	Roan Cliffs	CO	High
150	Sage Creek	CO	Medium
152	San Miguel River	CO	High
153	Sangre de Cristo Mtns	CO	Medium
154	Sapello/Mora Valleys	NM	Low
160	Snowy Range	WY	High
157	Slater Park	CO, WY	Low
165	South Park	CO	Medium
166	South San Juan	CO	Medium
167	Southern Sangre de Cristo Mountains	NM	Low

Site #	Site Name	State	Field Verification Level
170	St Charles River	CO	Medium
178	Unaweep	CO	High
179	Uncompahgre/Red Cloud	CO	Medium
182	Vermejo Park/Upper Purgatoire	CO, NM	Low
183	Wallrock Creek	WY	Low
188	Yampa River	CO	Medium
Activity Level 2			
1	Agua Caliente	NM	Medium
2	Animas River	CO	Medium
3	Archuleta Creek	CO	Low
4	Baldy Chato	CO	High
5	Baldy Cinco	CO	High
10	Big Dominguez River	CO	Medium
11	Billy Creek Uplands	CO	High
12	Black Mountain	CO	Low
13	Box Elder Creek	WY	Low
14	Brush Creek at Cannibal Point	CO	Medium
15	Burning Mountain	CO	High
16	Butler Creek	CO	High
17	Butterfly Haven	CO	Medium
18	Canyon Largo	NM	Low
19	Carnero Creek	CO	High
20	Castle Peak	CO	Medium
21	Cattle Creek	CO	High
24	Cimarron River	CO	Medium
26	Conejos River	CO, NM	Medium
27	Conundrum	CO	Low
28	Corral Creek	WY	Low
29	Cottonwood Crk S San Juans	CO	Low
30	Cottonwood Pass	CO	Medium
34	Crown	CO	High
35	Crystal Lake Creek	CO	Medium
37	Cumbres Pass Link	CO	Medium
38	Dark Canyon	CO	Medium
41	Debeque Canyon	CO	Medium
42	Debeque South	CO	Medium
124	Disappointment Valley	CO	Medium
43	Dry Laramie River	WY	Low
44	Eagle River at Gypsum	CO	Medium
47	East Rifle Creek	CO	Medium
49	Endlich Mesa Basin	CO	High
50	Escalante River	CO	Medium
52	Fall Creek	CO	Low
55	Forbes/Sheep Mountain	WY	Low
56	Fossil Ridge	CO	Medium
57	Fryingpan River	CO	High

Site #	Site Name	State	Field Verification Level
58	Garden Park	CO	Medium
60	Golden Gate Canyon	CO	Medium
61	Gore Range	CO	High
62	Gray Mountain	CO	High
63	Grays/Torrey	CO	High
65	Green Mountain	CO	Medium
67	Greenie Mountain	CO	Medium
68	Grizzly Peak	CO	High
69	Guanella	CO	Medium
73	Hermit Park	CO	High
77	Huerfano Grasslands	CO	Low
78	Hunter	CO	Medium
81	Jemez Canyon Reservoir	NM	Low
84	La Bonte Creek	WY	Low
85	La Garita	CO	Medium
86	La Veta Pass Link	CO	Low
89	Lawhead Gulch	CO	Low
91	Little Coal Creek	CO	Medium
92	Lizard Head	CO	Medium
93	Long Gulch	CO	High
95	Lower Poudre	CO	Medium
97	Lynx Link 3	CO	Medium
99	McClure Pass	CO	Medium
103	Montezuma Creek	CO	Low
110	Muddy Creek	CO	Medium
112	Naturita Creek	CO	Medium
113	North Boulder Creek	CO	High
115	North Laramie River	WY	Low
116	North Park	CO	Medium
118	North Platte River	WY	Low
121	Ojo Caliente	NM	Medium
122	Ouray	CO	Medium
123	Pagosa Springs	CO	Medium
129	Platte River	CO, WY	Low
131	Pryor Creek	CO	High
132	Punche Valley	CO, NM	Medium
133	Questa	NM	High
134	RaJadero Canyon	CO	Medium
135	Red & White Mtn	CO	High
139	Rio Chama	CO, NM	Low
140	Rio Grande	CO	Medium
141	Rio Grande Gorge	NM	Medium
142	Rio Grande Pyramid	CO	High
143	Rio Hondo	NM	Medium
146	Rocky Fork Creek	CO	High
149	Roubideau	CO	Medium

Site #	Site Name	State	Field Verification Level
158	SLV Greasewood	CO	Medium
159	Snowmass Creek	CO	Medium
161	South Arkansas River	CO	Medium
162	South Cameron Pass	CO	High
164	South Fork Bear Creek	WY	Low
168	Squaw Creek	CO	Medium
169	Squirrel Creek	CO, WY	High
171	Taos Pueblo	NM	Low
174	Trickle Mountain	CO	Medium
175	Troublesome Creek	CO	Medium
176	Troublesome Headwaters	CO	Low
177	Turtle Rock	WY	Medium
180	Upper San Luis Valley	CO	High
185	West Lake Creek	CO	High
186	Wolf Creek	CO	Medium
187	Woody Creek Headwaters	CO	Medium
Activity Level 3			
6	Beaton Creek East	CO	High
7	Beaver Creek - Lone Cone	CO	Medium
8	Bennett Creek - South	CO	High
22	Chacon Canyon	NM	Low
25	Colona Mountain	CO	High
39	Dawson Draw Canyon East	CO	High
40	Death Valley Creek	CO	High
45	East Divide Creek	CO	High
46	East Mancos River	CO	High
48	Elk Ridge	CO	Low
54	Florida Creek	CO	Low
72	Hardscrabble	CO	High
74	Highway Spring	CO	High
75	Hondo Creek, Rito	CO	High
80	Iron Creek	WY	High
83	Kenosha	CO	Low
90	Lion Creek	CO	High
94	Lower Dolores River	CO	Medium
98	Marten Link A	CO	Low
101	Middle Fork Powderhorn Creek	CO	High
107	Mount Falcon North	CO	Low
108	Mount Massive	CO	High
111	Mule Creek	WY	Low
120	Oak Ridge	CO	Low
125	Pass Creek	WY	Low
126	Pennock Mountain	WY	Low
130	Pleasant Valley Creek	CO	High
136	Red Buttes	WY	High

Site #	Site Name	State	Field Verification Level
137	Rifle Hogback	CO	High
145	Rock Mountain	WY	Low
147	Rogers Unit	CO	High
148	Romley	CO	Medium
151	San Juan River	CO	High
155	Sharkstooth Trail	CO	High
156	Shell Creek	WY	Low
163	South Cottonwood Creek	WY	High
172	Tipperary Creek	CO	High
173	Tomichi Creek	CO	High
181	Ute Trail	CO	Medium
184	West Dallas Creek	CO	High

Updating the Activity Levels and Field Verification

Threats to targets and information regarding targets change over time. The results of this analysis are our best predictions based on existing data. The assessment of activity level and field verification is a dynamic process and should be updated on a regular basis. This analysis should be revisited every two years or as major changes and information become available.

DATA GAPS/RESEARCH AND INVENTORY NEEDS

Throughout the project, the team documented the data gaps, research and inventory needs for the ecoregion. There are both broad and specific data gaps and research needs. Broad research needs include conservation goals, viability, inventory, portfolio design and analysis, threats, wide-ranging mammals, and climate change. Specific data gaps are listed by conservation target group to help drive future research and inventory in the ecoregion.

Broad Data Gaps/Research Needs

Conservation Goals

Conservation goals need to be tested and assumptions validated. Inventory efforts should be directed towards targets that did not meet conservation goals, particularly those not represented or documented in the portfolio.

Viability

Viability specifications were developed to assess the viability or integrity of priority (highly ranked) species and all terrestrial ecological systems. Specifications are needed for all targets (and need to be applied) in the ecoregion. These viability specifications should be refined as new information is obtained on targets and should be validated. Also, field assessments of the viability of a number of conservation targets lacking data are needed.

Inventory

Inventory efforts should be a priority in those conservation areas with low field verification but high activity level. The aquatic ecological systems should be one of the highest priorities for systematic and comprehensive inventory—to field validate the initial classification developed through this assessment. Further field validation is also needed for the terrestrial ecological systems, including assessments of integrity (e.g., quality and condition), extent, and threats. A number of conservation targets were not represented in the portfolio or did not meet goals due to lack of data; these targets should be priorities for future inventory efforts (particularly the invertebrates, reptiles, and plants). Finally, targets that are already protected within the GAP Analysis protected areas network, particularly relatively common endemic species, should be documented.

Portfolio Design and Analysis

The team was unable to conduct extensive analyses of alternative portfolios due to time constraints. Further refinement of the SITES model is recommended, particularly so that users can easily document what targets are selected at an area and which targets met goals. One important post-portfolio analysis that is needed is to test the coarse filter to see how well it captures common species and watch-listed species. Another step that needs to be completed is an evaluation of targets and conservation areas along boundaries of adjacent ecoregions. Finally, the SRM ecoregional database needs to be updated with information provided by reviewers of this report.

Threats

Further analysis is needed to better understand pattern of multi-area threats, target type, and land ownership. More information about current and future threats is needed for conservation areas. Future efforts might include an experts workshop to obtain more information about threats and policies that might be impacting the conservation targets. Levels and impacts of current activities, such as oil and gas exploration, need to be investigated.

Wide-Ranging Mammals

This assessment is a first attempt at a preliminary functional network, based on the targeted wide-ranging mammals. A range-wide approach to these species can be achieved by analyzing wide-ranging mammals at the multi-ecoregional level and incorporating new analyses and information resulting from nearby ecoregions.

Climate Change

Global warming could accelerate a number of the threats to conservation targets within the portfolio, such as spreading of invasive species and increasing the risk of devastating wildfires. While the team designed the portfolio to ensure that it spans the full range of climatic gradients and that individual sites span the greatest possibly altitudinal range within contiguous natural areas, addressing specific impacts of global climate change was beyond the scope of this assessment. Further work is needed to guide conservation efforts in light of different climate change scenarios. For example, it would be useful to predict level of endangerment for certain species (especially in the alpine zone) and ecological systems based on certain global warming scenarios.

Data Gaps/Research Needs by Target Group

Amphibians/Reptiles

- Further work is needed to document other amphibian and reptile targets within sites.
- Information is needed on chytrid fungus impacts on amphibians in the ecoregion.
- Great Plains toad and short-horned lizard need genetic studies to determine whether the San Luis Valley population warrants separate taxonomic recognition.
- Research is needed to determine the causes of decline in the northern leopard frog.
- Inventory is needed for amphibians and reptiles in the slower backwaters of upper Rio Grande and Chama Rivers near Albiquiu Reservoir.
- Resolve taxonomic issues of the variable skink.
- Research is needed to determine the taxonomic status of boreal toad populations, specifically the degree to which they are related to populations in the Utah Wyoming Rocky Mountains.
- Research is needed to determine taxonomic status of the wood frog (and relation to northern populations).
- Inventory of wetland habitats is needed in the northern Laramie Mountains.

Aquatic Ecological Systems/Aquatic Species

- A biotic classification is needed, with ground-truthing of ecological systems identified through biophysical modeling.
- Work with CDOW and others to update native fish surveys of Crystal, Roaring Fork, and Upper Colorado rivers
- Work with CDOW and other state fish and game agencies to monitor trends in salmonid diseases (i.e., whirling disease).
- Further evaluate viability criteria for targeted fish species.
- Need to determine the taxonomic status of the sculpin populations in the Eagle River.
- Revisit conservation goals for pikeminnow and razorback sucker in light of new recovery goals for these taxa once they are finalized.

Birds

- Research is needed on the dependence of dipper on water quality, reproductive success in areas with high recreational use, and on limiting factors, such as winter habitat.
- Research is needed on the importance of Virginia's warbler post-breeding habitat, and rates of nesting production, habitat sources/sinks, cowbird impact, habitat requirements, and model densities on protected areas to see how much we are protecting.
- Determine the levels of interaction among populations/individuals of South Park and the Great Plains mountain plover.
- Identify demographic and population parameters of ferruginous hawks in the ecoregion.
- Determine status of short-eared owl.
- Obtain and incorporate most recent data sets from grouse researchers (particularly Columbian sharp-tailed grouse, greater sage grouse) into future iterations of the portfolio; address these species in site conservation planning; determine causes of decline and potential for habitat enhancement for greater sage grouse.

- Once ecoregional plans are completed across the country, address migratory birds in a network of conservation areas.

Invertebrates

- Research needed on distribution and viability of a number of invertebrate groups.
- The following groups need inventory work: spiders, myriapods, solitary bees, moths, leaf hoppers, mollusks, branchiopods, high-elevation syrphid flies, low-elevation tiger beetles, Ephemeroptera, Trichoptera, Plecoptera limited to riparian systems, specialist groups associated with rare plants, bog and fen arthropods, arthropods associated with particular ecological systems, potential use of coarse filter to predict locations.
- Survey invertebrates of wetlands, marshes, alpine meadows, saline playas, springs, and wet meadows.
- Need distribution data for invertebrates.
- Collect, organize, and evaluate existing data on invertebrate distributions and status in SRM; use results to guide organized survey efforts.
- Investigate pollinator relationships.
- Inventory high-priority aquatic and terrestrial systems.
- Correlate invertebrate distribution with terrestrial and aquatic systems.
- Review species of major collections (e.g., CSU).

Mammals

- Need information for several small mammal targets, including the Plains pocket mouse, Goat Peak pika, and pygmy shrew.
- Need to determine status of mink *(Mustela vison)* (on the New Mexico Fish and Game list as extirpated).
- Need to determine status of Gunnison and white-tailed prairie dog populations.
- Clarify the range and potential overlap of Preble's meadow jumping mouse and the Western jumping mouse.
- Need to determine the status of the *Thomomys botae rubidus* subspecies of Botta's pocket gopher.
- Investigate/update the conservation status of bats in the SRM.
- Need to determine the status of badger, bobcat, and spotted skunk

Plants

- Inadequate information to assess data gaps for most non-vascular plant species, lichens, and fungi.
- Inadequate information to assess data gaps for most ferns and fern allies.
- Parish's alkali grass (*Puccinellia parishii*), G2, should be included on target list for next iteration.
- Mosses and lichens need inventory, particularly gypsum specific lichens.
- Assess impacts of medicinal plant collection.
- Need viability assessment of G3 species occurrences.
- Need to research the pollination ecology, breeding systems and autecology of selected species.

- Selected areas needing botanical inventory include Tribal lands, west end of Dolores County, private lands in Laramie Range, Wyoming, Tarryall Mountains, Cochetopa Hills, Taylor Ranch, Bear's Ears.

Terrestrial Ecological Systems / Plant Communities

- Nearly all terrestrial/palustrine ecological systems are moderately well understood and documented. Further ground-truthing of the vegetation map is needed. Existing ELU/vegetation combinations provide a useful structure to develop an efficient sample design (matched with road/trail networks), facilitating future refinements to the classification and description of terrestrial ecological systems and component plant communities.
- Additional literature review and field research should focus on documenting key dynamic processes, such as fire (size, frequency, intensity, etc.) and flow regimes in terrestrial and palustrine ecological systems.
- Terrestrial caves throughout the ecoregion are much less well documented than are plant communities. These systems should be systematically inventoried and characterized throughout the ecoregion.
- Less common ecological systems, including montane fens and ponderosa pine savannas, should be high priorities for further inventory. These systems and their component communities would be most effectively inventoried through systematic ecoregion-wide inventory.
- Several common small-patch and linear ecological systems were likely well represented in the portfolio, but sufficient occurrence information to document this is lacking. Ground truthing of potential conservation areas should include some focus on all four major riparian ecological systems (lower montane and foothill systems being highest priority), wet meadow, and freshwater marsh.
- None of the 79 rare terrestrial communities targeted in the SRM had sufficient numbers of occurrences to meet initial conservation goals. In many cases, sufficient numbers of occurrences are known from certain sections, but ecoregion-wide occurrence numbers are inadequate. Additional analysis of occurrence data, inventories and further documentation of rare communities, and refinement of conservation goals for each community based on this additional effort, are needed.
- Some effects of land use on ecological systems were noted during expert workshops: Is Green rabbitbrush in San Luis Valley (Costilla County) dominant because of past sheep grazing? Is it really a degraded winterfat/blue grama grass community? There is a potential to address these questions using historical survey records.
- Additional documentation of management issues is needed for each ecological system type.
- Further inventories of montane grassland ecological systems in the central part of the Laramie Range in Wyoming are needed.
- Classification of upland plant communities needs further revision (similar to riparian communities). Revisit global ranks on upland plant communities, including Ponderosa pine/Arizona fescue and bristlecone pine.

NEXT STEPS AND RECOMMENDATIONS

Conserving the entire portfolio of site across the SRM ecoregion will require conservation action at two levels:

- Conservation area specific strategies—This will involve working on the ground at conservation areas to address threats such as development and invasive species. Conservation actions will include work with private landowners to modify management practices or to place lands under conservation easements and work with public land managers to influence the use and management of public lands.

- Multiple conservation area strategies—Some threats are pervasive throughout the ecoregion, and can be most efficiently addressed through policy initiatives or the creation of new programs, such as increasing tax benefits for land and water conservation.

To develop the most effective conservation strategies, we first need to learn more about the threats to the conservation targets at individual conservation areas as well as to better understand the issues affecting multiple conservation areas. Then, we need to think creatively about ways to have greater impact in addressing threats and achieving lasting conservation results.

Recommended action steps toward achieving conservation of the SRM ecoregional portfolio:

1. Disseminate and share results of assessment with partners and interested entities.
2. Prioritize data gaps, inventory and research needs, and develop a plan to address these issues.
3. Conduct further analyses of the portfolio to better understand land ownership, targets and threat patterns of the portfolio.
4. Work with public and private partners to develop multi-area strategies to address pervasive threats; develop strategies for both area-specific and multi-area levels to protect the entire portfolio; focus on systemic multi-area threat abatement through changing policies.
5. Develop measures of success for the ecoregion.
6. Develop and update threats and areas needing immediate attention based on new information to guide conservation action.
7. Develop a five-year plan for completing rapid site conservation plans for portfolio conservation areas. Through the site conservation planning process, targets, viability, and threats will be refined, and conservation strategies will be developed to abate threats and ensure long-term viability of targets.
8. Initiate an effort to ground-truth aquatic areas and build an aquatic classification based on biological information (current classification is largely based on abiotic features).
9. Update/revise ecoregional assessment periodically so that it includes new information as it becomes available. The Nature Conservancy of Colorado will serve as the data repository and will disseminate new information as appropriate.
10. Educate public on systemic or pervasive threats.

LESSONS LEARNED

Challenges and Recommendations

During the course of this ecoregional assessment, the team encountered many challenges as well as successes. The following is a brief summary of key lessons learned from the project. This is provided to help future teams updating or revising this plan as well as other ecoregional teams.

Data Management

- There were many small but time-consuming issues in developing fine-filter data (missing ranks, distribution) and there were complications in making changes to ecological systems, such as cave systems.
- Preparing data for running SITES was extremely time-consuming; it would be best to allow ample time to analyze data from SITES runs.
- It would be best to have a full-time GIS manager/data manager for project.
- Reconciling different data sets from three states was time-consuming.

Experts Workshop

- Hold experts workshops in several key locations to maximize geographic expertise.
- We recommend obtaining information at the occurrence rather than site level for using data optimally in running SITES program.

Project Management

- Most steps of the assessment took longer than anticipated. This may be due to the large size of the data set and may also be due to the decision to use SITES.
- Allow ample time after completion of portfolio for analysis and evaluation prior to conducting threats analysis and action steps.

Portfolio Design

- Preparing data to get ready to run the SITES program was time-consuming, but given our growing experience with this software, there are many potential efficiencies that could be better integrated into the data gathering/processing steps (e.g., see comments on expert workshops).
- It would be helpful for technical teams/experts to clean up the portfolio before taking to broad group
- Use of the SITES program provides us with opportunities to further evaluate the portfolio in a wide variety of ways, provide a great degree of transparency and repeatability, and will be useful for periodic updates to the ecoregional assessment.
- SITES requires additional steps to tell which targets were selected to meet goals for a particular site; this is a serious drawback and needs attention.

Threats

- Ranking threats into one of three categories may not have sorted out threats very well. It might be better to use four categories (very high, high, medium and low) if information is available.

Wide-Ranging Mammals

- Wide-ranging mammals would be better analyzed at the multi-ecoregional level.
- Continue to follow the research work of Carlos Carroll and others on wide-ranging mammals and incorporate their results into future updates of the portfolio.

SUMMARY AND CONCLUSIONS

The primary product of this assessment is an ecoregional portfolio of conservation areas, based on the best available and current information, representing the targeted species, natural communities, and ecological systems of the SRM. The portfolio consists of 188 sites encompassing 19.8 million acres, or roughly 50% of the ecoregion. The ecoregional portfolio is considered a conservation blueprint—a vision for conservation success—to guide public land managers, land and water conservation organizations, private landowners and others in conserving natural diversity within this ecoregion. The goal is to conserve the entire portfolio of conservation areas, which will require a combination of actions, including on-the-ground action at specific conservation areas and multiple-area strategies to abate pervasive threats to targets across the ecoregion.

More than 65% of the land area within the portfolio is federal or state managed lands and 34% is in private ownership. The primary land managers, based on the extent of the areas that they manage, are the U.S. Forest Service, private landowners, states, Bureau of Land Management, National Park Service, and tribal authorities. Partnerships among public land management agencies, private landowners, and private organizations are critical to achieve conservation success of the portfolio.

The SRM portfolio provides an opportunity for us to identify multi-area approaches to implement biodiversity conservation efficiently across the ecoregion. Some priority actions should be taken to assure conservation success within the SRM portfolio conservation areas. These include but are not limited to: 1) ensure that key landowners and land managers are aware of the results of this assessment and the biodiversity significance of the lands they own and manage; 2) develop multi-area strategies to abate pervasive threats, including residential development, fire management practices and parasites/pathogens; 3) develop site conservation plans for portfolio conservation areas in order to determine site specific strategies for threat abatement; and 4) focus inventory efforts on ecological systems and species lacking sufficient occurrence information and conservation areas with little or no field verification.

Because information on targets and threats changes over time, ecoregional planning is a dynamic and iterative process. Additions and revisions should be sent to The Nature Conservancy of Colorado. This assessment should be updated periodically, at least every five years, to incorporate new information on targets and threats to targets within the ecoregion.

LITERATURE CITED

Agree J. K. 1982. True fir management for wilderness, water, recreation and wildlife values. Pages 227-237. In Oliver D. C., R. M. Kenady. Proceedings of the biology and management of true fire in the Pacific Northwest symposium, 1981 February 24-26, Seattle-Tacoma, WA. University of Washington, College of Forest Resources: Contribution No. 5, Seattle, WA.

Alexander, B. G. Jr., F. J. Ronco Jr., E. L. Fitzhugh and J. A. Ludwig. 1984. A classification of forest habitat types of the Lincoln National Forest, New Mexico. Gen. Tech. Rep. RM-143, USDA Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO. 29 pp.

Alexander, R. R. and F. J. Ronco Jr. 1987. Classification of the forest vegetation on the National Forests of Arizona and New Mexico. USDA Forest Service Rocky Mountain Forest and Range Experiment Station Research note RM-469: 1-10.

Alford, R. A.and S. J. Richards. 1999. Global amphibian declines: A problem in applied ecology. Annu. Rev. Ecol. Syst. 30:133-165.

Andelman, S., I. Ball, F. Davis, and D. Stoms. 1999. SITES V1.0: An analytical toolbox for designing ecoregional conservation portfolios. An unpublished manual prepared by the National Center for Ecological Analysis and Synthesis, University of California at Santa Barbara, CA. 42 pp.

Anderson, M, P. Comer, D. Grossman, C. Groves, K. Poiani, M. Reid, R. Schneider, B. Vickery & A. Weakley. 1999. *Guidelines for Representing Ecological Communities in Ecoregional Plans*. The Nature Conservancy.

Andrews, R. and Righter, R. 1992. *Colorado Birds: A Reference to their Distribution and Habitat*. Denver Museum of Natural History. Denver, CO. 442 pp.

Armstrong, D. 1972. *Distribution of Mammals in Colorado.* Monograph of the Museum of Natural History, The University of Kansas (3). 415 pp.

Arno, S. F. 1984. *Timberline: Mountain and Arctic Forest Frontiers*. The Mountaineers, Seattle, WA. 304 pp.

Association for Biodiversity Information. 2001. International classification of ecological communities: terrestrial vegetation. Natural Heritage Central Databases. Association for Biodiversity Information, Arlington, VA.

Bailey, R. 1995. *Description of the Ecoregions of the United States*. USDA Forest Service. Misc. Publication # 1391.

Bailey, R. 1998a. Ecoregions map of North America: Explanatory note. USDA Forest Service, Misc. Publication no. 1548. 10 pp. + map scale 1:15,000,000.

Bailey, R. 1998b. *Ecoregions: the Ecosystem Geography of the Oceans and Continents.* Springer-Verlag New York Inc., New York. 176 pp.

Baker, W. L. 1992. Structure, disturbance, and change in the bristlecone pine forests of Colorado. Arctic and Alpine Research 24(1): 17-26.

Baker, W. L. and R. L. Knight. 2000. Roads and forest fragmentation in the southern Rocky Mountains. In *Forest Fragmentation in the Southern Rocky Mountains*, R.L. Knight, F.W. Smith, S.W. Buskirk, W.H. Romme, and W.L. Baker, editors. University Press of Colorado: Boulder, Colorado. Pgs. 97-122.

Baron, J.S., D. M. Theobald, and D. B. Fagre. 2000. Management of land use conflicts in the United States Rocky Mountains. Mountain Research and Development 20(1): 24-27.

Barnes, A. M. 1993. A review of plague and its relevance to prairie dog populations and the black-footed ferret. In *Management of Prairie Dog Complexes for the Reintroduction of the Black-footed Ferret*, J. Oldemeyer, D. Biggins, B. Miller, and R. Crete, eds. Biological Report No. 13, U. S. Fish and Wildlife Service, Washington D.C. Pgs. 28-37.

Benedict, A. D. 1991. *A Sierra Club Naturalist's Guide: The Southern Rockies*, Sierra Club Books, San Francisco, California.

Benninger-Truax, M., J. L. Vankat, and R. L. Schaefer. 1992. Trail corridors as habitat and conduits for movement of plant species in Rocky Mountain National Park, Colorado, USA. Landscape Ecology 6:269-278.

Blair, R. (ed.). 1996. *The Western San Juan Mountains: their Geology, Ecology, and Human History*. University Press of Colorado, Niwot, CO. 406 pp.

Caldwell, M.M. 1968. Solar ultraviolet radiation as an ecological factor in alpine plants. Ecol. Monographs 38:243-268.

Capinera, J. L. and T. S. Sechrist. 1982. Grasshoppers (Acrididae) of Colorado: Identification, biology, and management. CSU Experiment Station, Fort Collins. Bull No. 584S.

Carroll, C. 2000. Personal communication to Bill Merkle. Conservation Science Inc., Corvallis, Oregon.

Cincotta, R.P. and R. Engleman. 2000. *Nature's Place: Human Population and the Future of Biological Diversity*. Population Action International, Washington DC.

Coles, J. 2001. Personal Communication to Pat Comer. Colorado Natural Heritage Program, Denver, Colorado.

Colorado Natural Heritage Program. 1999. Assessing transportation effects on biodiversity in the Southern Rocky Mountain ecoregion. Prepared for the Colorado Dept. of Transportation.

Colorado Natural Heritage Program. 2000. Unpublished Data. Colorado State University, Ft. Collins, Colorado.

Comer, P. 2001. Description of ecological zones within elevation zones in the Southern Rocky Mountains. Report on file at The Nature Conservancy of Colorado and Western Resources Office, The Nature Conservancy, Boulder, Colorado.

Cox, J., R. Kautz, M. MacLaughlin, & T. Gilbert. 1994. *Closing the Gaps in Florida's Wildlife Habitat Conservation System*. Tallahassee: Florida Game and Fish Commission.

Cully. 1993. Plague, prairie dogs, and black-footed ferrets. In *Management of Prairie Dog Complexes for the Reintroduction of the Black-footed Ferret*, J. Oldemeyer, D. Biggins, B. Miller, and R. Crete, eds. Biological Report No. 13, U. S. Fish and Wildlife Service, Washington D.C. Pgs. 38-49.

Dahl, T.E. 1990. *Wetlands Losses in the United States 1780's to 1980's*. U.S. Department of Interior, Fish and Wildlife Service, Washington, D.C. 21 pp.

De Buys, William. 1985. *Enchantment and Exploitation: the Life and Hard times of a New Mexico Mountain Range*. University of New Mexico Press, Albuquerque, NM. 394 pp.

Denver Post. 2001. Colorado helped propel 1990's economic boom. June 5, 2001.

DeVelice, R.L., J.A. Ludwig, W.H. Moir, and F. Ronco. 1986. A classification of habitat types of Northern New Mexico and Southern Colorado. U.S. Forest Service Technical Report RM-131. Rocky Mountain Forest and Range Experiment Station, Ft. Collins, CO.

DeVelice R. L. and J. Ludwig. 1983. Climax forest series of northern New Mexico and southern Colorado. Pages 45-53. In Moir W. H. and L. Hendzel. Proceedings of the workshop on southwestern habitat types, April 6-8, 1983, Albuquerque, NM. USDA, For. Ser., Southwestern Region, Albuquerque, NM.

Dick-Peddie, W.A. 1993. *New Mexico Vegetation: Past, Present and Future*. Univ. New Mexico Press, Albuquerque.

Dieterich, J. H. 1983. Fire history of southwestern mixed conifer: a case study. Forest Ecology 6: 13-31

Dobson, A. 1996. *Conservation and Biodiversity*. Scientific American Library, New York. p. 66.

Fitzgerald, J. P., C. A. Meaney, and D. M. Armstrong. 1994. *Mammals of Colorado*. Denver Museum of Natural History and University Press of Colorado, Niwot, CO.

Flather, Curtis H., and H. Ken Cordell. 1995. Outdoor recreation: historical and anticipated trends. Pages 3-16. In Richard L. Knight and Kevin J. Gutzwiller (editors). *Wildlife and Recreationists*. Island Press, Washington, D.C. 372 pp.

Forman, R. T., and L. E. Alexander. 1998. Roads and their major ecological effects. Annual Review of Ecology and Systematics. 29:207-231.

Fryberger, S. G., L. F. Krystinik and C. J. Schenk. 1990. Modern and ancient eolian deposits: Petroleum exploration and production. Rocky Mountain Section, Society of Economic Paleontologists and Mineralogists, Denver, Colorado.

Granath, W. O., Jr. 2000. Summary: 6th Annual Whirling Disease Symposium. Feb. 3-4, 2000, Coeur d'Alene, Idaho.

Gregg, R. E. 1963. *The Ants of Colorado*. University of Colorado Press, Boulder, Colorado. 792 pp.

Grossman, D.H., D. Faber-Langendoen, A.S. Weakley, M. Anderson, P. Bourgeron, R. Crawford, K. Goodin, S. Landaal, K. Metzler, K.D. Patterson, M. Pyne, M. Reid & L. Sneddon. 1998. *International Classification of Ecological Communities: Terrestrial Vegetation of the United States. Volume I: The Vegetation Classification Standard.* The Nature Conservancy. Arlington, VA.

Hammerson, G. 1999. *Amphibians and Reptiles in Colorado: A Colorado Field Guide*. Second Edition. University Press of Colorado and Colorado Division of Wildlife. Niwot, CO. 484 pp.

Hart, M.M., R.J. Reader, & J.N. Klironomos. 2001. Biodiversity and ecosystem function: Alternate hypotheses or a single theory? Bulletin of the Ecological Society of America. Vol. 82, No. 1. pp. 88-90.

Hocutt, C. H. and E. O. Wiley, eds. 1986. *The Zoogeography of North American Freshwater Fishes*. John Wiley and Sons: New York. Pgs. 519-613.

Hopkins W. E. 1982. Ecology of white fire. Pages 35-41. In Oliver D. C., R. M. Kenady. Proceedings of the biology and management of true fire in the Pacific Northwest symposium, 1981 February 24-26, Seattle-Tacoma, WA. University of Washington, College of Forest Resources: Contribution No. 5, Seattle, WA.

Johnston B. C. 1997. Ecological types of the Upper Gunnison Basin. Review draft. USDA, Forest Service, Gunnison, CO. 539 pp.

Hogan, T. 2001. Personal communication to Betsy Neely. Herbarium. University of Colorado. Boulder, Colorado.

Kaufmann, M.R., L. Huckaby, and P. Gleason. (in press). Pondrosa Pine in the Colorado Front Range: Long historical fire and tree recruitment intervals and a case for landscape heterogeneity. Proceedings, Joint Fire Science Conference and Workshop, Boise, ID. June 1999.

Kaufmann M.R., Moir W.H., Bassett R.L., Technical Coordinators. 1992. Old-growth forests in the Southwest and Rocky Mountain regions. Proceedings of a workshop; 1992 Mar 9-1992 Mar 13; Portal, Arizona. Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO: USDA Forest Service, General Technical Report RM-213. 106-120.

Kimball, S. and C. Moritz. 2000. Protected areas assessment: Southern Rocky Mountains ecoregion. Report prepared for the Nature Conservancy of Colorado. Boulder, Colorado.

Kingery, H. E. 1998. Editor. *Colorado Breeding Bird Atlas.* Colorado Bird Atlas Partnership and Colorado Division of Wildlife. 636 pp.

Knight, D. H. 1994. *Mountains and Plains: the Ecology of Wyoming Landscapes*. Yale University. 338 pp.

Knight, R.L. 2000. Forest fragmentation and outdoor recreation in the Southern Rocky Mountains. In *Forest Fragmentation in the Southern Rocky Mountains*, R.L. Knight, F.W. Smith, S.W. Buskirk, W.H. Romme, and W.L. Baker, editors. University Press of Colorado: Boulder, Colorado. Pgs. 135-153.

Knight, R. L., and K. J. Gutzwiller (editors). 1995. *Wildlife and Recreationists*. Island Press, Washington, D.C. 372 pp.

Kontradieff, B. and P. Opler. Unpublished data. Colorado State University, Ft. Collins, Colorado.

Kontradieff, B. 2000. Personal communication to Betsy Neely and Chris Pague. Colorado State University, Ft. Collins, Colorado.

Lahr, H. A. 2001. Personal communication to Betsy Neely. Volunteer, The Nature Conservancy, Boulder, Colorado.

Livo, L. and D. Yeakley. 1997. Comparison of current with historical elevational range in the boreal toad, *Bufo boreas*. Herpetological Review 28: 143-144.

MacArthur, R. H. and E. O. Wilson. 1967. *The Theory of Island Biogeography*. Princeton Univ. Press, Princeton, New Jersey.

McNab, W.H. and P. E. Avers. 1994. *Ecological Subregions of the United States: Section Descriptions*. U.S. Department of Agriculture, Forest Service. WO-WSA-5. Washington, DC.

Mehl, M.S. 1992. Old-growth descriptions for the major forest cover types in the Rocky Mountain region. In: Kaufmann M.R., Moir W.H., Bassett R.L., Technical Coordinators. Old-growth forests in the southwest and Rocky Mountain regions. Proceedings of a workshop; Mar 9-1992 Mar 13; Portal, Arizona. Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO: USDA Forest Service, General Technical Report RM-213. 106-120.

Merkle, B. 2001. Unpublished Data on Wide-ranging Species of the Southern Rocky Mountains. On file at The Nature Conservancy of Colorado. University of Colorado, Boulder, Colorado.

Merriam, C.H. 1898. *Life Zones and Crop Zones of the United States*. United States Dept. Agr. Bul. 10.

Merrill, E.H., W.A. Reiners, R.W. Marrs, S.H. Anderson, T.W. Kohley, M.E. Herdendorf, K.L. Driese. 1996. *Wyoming Gap Analysis: A Geographic Analysis of Biodiversity - Final Report,* U.S.G.S. Biological Resources Division. Wyoming Cooperative Fish and Wildlife Research Unit and University of Wyoming, Laramie, WY.

Miller R. F. and P. E. Wigand. 1994. Holocene changes in semiarid pinyon-juniper woodlands: response to climate, fire, and human activities in the U.S. Southern Rocky Mountains. BioScience 44 (7): 465-474.

Miller, S. G., R. L. Knight, and C. K. Miller. 1998. Influence of recreational trails on breeding bird communities. Ecological Applications 8: 162-169.

Minckley, W.L., D.A. Hendrickson, and C.E. Bond. 1986. Geography of Western North American freshwater fishes: Description and relationships to intracontinental tectonism. In Hocutt, C. H. and E. O. Wiley, eds. *The Zoogeography of North American Freshwater Fishes*. John Wiley and Sons: New York. Pgs. 519-613.

Moir W. H. and J. A. Ludwig. 1979. A classification of spruce-fir and mixed conifer habitat types of Arizona and New Mexico. Res. Pap. RM-207 U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO. 47 pp.

Morris, W., D. Doak, M. Groom, P. Kareiva, J. Fieberg, L. Gerber, P. Murphy, & D. Thomson. 1999. *A Practical Handbook for Population Viability Analysis*. The Nature Conservancy.

Muths, E. 2000. Personal communication to Chris Pague. U.S. Geological Survey, Ft. Collins, Colorado.

Nesler, T. 2000. Personal communication to Betsy Neely. Colorado Division of Wildlife, Ft. Collins, Colorado.

Noel, T. J., P.F. Mahoney, and R.E. Stevens. 1994. *Historical Atlas of Colorado*. University of Oklahoma Press, Norman, Oklahoma.

Noss, R.F. 2000. Maintaining integrity in landscapes and ecoregions. In: Pimentel, D., L. Westra, & R.F. Noss (eds.). *Ecological Integrity: Integrating Environment, Conservation, and Health*. Island Press, Washington D.C. pp. 191-208.

Noss, R.F. 1996. Protected areas: How much is enough? In R.G. Wright (ed.) *National Parks and Protected Areas*. Blackwell Science, Cambridge MA. Pgs. 91-120.

Oelschlaeger, M. 1995. Taking the land ethic outdoors: its implications for recreation. Pages 335-350. In Richard L. Knight and Kevin J. Gutzwiller (editors). 1995. *Wildlife and Recreationists.* Island Press, Washington, D.C. 372 pp.

Opler, P. 2000. Personal communication to Betsy Neely and Chris Pague. Private consultant, Loveland, Colorado.

Parsons, D. J. and S. H. DeBenedetti. 1979. Impact of fire suppression in a mixed-conifer forest. Forest Ecology and Management 2: 21-33.

Peet, R. K. 1978. Latitudinal variation in southern Rocky Mountain forests. J. of Biogeography 5: 275-289.

Peet, R. K. 1981. Forest vegetation of the Colorado Front Range. Vegetatio 45: 3-75.

Peet, R.K. 2000. Forests and meadows of the Rocky Mountains. In: Barbour M.G. and W.D. Billings (editors). *North American Terrestrial Vegetation*, Cambridge, England: Cambridge University Press. Second edition. Pgs. 75-121.

Pineda, P. M., R. J. Rondeau and A. Ochs. 1999. *A biological inventory and conservation recommendations for the Great Sand Dunes and San Luis Lakes, Colorado*. Colorado Natural Heritage Program, Colorado State University, Fort Collins, CO 86 pp. Report prepared for The Nature Conservancy, San Luis Valley Program.

Poiani, K. A., B. D. Richter, M. G. Anderson, & H. E. Richter. 2000. Biodiversity conservation at multiple scales: Functional sites, landscapes and networks. Bioscience 50 (2). 133-146.

Quinn, J.F., and A. Hastings. 1987. Extinction in subdivided habitats. Conservation Biology 1:198-208.

Raines, Gary L., Johnson, B. R., Frost, Thomas P. and Zientek, Michael L. 1996. Digital maps of compositionally classified lithologies derived from 1:500,000-scale geologic maps for the Pacific Northwest: a contribution to the Interior Columbia Basin Ecosystem Management Project: U.S. Geological Survey Open-File Report. Pgs. 95-685.

Reid, M.S., K.A. Schulz, P.J. Comer, M.R. Schindel, D.J. Culver, D.A. Sarr, & M.C. Damm. 1999. An alliance level classification of vegetation of the coterminous western United States. The Nature Conservancy and Association for Biodiversity Information.

Ricketts, T. H., E. Dinerstein, D.M. Olson, S.J. Loucks, W. Eichebaum, D. DellaSala, D. Kavanagh, P. Hedao, P. T. Hurley, K.M. Carney, R. Abell, and S. Walters. 1999. *Terrestrial Ecoregions of North America: A conservation assessment*. Island Press, Washington D.C. 486 pp.

Riebsame, W.E., J. Robb, Gosnell, H., D. Theobald, P. Breding, C. Hanson, K. Rokoske. 1997. *Atlas of the New West: Portrait of a Changing Region*. Center of the American West, Univ. of Colorado. W.W. Norton and Co., New York.

Romme, W. R. Knight, W. Baker, F. Smith and S. Buskirk. 2000. What have we learned about forest fragmentation in the SRM (2000). In *Forest Fragmentation in the Southern Rocky Mountains*, R.L. Knight, F.W. Smith, S.W. Buskirk, W.H. Romme, and W.L. Baker, editors. University Press of Colorado: Boulder, Colorado. Pgs. 423-430.

Rondeau, R. 2001. Viability specifications for terrestrial ecological systems. Report produced for The Nature Conservancy of Colorado by the Colorado Natural Heritage Program. Ft Collins, CO. 166 pp.

Rondeau, R. 2001. Personal communication to Betsy Neely. Colorado Natural Heritage Program, Ft. Collins, Colorado.

Rosgen, D. L. 1994. A classification of natural rivers. Catena 22:169-199.

Sanderson, J. and M. March. 1996. Extreme rich fens of South Park, Colorado: Their distribution, identification, and natural heritage significance. Unpublished report prepared for Park Co., Colorado Dept. of Natural Resources, and US EPA. Colorado Natural Heritage Program, Ft. Collins, Colorado.

Schorr, R., J. Sovell, C. Melcher, B. Lambert, and J. Siemers. 2000. Southern Rocky Mountain conservation planning: Zoology element occurrence specification development. Report produced for The Nature Conservancy of Colorado by the Colorado Natural Heritage Program.

Schrupp, D.L., W.A. Reiners, T.G. Thompson, L.E. O'Brien, J.A. Kindler, M.B. Wunder, J.F. Lowsky, J.C. Buoy, L. Satcowitz, A.L. Cade, J.D. Stark, K.L. Driese, T.W. Owens, S.J. Russo, and F. D'Erchia. 2000. *Colorado Gap Analysis Program: A Geographic Approach to Planning for Biological Diversity – Final Report*, U.S.G.S. Biological Resources Division. Gap Analysis Program and Colorado Division of Wildlife, Denver, CO.

Shinneman, D., R. McClellan, and R. Smith. 2000. *The State of the Southern Rockies Ecoregion: A report by the Southern Rockies Ecosystem Project.* Southern Rockies Ecosystem Project. Nederland, CO. 137 pp.

Simmons, V. M. 1999. *The San Luis Valley: Land of the Six-armed Cro*ss. Second edition. University Press of Colorado, Niwot, CO. 364 pp.

Simmons, V. M. 1992. *Bayou Salado: the Story of South Park*. Revised Edition. Fred Pruett Books, Boulder, CO. 275 pp.

Soule, M.E. & M. A. Sanjayan. 1998. Conservation targets: Do they help? Science Vol. 279, Number 5359, Issue of 27, Mar 1998. Pgs. 2060–2061.

Sousa, Wayne. 1984. The role of disturbance in natural communities. Ann. Rev. Ecol. Syst. 15:353–391.

Spackman, S. and Botany Experts from Wyoming, Colorado, and New Mexico. 2000. Viability specifications for Southern Rocky Mountains plants. Report produced for The Nature Conservancy of Colorado by the Colorado Natural Heritage Program.

Stark, Ronald W. 1987. Impacts of forest insects and diseases: Significance and measurement. CRC Critical Reviews in Plant Sciences 5:161-203.

Stednick, J. D. 1987. The potential of subalpine forest management practices on sediment production. Pages 95-100 in Troendle, Charles, Merrill R. Kaufmann, R.H. Hamre, and Robert P. Winokur. *Management of Subalpine Forests: Building on 50 Years of Research*. USDA Forest Service, Rocky Mouton Forest and Range Experiment Station, General Technical Report RM-149.

Stein, B.A., L.S. Kutner, & J.S. Adams (eds.). 2000*. Our Precious Heritage: The Status of Biodiversity in the United States.* The Nature Conservancy and Association for Biodiversity Information. Oxford University Press.

Stucky-Everson, V. 1997. *Mushrooms of Colorado and the Southern Rocky Mountains*. Denver Botanical Gardens, Denver, Colorado.

The Nature Conservancy. 2000. *Designing a Geography of Hope: A Practitioner's Handbook to Ecoregional Conservation Planning*. The Nature Conservancy, Arlington, Virginia.

The Nature Conservancy. 2001. *Conservation by Design: A Framework for Mission Success*. The Nature Conservancy, Arlington, Virginia.

The Nature Conservancy of Colorado and Colorado Natural Heritage Program. 1999. *Species Report Card: The State of Colorado's Plants and Animals*. The Nature Conservancy. Boulder, Colorado.

Theobald, D.M. 2000. Fragmentation by inholdings and exurban development. In *Forest Fragmentation in the Southern Rocky Mountains*, R.L. Knight, F.W. Smith, S.W. Buskirk, W.H. Romme, and W.L. Baker, editors. University Press of Colorado: Boulder, Colorado. Pgs. 155–174.

Theobald, D. 2000. Personal communication to Betsy Neely. Natural Resources Ecology Laboratory, Colorado State University, Ft. Collins, Colorado.

Theobald, D. 2001. Forecasting housing densities using census block-groups in the Southern Rocky Mountains. Natural Resources Ecology Laboratory, Colorado State University, Ft. Collins, Colorado.

Thompson, B.C., P.J. Crist, J.S. Prior-Magee, R.A. Deitner, D.L. Garber, and M.A. Hughes. 1996. *Gap Analysis of Biological Diversity Conservation in New Mexico Using Geographic*

Information Systems – Final Gap Analysis Report, US Dept of Interior. New Mexico Cooperative Fish and Wildlife Research Unit, Las Cruces, NM.

Trails and Wildlife Task Force. 1998. *Planning Trails with Wildlife in Mind: A Handbook for Trail Planners*. Colorado State Parks – Trails Program. 51 pp.

Travis, B. R. 2001. Personal communication to Betsy Neely. Dept. of Geography. University of Colorado.

Turner G. T. 1975. Mountain grassland ecosystem. USDA Forest Service Research Paper RM-161, Rocky Mt. Forest and Range Exp. Station, Fort Collins, CO.

Ubbelohde, C., M. Benson, and D. A. Smith. 1976. *A Colorado History.* Pruett Publishing Company, Boulder, CO. 390 pp.

U.S. Census Bureau. 2001. Census 2000 Redistricting Data (P.L. 94-171); Summary File and 1990 Census. Internet Release Date: 2 April 2001.

U. S. Fish and Wildlife Service. 2000. 12-Month administrative finding, black-tailed prairie dog. Fed. Register Feb. 4, 2000.

U.S. Forest Service. 1999 (draft). ECOMAP domains, divisions, provinces, and sections of the United States. U.S. Forest Service Reg. 2. Digital map.

Veblen, T. T., and D.C. Lorenz. 1991. *The Colorado Front Range: a Century of Ecological Change*. University of Utah Press. Salt Lake City. 186 pp.

Veblen, T. 2000. Disturbance patterns in Southern Rocky Mountain forests. In *Forest fragmentation in the Southern Rocky Mountains*, R.L. Knight, F.W. Smith, S.W. Buskirk, W.H. Romme, and W.L. Baker, editors. University Press of Colorado: Boulder, Colorado. Pgs. 31–54.

Veblen T. T. 1986. Age and size structure of subalpine forests in the Colorado Front Range. Bulletin of the Torrey Botanical Club 113(3): 225-240.

WCED. 1987. *Our Common Future.* New York: Oxford University Press for the UN World Commission on Environment and Development.

Weaver H. 1970. Fire and its relationship to ponderosa pine. Proceedings, California tall timbers fire ecology conference; 1970 Oct; Missoula, MT: Intermountain Fire Research Council. University of Montana, School of Forestry: Pgs.127-149.

Weber, W. A. and Wittman, R.C. 1992. *Catalog of the Colorado Flora: A Biodiversity Baseline*. University Press of Colorado. 215 pp.

West, N. E. 1999. Distribution, composition, and classification of current juniper-pinyon woodlands and savannas across Western North America. Pages 20-23 in S. B. Monsen and R. Stevens, eds. *Proceedings: Ecology and Management of Pinyon-juniper Communities within the Interior West.* U.S. Dept. Agric., Forest Service, Rocky Mountain Research Station, Proc. RMRS-P-9 Ogden, UT. 411.

Whipple, S. A. and R. L. Dix. 1979. Age structure and successional dynamics of a Colorado subalpine forest. Amer. Midl. Nat. 101: 142-158.

White, D., A.J. Kimerling, and W.S. Overton. 1992. Cartographic and geometric components of a global sampling design for environmental monitoring. Cartography and Geographic Information Systems 19: 5-22.

Wilcox, B.A. 1980. Insular ecology and conservation. In *Conservation Biology: An Ecological-Evolutionary Perspective*, M.E. Soule; and B.A. Wilcox, eds. (Sinauer, Sunderland, MA.). Pgs. 95-118.

Wilson, E. O. 1992. *The Diversity of Life.* W.W. Norton and Company, New York. 424 pp.

Wohl, E. 2001. *Virtual Rivers*. Yale University Press.

Wright J. R., H. G. Fisser, C. L. Hanson. 1986. Biology and ecology of sagebrush in Wyoming: IV. Validation of a rangeland production model (ERHYM) for sagebrush sites. Pages 320-330. In McArthur E. D., B. L. Welch. Proceedings - Symposium on the biology of *Artemisia* and *Chrysothamnus*. U.S. Department of Agriculture, Forest Service, Gen. Tech. Report INT-200. Odgen, UT. 398.

Young, M. K., tech. ed. 1995. Conservation assessment for inland cutthroat trout. General Technical Report. RM-256. Ft. Collins, Colorado: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 61 pp.

Young, J. R., C.E. Braun, S.J. Oyler-McCance, J.W. Hupp, and T.W. Quinn. 2000. A new species of sage-grouse (Phasianidae: *Centrocercus*) from southwestern Colorado. Wilson Bulletin.

Web Sites

Association for Biodiversity Information. 2001. International classification of ecological communities: terrestrial vegetation. Natural Heritage Central Databases. Association for Biodiversity Information, Arlington, VA. (http://www.natureserve.org)

GAP Analysis Program: http://www.gap.uidaho.edu/handbook/stewardship/default.htp#table_2

http://www.whirling-disease.org

Fire web site. http://www.fs.fed.us/fire/fuelman/

USDA, NRCS. 2001. The PLANTS Database, Version 3.1 (http://plants.usda.gov). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

Western Regional Climate Center WWW Server (http://www.wrcc.dri.edu/index.html)

http://www.census.gov/dmd/www/databank.html

U.S. Forest Service section descriptions: http://www.fs.fed.us/land/pubs/ecoregions/intro.html

APPENDIX 1

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APPENDIX 2

DESCRIPTION OF ECOLOGICAL SYSTEMS WITHIN ELEVATION ZONES

Because of the dramatic elevation gain within the ecoregion, broad ecological zones are easily distinguished and reflected in dominant vegetation. These zones have long been used to broadly characterize the Rocky Mountains (Merriam 1898, Schimper 1898, Ramaley 1908). Four ecological zones include the *Alpine, Subalpine, Upper Montane*, and *Lower Montane-Foothills* zones. This zonation is controlled by a combination of elevation, latitude, direction of prevailing winds, and slope exposure, which influence precipitation and natural disturbance processes. Generally, the vegetation zones are at higher elevations in the southern part of the province than in the northern, and they extend downward on east-facing and north-facing slopes and in narrow ravines and valleys subject to cold air drainage.

The **Alpine** zone, typically above 11,500 ft. (3,500 m), includes the highest mountain peaks with snow and ice fields, fellfield, dry alpine tundra, moist to wet alpine meadow, cold alpine streams, and small cirque lakes. These are cold and wind-swept environments much of the year and receive intense ultra-violet radiation (Caldwell 1968). These factors are reflected in adaptations of many plants and animals. Alpine tundra fellfields include cushion plants, such as moss campion and alpine phlox, resist desiccating winds and are common, along with mosses and lichens. Alpine dwarf shrubland occurs on rocky, unstable slopes and flats where some snow cover exists through much of the winter. Low-lying shrubs such as arctic willow, dwarf blueberry, and mountain dryad are common here. Dry alpine tundra occurs across stable side slopes and flats where fine-textured soils have accumulated and support dense plant growth. These areas are dominated by rhizomatous or tussock-forming grasses, sedges, and forbs, such as Idaho fescue, or Ross' avens. Although alpine tundra dry meadow is the matrix of the alpine it typically intermingles with alpine substrate ice field, tundra fell-field, alpine dwarf shrubland, and alpine/subalpine wet meadow. Alpine-subalpine wet meadows are typically associated with gentle lee slopes and shallow basins where snow accumulation, and subsequent spring melt, support moist to saturated soils, and a diversity of alpine wildflowers, such as marsh marigold. Most alpine lakes and streams are fishless, but support many invertebrates. Species commonly associated with talus slopes and alpine meadows include bighorn sheep, yellow-bellied marmot, pika, and golden-mantled ground squirrels . Birds commonly found in this zone include American pipit, horned lark, and brown-capped rosy finch (Benedict 1991).

The **Subalpine** zone occurs roughly between about 9,186 ft. (2,800 m) and 11,500 ft. (3,500 m) elevation. Common ecological systems in this zone are bristlecone-limber pine woodland, spruce-fir forest, wet meadow, subalpine-montane riparian shrubland, and high gradient streams. Tree line marks the elevational limit of the trees and is largely determined by a complex interplay of weather, landform, and soil (Arno 1984). Quite variable across the SRM, it may occur at over 12, 467 ft. (3,800 m) at the southern end of the Southern Rocky Mountain ecoregion, whereas it does not exceed 11,154 ft. (3400 m) at the northern end (Peet 1978). Bristlecone pine-limber pine forest and woodland occurs on steep, rocky, south-facing slopes along this upper margin. Both pine species are well adapted to strong and dessicating winds. Bristlecone pine (*Pinus aristata*) is found in the Front, Mosquito, Sawatch, San Juan, and Sangre de Cristo ranges (Ranne 1995). Outside of SRM, this species is only found on the San Francisco Peaks in Arizona. A recent study found a tree over 2,400 years old in an ancient bristlecone pine forest on Black Mountain (Brunstein and Yamaguchi 1992). Limber pine replaces bristlecone pine north of Interstate 70, but is more widely distributed in other ecoregions. Bristlecone pine regenerates primarily following fires (Baker 1992). Limber pine apparently does not withstand fires and primarily becomes established from Clark's nutcracker caches. Fires, however, may uncover these caches.

Spruce-fir dry-mesic forest and spruce-fir moist-mesic forests are the dominant terrestrial and matrix-forming systems of the subalpine zone. Over 10% of SRM is characterized by these two systems occupying nearly 1.3 million hectares (Alexander et al. 1984, Alexander 1987, Whipple and Dix 1979).

The relative dominance of the two canopy tree species (subalpine fir and Englemann's spruce) and the understory composition vary substantially over a gradient from excessively moist to xeric sites (Peet 1981). The mesic spruce-fir type occurs on cool, sheltered, but well-drained sites above 2700 m and is one of the most widespread forest types in the subalpine zone. Open slopes above 3000 m are typically characterized by Peet's (1981) xeric spruce-fir type, which include varying amounts of lodgepole and limber pine. Towards lower elevations, the spruce-fir types give way, often along abrupt fire-induced boundaries, to lodgepole pine or aspen-dominated forests.

Fire, spruce beetle outbreaks, avalanches, and blowdowns or windstorms all play an important role in shaping the dynamics of spruce-fir forests. Fires in the subalpine forest are typically stand replacing, resulting in the extensive exposure of mineral soil and initiating the development of new forests. Spruce-fir forests have fifty year return interval for high intensity surface fires and 100-400 years return interval for crown fires, which cover 1000 to 10,000 acres (Peet 1981, 1987). Depending on site conditions, spruce and fir may share the post-fire site with shade-intolerant species such as lodgepole pine, limber pine, and quaking aspen. Many stands in the subalpine zone of the Colorado Front Range are of post-fire origin from the mid 1700s (Veblen 1986). Spruce beetle outbreaks may be exacerbated by fire suppression and also could be as significant as fire in the development of spruce-fir forests. In addition to fires and beetle kill, wind disturbance in spruce-fir forests has been well-documented (Schaupp et al. 1999). Blowdowns involving multiple treefalls add to the mosaic of spruce-fir stands. Pine martens are mostly a spruce-fir and lodgepole obligate that require a healthy and sizeable occurrence of mature forest. Other species characteristic of the spruce-fir forests are brown wood creeper, boreal owl, gray jay, golden-crowned kinglet, three-toed woodpecker, and gray jay (Benedict 1991).

Subalpine-montane riparian shrubland is confined to floodplains or terraces of rivers and streams and shallow broad valleys. Although these riparian shrublands occupies less than 1% of the SRM ecoregion, they can be found throughout the region within a broad elevation range (2,600 – 3,600 m). The dominant shrubs reflect the large elevation gradient and include alder, birch, and many willow species. Beavers are primary users as well as maintainers of this system. Annual and episodic flooding is important in maintaining this system. Common mammals and birds of this zone include bobcat, snowshoe hare, pine squirrel, southern red-backed vole, Steller's jay, red crossbill, white-tailed ptarmigan, blue grouse, and three-toed woodpecker (Benedict 1991). The primary abiotic ecological process necessary to maintain this ecological system is hydrology and more specifically surface flow.

The **Upper Montane zone** lies generally between 7,546 ft. (2,300 m) and 9,186 ft. (2,800 m) elevation, and is characterized by lodgepole pine forest, aspen forest, mixed conifer forests, montane grasslands, mountain sagebrush shrubland, montane riparian woodland and shrubland, high montane lakes and streams of high-moderate gradient.

Lodgepole pine forest is a dominant terrestrial system that occupies nearly 6% of the ecoregion. This pine species reaches the southernmost edge of its range at about the middle of the upper Gunnison Basin (Johnston 1997). These forests occur on gentle to steep slopes in extensive stands of pure lodgepole pine, or to a lesser extent, stands in association with other conifer species. Lodgepole pine is shade intolerant and is an aggressive pioneer developing on sites recently opened up due to fire, insects, disease, windstorms, clearcutting, or other major stand removing disturbance. Lodgepole pine stands that are 350 to 400 years old exist but are uncommon (Mehl 1992). Fires are more frequent in lodgepole pine than spruce-fir, as lodgepole pine forests occur in warmer and drier environments. Fire return intervals were historically about 200-400 years at the high elevation end of its distribution. Farther downslope, however, fire return intervals of 50-150 years were probably more characteristic (Peet 1981). Lodgepole pine forests have depauperate bird community, consisting mostly of hermit thrush, yellow-rumped warbler, junco, brown creeper, boreal owl, three-toed woodpecker, and gray jay.

Aspen forests are found at similar elevations as lodgepole pine and cover nearly 7% of the ecoregion. They are also maintained by fire and usually occur as a mosaic of many communities and may be surrounded by a diverse array of other systems, including montane grasslands and wetlands. These forests are most prominent west of the Front Range and Sangre de Cristo ranges. Aspen is confined to relatively moist sites that have cold winters and a reasonably long growing season in the Southern Rockies. These conditions restrict aspen to low elevations in the northern and eastern portions of its range. Aspen grows at progressively higher elevations southward in the Rocky Mountains. The aspen ecosystem is rich in number and species of animals, especially in comparison to associated coniferous forest types. Characteristic species of aspen forest are flammulated owl, hairy woodpecker, Williamson's sapsucker, warbling vireo, purple martin, red-naped sapsucker, and long-tailed vole.

Mixed-conifer forests form the matrix in the southern portions of the ecoregion within this zone. Common trees in this system are white fir, blue spruce, Douglas-fir, and ponderosa pine. White fir is dominant on moist, north-facing slopes, while ponderosa pine and Douglas-fir dominate warmer and drier sites. White fir will eventually dominate if the fire-free interval is sufficiently long to allow trees to grow to a fire-resistant size. Ponderosa pine and Douglas-fir are more fire tolerant, while blue spruce is fire intolerant. Historical ground-fire return-intervals in the mixed conifer forests were likely between 7 to 22 years (Alexander et al. 1984, Dieterich 1983). In cool, moist white fir forests in New Mexico, naturally occurring fires are mostly light, erratic, and infrequent (DeVelice and Ludwig 1983, Moir and Ludwig 1979). These frequently occurring fires were generally of low intensity because of the short time span between fires resulted in low accumulations of dead and down fuels. High-intensity, stand-replacing fires were uncommon (Dieterich 1983). Before fire suppression in mixed conifer forests, ponderosa pine and Douglas-fir, often dominated the overstory (Agee 1982, Hopkins 1982). White fir density has greatly increased in mixed conifer forests, resulting from fire suppression since the turn of the century. Today, the heavy accumulations of fuels and abundant young white fir (which often form "dog-hair" thickets) greatly increase the chances for high-intensity, stand-replacing crown fires (Parsons and DeBenedetti 1979). Characteristic species of the mixed-conifer forest include pygmy nuthatch, Williamson's sapsucker, northern goshawk, and flammulated owl. The Jemez Mountains salamander is an endangered species that occurs primarily in mixed conifer forests of New Mexico.

Montane grasslands form large patches throughout the ecoregion but also occur as the matrix of South Park. In total, these systems characterize less than 3% of the ecoregion. These systems are dominated by bunch grasses such as oatgrass, Arizona fescue, mountain muhly, and bluebunch wheatgrass. Soils resemble prairie soils that are relatively high in organic matter, slightly acid, and usually well-drained. Frequent fires help to maintain the grassland dominants and likely play an important role in restricting the invasion of trees and shrubs (Turner 1975). An accumulation of ground litter characterizes lighlty grazed grasslands. Buildup of litter lowers soil temperature, which in turn reduces bacterial activity, ties up nutrients, and slows the general nitrogen cycling process, particularly during cool, wet years. Native rodents tend to be more abundant with increases in litter. Fires will burn the litter and release nutrients. Montane grasslands provide habitat for large grazers such as elk, pronghorn, and bison. Small mammals include montane vole, pocket gopher, and Wyoming ground squirrel. Common birds include red-tailed hawk, northern harrier, mountain bluebird, savanna sparrow, and broad-tailed hummingbird.

Sagebrush shrublands are matrix-forming and occupy nearly 10% of the SRM ecoregion. In North Park, Middle Park, and the upper Gunnison Basin, this system is found on flat to rolling hills with well-drained clay soils. It is characterized by a dense shrubland with a significant herbaceous understory. The dominant shrub species include mountain sagebrush, dwarf sagebrush, and silver sagebrush. Common grasses and sedges include Idaho fescue, bluebunch wheatgrass, western wheatgrass, and Geyer's sedge. Historically, stand-replacing fires likely occurred every 40-60 years, with smaller fires every 20-25 years (Wright et al. 1986). Following fire, sagebrush must re-establish itself by seed; so growth and recovery are slow. Fire favors shrubs like rabbitbrush that can re-sprout after fire (Wambolt et al. 1999). Dwarf sagebrush species are less susceptible to natural fire than taller sagebrush; although if burnt, these sagebrush will also die (Bunting et al. 1987 as cited in Johnston 1997). These dwarf shrublands are often found on poorly drained soils whereas the big sagebrush shrublands are usually on well-drained soils (Johnston 1997). Characteristic species in these systems include sagebrush vole (in northern part of ecoregion), white-tailed prairie dog, badger, sage grouse, sage thrasher, golden eagle, and sagebrush lizard.

Montane fens are small patch systems confined to specific environments defined by ground water discharge, soil chemistry, and peat accumulation. This system includes extreme rich fens and iron fens, both rare within the SRM ecoregion. Fens form at low points in the landscape or near slopes where ground water intercepts the soil surface. Ground water inflows maintain a fairly constant water level year-round, with water at or near the surface most of the time. Constant high water levels lead to accumulation of organic material. In addition to peat accumulation and perennially saturated soils, extreme rich fens and iron fens have distinct soil and water chemistry, with high levels of one or more minerals such as calcium, magnesium, or iron. They usually occur as a mosaic of several plant communities dominated by sedges and/or bog birch. *Sphagnum* moss is indicative of iron fens. The surrounding landscape may be ringed with other wetland systems, e.g., riparian shrubland, or a variety of upland systems from grasslands to forest. Fens are limited to a few small areas, notably South Park, Mount Evans, Grand Mesa, and Iron Creek.

Upper montane riparian forests and woodlands form linear strips confined to floodplains or terraces of rivers and streams. These systems are often dominated by conifers such as subalpine fir, Englemann spruce, or blue spruce, and quaking aspen. The primary ecological process necessary to maintain riparian forests is surface water flow, although ground water is important. Annual and episodic flooding is important in maintaining this system. Characteristic species include American dipper, hairy woodpecker, and black swift.

Lower Montane-Foothill zone generally lies below 7,546 ft. (2,300 m) elevation and encompasses the transition from montane ecosystems to lower-elevation systems characteristic of neighboring ecoregions. A wide diversity of terrestrial and freshwater aquatic ecological systems can be found in this zone. These include Douglas-fir and ponderosa pine forests, ponderosa pine woodland and savanna pinyon-juniper woodland, Gambel oak shrubland, intermontane-foothills grassland, active and stabilized sand dunes, greasewood flats and ephemeral wetlands, foothill riparian woodland and shrubland, as well as rivers and of varying size and gradient.

Douglas-fir and ponderosa pine forests are found over a wide range of aspects, on side and lower slopes, and on granitic and basaltic substrates with thin soils. Often, Douglas-fir dominates on north-facing slopes while ponderosa pine occupies south-facing slopes. Douglas-fir is more shade tolerant than pine and aspen, and reproduces under its own canopy, resulting in old stands of pure Douglas-fir that tend to be mixed-aged (Mehl 1992). While old Douglas-firs develop a resistance to fire due to a thick, corky bark, young trees are easily killed by fires. The oldest stands generally reach a maximum age of 400 years old, although some have reached an age of 700 years (Mehl 1992). Historic fire-return intervals were likely in the range of 35-40 years (Peet 1981). Fire suppression has altered the distribution and frequency of Douglas-fir in the SRM. Some believe that, nearly pure Douglas-fir stands historically were limited to the Roan/Piceance Basin region and to north-facing slopes and canyons in a narrow elevation belt along the Eastern Slope of the Front Range. Along with fire frequency and intensity, insects (tussock moth, spruce budworm, Douglas-fir beetle) are major factors in determining stand structure and density of Douglas-fir plant communities (J. Coles pers. com.). Characteristic mammals and birds in these systems include mountain lion, mule deer, elk, long-legged myotis, masked shrew, pine squirrel, Cooper's hawk, great horned owl, hairy woodpecker, Western tanager, and pygmy nuthatch (Benedict 1991).

Montane-foothill cliffs and canyons occur along steep mountain slopes and major river drainages, often associated with outcrops of shale and sandstone. Douglas-fir, ponderosa pine, or white fir are widely spaced with a limited shrubland understory of oceanspray, cliff bush, or ninebark. Soil development is limited as is herbaceous cover. Due to the sparse nature of the vegetation, fires seldom occur, therefore the trees can be quite old.

Ponderosa pine woodlands and savannas occupy roughly 10% of the ecoregion within the lower montane-foothill zone. Ponderosa pine woodlands tend to be found on moderate to steep rocky slopes, while more open savanna was historically found on more gentle slopes and valley bottoms with deeper soils. Fire has played an important role in shaping ponderosa pine woodlands and savannas. In the past, low- intensity fires would burn through ponderosa pine stands every 8-15 years, removing competing understory vegetation and down material (Mehl 1992). Savannas were likely maintained with the most frequent ground fires, and supported prairie grasses such as big bluestem and blue grama. Ponderosa pine woodlands on steeper, rocky slopes support lower densities of these “fine fuels,” so fire return intervals were likely a bit longer. These fire regimes resulted in irregular shaped stands of even-aged groups of trees varying in size, age, and density (Mehl 1992). The large, old trees will have irregular, open, large-branched crowns. The bark will be lighter in color, almost yellow, thick, and some trees will like have basal fire scars. Grace’s warbler, pygmy nuthatch, and flammulated owl are indicators of healthy ponderosa pine woodland. All of these birds prefer mature trees in an open woodland setting. Other characteristic species of these systems include Abert’s squirrel, least chipmunk, little brown bat, Williamson’s sapsucker, western bluebird, variable skink, and butterflies such as the western pine elfin or the red-bordered brown (Benedict 1991).

Pinyon-juniper woodland is a matrix-forming ecological system that occupies approximately 11% of the ecoregion, primarily in the southern half. These woodlands are often found on sandstone, shale and siltstone, and are dominated by a mix of pinyon pine and rocky mountain juniper, one-seeded juniper, or Utah juniper. This system is best developed just below the lower elevation range of ponderosa pine and above the grassland/shrublands of the foothills. The woodland stands exhibit considerable diversity in appearance and composition. Trees 800 to 1000 years old have been recorded in these systems (Mehl 1992). When disturbed by fire, pinyon-juniper woodland can convert to grasses and begin a slow recovery. The density of woodland, both historically and currently, is strongly related to topo-edaphic gradients. The trees persisted throughout past centuries on steeper, rockier, and, thus, less burned sites (West 1999). Less steep sites with finer textured soils are often where savannas, grasslands, and shrub steppes have occurred in the past. Pinyon-juniper stands on these gentler slopes may have been large, but more savanna-like with open upper canopy and high grass production. Juniper savanna is a large-patch system that occurs in primarily in New Mexico. Although juniper savannas are expected to occur naturally on the landscape, typically adjacent to pinyon-juniper woodland and montane-foothill grasslands, their extent and quality has been severely altered since the early 1900s. Juniper has encroached on shrublands and grasslands (West 1999). Characteristic animal species in pinyon-juniper woodlands include common poorwill, bushtit, juniper titmouse, pinyon jay, scrub jay, and black-throated gray warbler, Nuttall’s cottontail, desert cottontail, Mexican woodrat, pinyon mouse, pallid bat, eastern fence lizard, bull snake, and western rattlesnake (Benedict 1991).

Lower montane-foothills shrublands are large-patch systems found in more than 5% of the ecoregion and is well represented throughout the ecoregion. This system is typically associated with rocky substrates on side slopes and lower slopes. This system is dominated by shrubs, including curly-leaf mountain mahogany, bitterbrush, skunkbrush, and golden currant. Scattered trees may occur. The lower montane-foothills shrublands often occur as a mosaic surrounded by grasslands or woodlands. Fires play an important role in this system as the dominant shrubs usually die back, although some plants will stump sprout. Gambel oak-serviceberry shrublands are large patch communities found along canyon walls, dry foothills, lower mountain slopes, and at the edge of the plains. These shrublands can often occur in association with pinyon-juniper woodlands or sagebrush-grasslands, and may intergrade with the lower montane-foothills shrublands. Bitterbrush and mountain mahogany usually have a severe die back following a fire, although some plants will stump sprout, while serviceberry and Gambel oak are more resistant to fires, often sprouting vigorously from stem bases or from underground rhizomes. Viable populations of green-tailed towhee and scrub jay (especially among oaks) indicate a healthy foothills shrublands. Other characteristic animal species in these two systems include Hopi chipmunk, rock squirrel, Virginia's warbler, rufous-sided towhee, eastern fence lizard, smooth green snake, tailed copper, aphrodite fritillary, and large wood nymph (Benedict 1991).

Foothills grasslands are large-patch systems, perhaps best characterized as a mid-grass to tallgrass prairie on gentle slopes, usually at the base of foothill slopes, e.g., the hogbacks of the Front Range. This system is limited to lower elevations within the ecoregion, with roughly 16 inches of precipitation per year . This system often occurs, but is not limited to, the edge of the ecoregion and intergrades with the Central Shortgrass Prairie ecoregion. It is maintained by frequent fires and associated with well-drained clay soils. These systems are dominated by big bluestem, blue grama, side-oats grama, mountain muhly, western wheatgrass, little bluestem, buffalo grass, or needlegrass. These systems typically transition into foothill shrublands, ponderosa pine savannas and woodlands, pinyon-juniper woodlands, and shortgrass prairie. Opler (personal communication) considers the Colorado Front Range the fourth richest butterfly region in the United States, perhaps resulting from several systems coming together. Several targeted skippers and butterflies need this system to survive, including the Ottoe skipper, cross-line skipper, Arogos skipper, dusted skipper, and regal fritillary. Other, more common and characteristic species of the foothills grasslands include swift fox, plains pocket mouse, prairie vole, black-tailed prairie dog, plains spadefoot, plains garter snake, plains gray skipper, and Riding's satyr (Benedict 1991).

Semi-desert scrub systems occur at low elevations, and are well represented in the San Luis Valley. Sagebrush steppe has a limited distribution (currently <2% of the ecoregion) on flat to rolling valley floors where frequent light wildfire was historically characteristic. Characteristic species of this type include sage sparrow and Gunnison sage grouse. Winterfat shrub steppe primarily occurs in the San Luis Valley and the Gunnison Basin (Johnston 1997) on shales and young alluvial deposits. Today, Green's rabbitbrush is the dominant shrub in the San Luis Valley, although the wetter areas still support significant amounts of winterfat and blue grama. Greasewood flats-ephemeral wet meadow complexes are large patch systems confined to specific environments in the San Luis Valley defined by a fluctuating water table, soil salinity, and soil texture. These systems are surrounded by grasslands, stabilized sand dunes, or wet meadows.

Stabilized sand dunes are large-patch systems primarily associated with the Great Sand Dunes area in the San Luis Valley. This eolian depositional system covers about 800 km^2 extending from the Rio Grande northeastward to the Sangre de Cristo Mountains (Fryberger et al. 1990). It is characterized by mostly flat-bedded sand deposits with scattered groups of parabolic dunes, many of which have trailing "arms" of sand anchored by grassy or brush vegetation. Rabbitbrush is often the dominant shrub, although greasewood may be co-dominant. Ecological processes that are important in the maintenance of this system are most likely a combination of grazing (pronghorn, elk, bison), fire, and wind. The natural/historic frequency and intensity of fires is unknown. The active sand dune and swale complex is limited to a few adjacent ecoregions and found within the SRM only in the San Luis Valley. Large dunes comprise this dune system for which Great Sand Dunes National Park is named. These dunes cover about 27 km^2 (Fryberger et al. 1990). The southwest winds and the east winds are nearly balanced, resulting in continued and upward growth of the dunes, and an imperceptible migration to the east. Here, the massive dunes form "star" formations reaching a height of over 700 feet (200 m) above the valley floor. This system is comprised of multiple sparsely vegetated plant communities that often occur as a mosaic with unvegetated dunes. Vegetation mostly occurs in swales where the moisture content is high. At least six endemic beetle species are restricted to the Great Sand Dunes (Pineda et al. 1999).

Lower montane riparian woodland is confined to floodplains or terraces of rivers and streams. Communities that make up this system reflect elevation, stream gradient, floodplain width, and flooding events. The dominant trees may include box elder, narrow-leaf cottonwood, Douglas-fir, and Rocky Mountain juniper. Dominant shrubs include Rocky Mountain maple, water birch, and many willow species. Annual and episodic flooding is extremely important for maintaining a diversity of age classes of cottonwoods as well as a mosaic of plant communities within any given floodplain. Foothills riparian woodlands and shrublands are confined to low-gradient river floodplains or terraces at the lowest elevations in the ecoregion. Dominant species of this system include narrowleaf cottonwood, Fremont's cottonwood, Plains cottonwood, chokecherry, sandbar willow, and hawthorn.

Wet meadow and emergent marsh systems occur as small patches throughout all elevation zones of the SRM. Water levels in wet meadows are often at or near the ground surface for much (or all) of the growing season, but also may fluctuate considerably through the year. Surface inundation may occur, but it typically does not last long. Physical disturbance during flood events may be significant for the structure and composition of these systems. Wet meadows occur on mineral soils that have typical hydric soil characteristics, including relatively high organic content and redoximorphic features. Freshwater marshes are frequently or continually inundated, with water depths up to 2 m. Water levels may be stable, or may fluctuate 1 m or more over the course of the growing season. Natural marshes may occur in depressions in the landscape (ponds), as fringes around lakes, and along slow-flowing streams and rivers (such riparian marshes, are also referred to as sloughs). Marshes have distinctive soils that are typically mineral soils but can also accumulate organic material. Soils have characteristics that result from long periods of anaerobic conditions (e.g., gleyed soils, high organic content, redoximorphic features). Marshes are characterized by herbaceous vegetation adapted to saturated soil conditions. Vegetation is typically emergent (rising out of the water) such as cattail and rushes, or submergent/floating vegetation. Characteristic animal species of these systems include mink, long-tailed weasel, common snipe, boreal toad, northern leopard frog, terrestrial garter snake, and western chorus frog (Benedict 1991).

APPENDIX 3

POPULATION GROWTH, SOUTHERN ROCKY MOUNTAINS (by Megan Kram)

Population growth can aggravate sources of environmental stress such as development, recreation, and pollution. Theoretically, the larger the population, the greater the potential environmental threats, and thus the higher the urgency for habitat protection. Under this assumption, the relatively high growth rates of the SRM suggest that this ecoregion—especially the Colorado portion—may require urgent action to achieve conservation success. Growth trends for the states and counties that the SRM fully or partially covers, as well as housing density for the region, are described below.

SRM States

From 1990 to 2000, population increased in all three states (Colorado, New Mexico, and Wyoming) encompassing the SRM. Table 1 presents select population figures for each of the SRM states.

Table 1. Population Figures for SRM States.[1]

State	Census Population		Change 1990-2000			US Ranks	
SRM State	04/01/1990	04/01/2000	Number	Percent	2000 Population	Population change (Number)	Population change (Percent)
Colorado	3,294,394	4,301,261	1,006,867	**30.6**	24	8	**3**
New Mexico	1,515,069	1,819,046	303,977	**20.1**	36	31	**12**
Wyoming	453,588	493,782	40,194	**8.9**	50	48	**32**

While none of the SRM states exhibit particularly high populations when compared to other U.S. states, the *percentage* increases in population alarms land conservationists. Colorado experienced the third largest population increase in the nation, growing 30.6% from 1990-2000. New Mexico was the 12th fastest-growing state, with an increase of 20.1%. Wyoming was ranked 32nd for percent growth change and grew by 8.9%. The average growth for all U.S. states was 13.2%.

SRM counties[2,3]

Like state growth trends, county population figures also demonstrate the urgency of land protection efforts for the ecoregion as a whole. In addition, county trends may contribute to timeline decisions for taking action on portfolio sites. The sites with the highest growth pressures may require expedited action to achieve conservation success.

The population for counties within the three states within the SRM was 3.1 million in 2000. The average growth rate of counties within the ecoregion was 31% from 1990 to 2000—2.3 times that of the U.S. average of 13% for the same time period. Table 2 summarizes population information for the ecoregion by SRM state**.**

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[1] Census 2000 PHC-T-2. Ranking Tables for States: 1990 and 2000. Table 3, “States Ranked by Percent Population Change: 1990 to 2000.” U.S. Census Bureau. 2 April 2001.
[2] All tables in the “Counties” section were adapted from: Census 2000 PHC-T-4. Ranking Tables for Counties: 1990 and 2000. Table 1, “Counties in Alphabetic Sort Within State, 1990 and 2000 Population, Numeric and Percent Change: 1990 to 2000.” U.S. Census Bureau, Census 2000 Redistricting Data (P.L. 94-171) Summary File and 1990 Census. Internet Release date: 2 April 2001.
[3] Columns designated with an asterisk () were calculated from the original data. All counties that the SRM at least partially covers were included in the calculations.

Table 2: Growth rate for SRM counties compared to the U.S. Average, 1990-2000

	Census Population for counties at least partially covered by the SRM		Change 1990 to 2000	
State	**April 1, 1990**	**April 1, 2000**	**Number**	**Percent**
Colorado	1,905,781	2,555,546	649,765	41%
New Mexico	280,777	358,207	77,430	28%
Wyoming	201,097	216,652	15,555	8%
TOTAL SRM	2,387,655	3,130,405	742,750	31%
TOTAL U.S.	248,702,824	281,421,906	32,719,082	13%

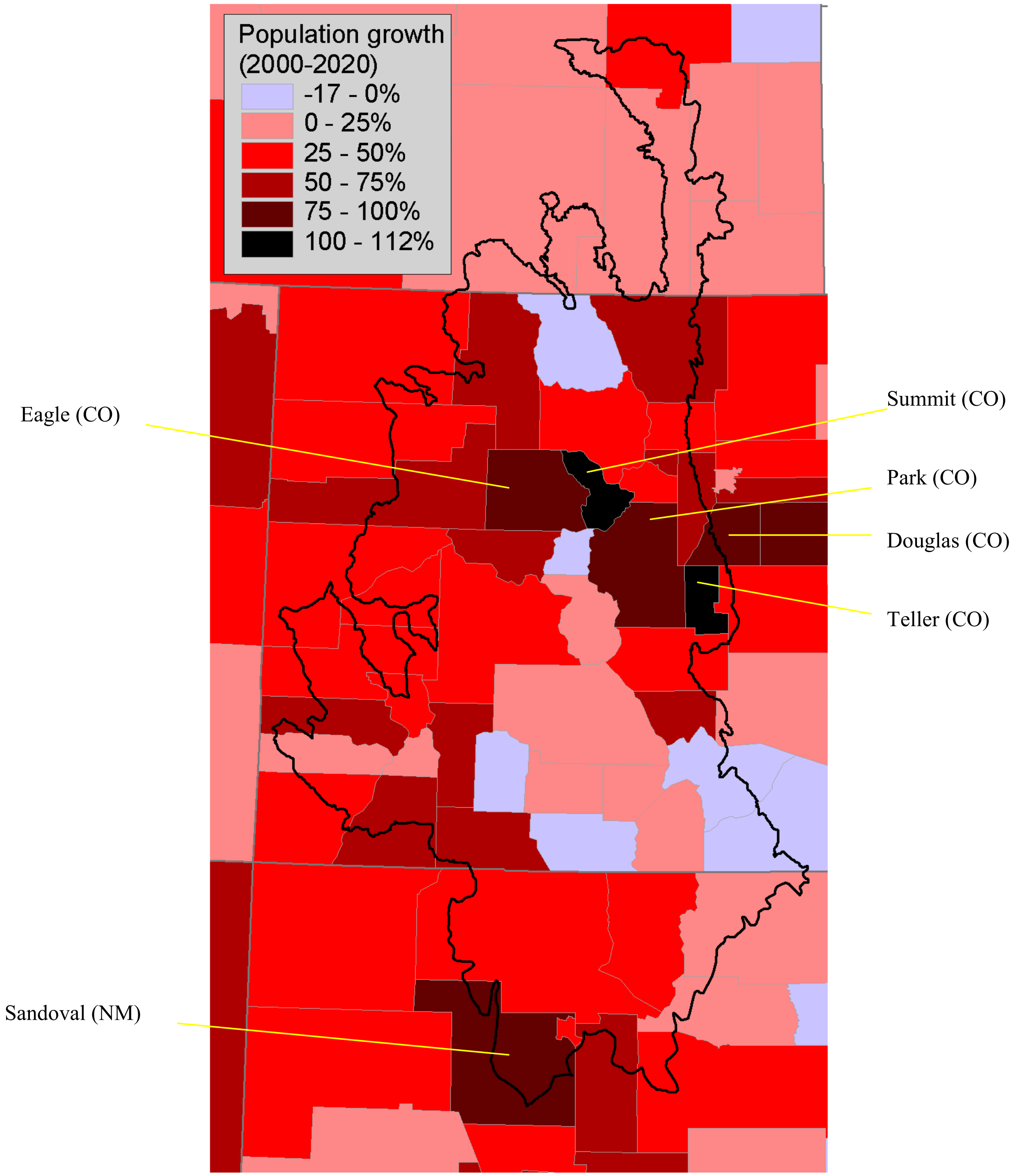
Many SRM counties have demonstrated high rates of growth as well. For example, Douglas County, CO is the fastest-growing county in the entire United States, with a population increase of 191% from 1990-2000. In fact, 7 of the top 20 fastest-growing counties within the United States lie within the SRM, as Table 3 illustrates.

Table 3: SRM counties among the 20 fastest-growing counties of the U.S.

County	Rank for population growth, 1990-2000, compared to all US counties	Census population 1990	Census population 2000	Population increase 1990 to 2000	Percentage population increase 1990 to 2000
Douglas County, CO	**1**	60,391	175,766	115,375	191.0
Park County, CO	**5**	7,174	14,523	7,349	102.4
Eagle County, CO	**10**	21,928	41,659	19,731	90.0
Archuleta County, CO	**14**	5,345	9,898	4,553	85.2
Summit County, CO	**15**	12,881	23,548	10,667	82.8
Custer County, CO	**17**	1,926	3,503	1,577	81.9
San Miguel County, CO	**18**	3,653	6,594	2,941	80.5

Based on past data, experts have predicted growth rates for the SRM counties through 2020, as displayed in **Map 1** below (labels are provided for counties with over 75% predicted growth).

Map 1: Anticipated Population Growth from 2000-2020[4]



[4] Source: Theobald, D.M. 2000.

The fastest-growing counties are not necessarily the largest in population. In 2000, eight counties exceeded populations of 100,000 (see Table 4). Douglas County is the only county that is both one of the top growing (in the top 20 in the United States) *and* one of the counties with a population of over 100,000.

Table 4: SRM counties that exceeded populations of 100,000 in 2000.

			Census Population		**Change, 1990 to 2000**	
County Name	**Interior vs. Exterior ("interior" = the county at least 50% within the SRM)**	**State**	**April 1, 1990**	**April 1, 2000**	**Number**	**Percent**
Denver County	Exterior	CO	467,610	**554,636**	87,026	18.6
Jefferson County	Interior	CO	438,430	**527,056**	88,626	20.2
Arapahoe County	Exterior	CO	391,511	**487,967**	96,456	24.6
El Paso County	Exterior	CO	397,014	**516,929**	119,915	30.2
Boulder County	Interior	CO	225,339	**291,288**	65,949	29.3
Larimer County	Interior	CO	186,136	**251,494**	65,358	35.1
Douglas County	Exterior	CO	60,391	**175,766**	115,375	191.0
Pueblo County	Exterior	CO	123,051	**141,472**	18,421	15.0
Santa Fe County	Exterior	NM	98,928	**129,292**	30,364	30.7

Denver and Arapahoe counties are not part of the SRM; however, their close proximity to the ecoregion and thus potential impact on protection efforts warrants their inclusion in this table.

While the largest counties were not necessarily the *fastest*-growing, they still exhibited growth rates that were higher-than-average for the United States. Including Douglas County's rate of 191%, the eight counties grew an average of 50% between 1990 and 2000. Excluding Douglas County's growth rate (due to its potential to skew the data), the eight counties averaged 27% growth, still more than double the U.S. population growth rate of 13%.

Housing Density

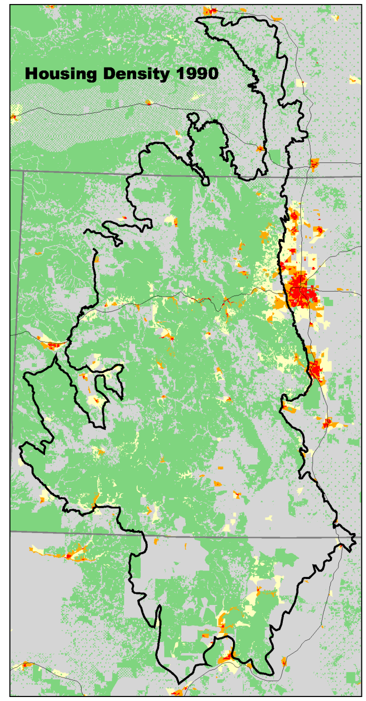
Housing-density data also provide decision support for taking action on portfolio sites. SRM housing density is primarily concentrated along the eastern border of the SRM, along the Front Range of the Rocky Mountains. This trend is expected to continue; in addition, experts predict that the center of the ecoregion will also experience density increases. This latter observation suggests that conservation action at the core of the ecoregion is particularly import, as new home construction may require additional roads and other potentially harmful infrastructure. The maps on the following page depict the past and predicted housing densities for the SRM.

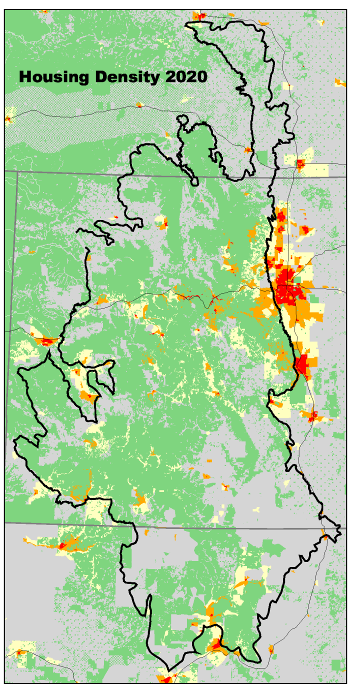
Housing Densities for the SRM --
Past (1990) and Predicted (2020 & 2050)[5]

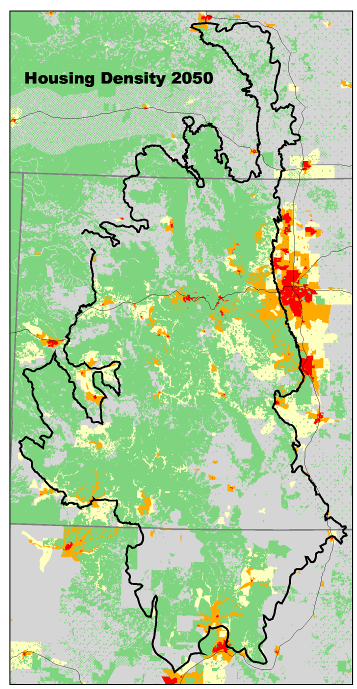
The 1990 map illustrates actual housing density; the 2020 and 2050 maps depict predicted densities. The darker the color, the denser the housing—red represents urban, orange is suburban, yellow is exurban, gray is rural, and green is public land.

Of particular interest are increases in exurban housing. This type of development can be especially detrimental to habitat, as it may cause large-scale landscape fragmentation. Construction of secondary residences likely represents at least a portion of the anticipated exurban development; it was estimated that up to 83% of the houses in some Southern Rockies communities, such as in Eagle County, were second homes (Theobald 2000).

Please refer to Appendix 4 for a description of how these maps were created.







[5] Source: Theobald, D.M. 2000.

Detailed County Data

This table includes population figures for all counties that the SRM at least partially covers ("interior" = the county at least 50% covered by the SRM).

		Census Population		Change, 1990 to 2000	
County Name	SRM Location -- Interior vs. Exterior	April 1, 1990	April 1, 2000	Number	Percent
COLORADO (45 counties)					
Alamosa County	interior	13,617	14,966	1,349	9.9
Arapahoe County	exterior	391,511	487,967	96,456	24.6
Archuleta County	interior	5,345	9,898	4,553	85.2
Boulder County	interior	225,339	291,288	65,949	29.3
Chaffee County	interior	12,684	16,242	3,558	28.1
Clear Creek County	interior	7,619	9,322	1,703	22.4
Conejos County	interior	7,453	8,400	947	12.7
Costilla County	interior	3,190	3,663	473	14.8
Custer County	interior	1,926	3,503	1,577	81.9
Delta County	interior	20,980	27,834	6,854	32.7
Denver County	exterior	467,610	554,636	87,026	18.6
Dolores County	interior	1,504	1,844	340	22.6
Douglas County	exterior	60,391	175,766	115,375	191.0
Eagle County	interior	21,928	41,659	19,731	90.0
El Paso County	exterior	397,014	516,929	119,915	30.2
Fremont County	interior	32,273	46,145	13,872	43.0
Garfield County	interior	29,974	43,791	13,817	46.1
Gilpin County	interior	3,070	4,757	1,687	55.0
Grand County	interior	7,966	12,442	4,476	56.2
Gunnison County	interior	10,273	13,956	3,683	35.9
Hinsdale County	interior	467	790	323	69.2
Huerfano County	interior	6,009	7,862	1,853	30.8
Jackson County	interior	1,605	1,577	-28	-1.7
Jefferson County	interior	438,430	527,056	88,626	20.2
La Plata County	interior	32,284	43,941	11,657	36.1
Lake County	interior	6,007	7,812	1,805	30.0
Larimer County	interior	186,136	251,494	65,358	35.1
Las Animas County	exterior	13,765	15,207	1,442	10.5
Mesa County	exterior	93,145	116,255	23,110	24.8
Mineral County	interior	558	831	273	48.9
Moffat County	exterior	11,357	13,184	1,827	16.1
Montezuma County	exterior	18,672	23,830	5,158	27.6
Montrose County	exterior	24,423	33,432	9,009	36.9
Ouray County	interior	2,295	3,742	1,447	63.1
Park County	interior	7,174	14,523	7,349	102.4
Pitkin County	interior	12,661	14,872	2,211	17.5
Pueblo County	exterior	123,051	141,472	18,421	15.0

APPENDIX 4

FORECASTING HOUSING DENSITIES USING CENSUS BLOCK GROUPS

David M. Theobald, Smith Fellow, The Nature Conservancy and Research Scientist, Natural Resource Ecology Laboratory, Colorado State University

A number of approaches have been developed to forecast future growth patterns. Most of these efforts focus on *urban* growth and changes to urban or built-up cover types. The approach I developed here explicitly recognizes and represents land use changes beyond urban and built-up areas, into rural areas, which is especially important for understanding potential threats to biodiversity. The primary objective of this approach is to create a straightforward, easy-to-interpret model based on reasonable assumptions, utilizing available data.

Fine-grained, spatially detailed housing data are available by employing Census block-groups and blocks, which are subdivisions of the familiar census tract. A typical block-group contains between 250 and 550 housing units, and there are over one-quarter million block-groups in the US. Historical housing densities (useful to understand trends in the data set, and critical for developing projections into the future) were computed from attribute data on the number the number of housing units in each block-group (available back to 1940). Because they are estimates of units present in 1990, there are a number of potential reasons why these data underestimate the number of actual historical units. Nationwide, the number of housing units was underestimated by 8.3% in 1980 with 1.8% of counties less, by 14.4% in 1970, and by 27.0% in 1960. I corrected historical housing unit estimates for block-groups using county-level estimates from historical decennial census. A correction factor for each county was computed as the ratio of the number of units in the historical census, divided by the total housing units summed from the block-group estimates.

To ease the description and portrayal of development patterns, I classify housing density into four general classes: urban, suburban, exurban, and rural (see file blockgroups.avl). Urban densities are typically defined as areas with greater than 1,000 people per square mile (1.6 people per acre). Assuming an average of 2.5 people per housing unit, this translates to roughly 0.7 units per acre (~1 unit per 1.6 acres). I define *urban housing density* as greater than 0.5 units per acre (>1 unit per 2.0 acres), which is slightly more relaxed than the Census definition of urban. *Suburban densities* are defined as from 0.1 to 0.5 units per acre (1 unit per 2 to 10 acres). This identifies areas that are lower-density subdivisions. *Exurban densities* range from 0.025 to 0.1 units per acre (1 unit per 10 to 40 acres). This class identifies very low-density development, including "ranchette" development in Colorado, which occurs at 1 per 35 – 45 acres. *Rural density* then is defined as housing density below 0.025 units per acre (1 per 40 acres and more). Typically this includes working farmsteads and ranches, but also includes remote vacation and second houses on the public lands interface.

The forecast modeling approach used here is a simplified version of the supply/demand/allocation (SDA) model. The SDA model is not driven by a particular economic theory, but is rooted in practical assumptions and limitations of development. The number of units available to be developed in an area is described by the supply component, while the demand component defines the number of units that are likely to be needed in the future, to meet the demands of a projected population. The locations where new housing units will be placed first, assuming that supply exceeds demand, are identified within the allocation component. If demand exceeds supply, then allocation is essentially irrelevant. Because the model is designed to forecast patterns for a 25 to 50 year time horizon, then most areas will be mapped so that they approach their "build-out" densities.

Broadly defined, supply is the number of units that can be developed on a piece of land. A number of coarse-scale factors help to determine whether land can be developed in the first place. Developable land is defined here as private land not occupied by water bodies such as lakes, swamps, or rivers. Additional fine-scale factors are typically considered in modeling land use change as well, such as hazardous areas (e.g., flooding, steep slopes, unstable soils, etc.) and provision of basic services (e.g., domestic wells or water and septic or sewer), though these were not used to create the block-group housing density dataset.

Initially, all developable land is assumed to be suitable for housing development. A critical factor in accurately portraying the spatial pattern of growth, however, is to consider the maximum density that an area will attain. A typical, recurrent characteristic of development is that the housing density is roughly homogeneous at a scale that corresponds roughly to subdivision patterns (~160 ac – 640 ac). A number of fine-scale factors typically determine the "build-out" density of an area, most importantly zoning. Zoning regulations typically restrict the land use and intensity (i.e. housing density) of use that can occur on a given parcel. Many counties, particularly those in the West, do not have zoning regulations, however. For example, in Colorado, roughly one-third of counties have zoning regulations in place.

Probably the most challenging, but important, part of modeling future growth patterns is to determine the allocation of housing units. This is even more challenging when representing development as a continuum (housing density), rather than as a distinct class (e.g., urban/non-urban). The question answered here is: at what density does a given area (block-group) fill up with housing units? This determines at what point new development "spills-over" into adjacent areas. The strongest influence on these build-out densities are zoning regulations that restrict development types and densities.

In lieu of detailed information (such as zoning) on build-out densities, one alternative is to assume that future development will continue to occur in a similar pattern as it has in recent years. The approach used here is to assume that in any given decade, a block-group's density will not exceed the average density of its neighboring block-groups. This allows urban areas to organically grow up and spread out over time. Furthermore, an advantage of this approach is that the average density is calculated locally, so it is specific to each county, indeed sub-sections of counties can have markedly different patterns.

A common method to generate demand for development is to use population projections. We developed our own projections using state-level population projections to the year 2025 from the US Census Bureau. We then projected growth for each county out to 2025 using their 1990-99 growth rates, but constrained them so that the sum of the county population did not exceed the state-level projection from the Census data. Population estimates for 2050 were derived by a simple linear extension of growth from 2025 to 2050 to equal the same additional people as had occurred from 2000 to 2025. It is important to note that Census projections typically underestimate actual growth, particularly in the Rocky Mountain West.

References

Theobald, D.M. (*in review*). Land use dynamics beyond the urban fringe. *Geographical Review*.

Theobald, D.M. 2001. *Technical description of mapping historical, current, and future housing densities in the US using Census block-groups*. Natural Resource Ecology Lab, Colorado State University. 31 May. http://www.ndis.nrel.colostate.edu/davet/dev_patterns.htm

APPENDIX 5

PROTECTED AREAS ASSESSMENT
by Shannon Kimball and Cherie Moritz

Description of GIS Layers

Seventeen individual ArcView GIS shape files have been developed and provided on this CD to portray protected and managed area information for the Southern Rocky Mountain Ecoregion. Twelve of these layers depict individual land management/ownership types and contain descriptive information on individual units. These layers are described in detail below. Since some of these types overlap geographically, five additional shape files representing aggregations of different protection levels (individual layers depicting each separate protection rank and one layer depicting a compilation of all four ranks) have also been developed and provided on this CD.

Please note that all GIS shape files are provided in the following map projection:

UTM Zone 13
units meters
datum NAD27
Spheroid Clark 1866
500000.0 false easting
0.0 false northing

The following twelve shape files are located in the Protected Area Data directory on this CD:

A. 1) Research Natural Areas (RNAs) shape file = RNA
Extent: WY, CO and NM
Conservation Protection Categories (TNC Rank): 1
Sources:
WY & CO = Digital information for most of this layer was obtained for U.S. Forest Service Region 2 Research Natural Areas courtesy of Clark Roberts, Region 2 GIS manager. Daryll Murphy of the Pike San-Isabel National Forest and Dan Green of the San Juan National Forest supplied additional information.
NM = There is currently only one established Research Natural Area in Region 3, Monument Canyon RNA, that is included within the Southern Rocky Mountain Ecoregion. This RNA covers exactly one 640 acre section. Cherie Moritz digitized the boundary for Monument Canyon RNA.
Spatial Accuracy: 1:100,000
Refer to Rna_meta.asc in the Documentation directory on this CD for detailed metadata about the original coverage from the Forest Service.

2) Nature Conservancy Preserves, Cooperative Projects and Conservation Easements shape file = TNC
Extent: WY, CO and NM
Conservation Protection Categories (TNC Rank): 1, 2 or 3
Sources:
WY = Holly Copeland, TNC of Wyoming GIS Specialist
CO = Cherie Moritz, GIS Manager for TNC Colorado Field Office
NM = Gary Ball, TNC of New Mexico Director of Conservation Science

Spatial Accuracy: variable, but generally 1:100,000 or better

3) Federal Wilderness Areas shape file = WILD
Extent: WY, CO and NM
Conservation Protection Categories (TNC Rank): 2
Sources:
WY: All federal wilderness boundaries were acquired from the USFS at
www.fs.fed.us/incoming/r2/ro/r2_wilderness.e00.gz.

CO: BLM wilderness boundaries were acquired from the website of the Colorado BLM GIS and Mapping Sciences Program. Most Forest Service boundaries were acquired from the USFS at www.fs.fed.us/incoming/r2/ro/r2_wilderness.e00.gz. Mark Roper, GIS analyst for the Pike-San Isabel National Forest provided Buffalo Peaks and Sangre de Cristo wilderness boundaries. Larry Gibbens, GIS analyst for the Arapaho-Roosevelt National Forest provided boundaries for the Byers Peak and Vasques Peak wilderness areas. Jim Evans, GIS analyst for the White River National Forest, provided the Ptarmigan Peak wilderness area boundary. Don Watts, GIS analyst for the Grand Mesa – Uncompahgre – Gunnison National Forest, provided the boundary for Fossil Ridge wilderness area. Sara Beetch, GIS Analyst for the National Park Service in Denver, provided the boundary for the Black Canyon of the Gunnison (NPS Wilderness). We derived other NPS Wilderness areas from the statewide coverage of land management (see reference at end of this section).
NM: Richard Trujillo of the New Mexico State BLM office provided BLM wilderness boundaries.
*Spatial Accuracy: v*ariable, but generally 1:100,000.

4) Areas of Critical Environmental Concern (ACECs) shape file = ACEC
Includes some Outstanding Natural Areas (ONA) and National Natural Landmarks (NNL)
Extent: WY, CO and NM
Conservation Protection Categories (TNC Rank): 2 or 3
Sources:
WY & NM: There are no ACECs in either state that fall into the Southern Rocky Mountain Ecoregion.
CO: Most boundaries were acquired from the website of the Colorado BLM GIS and Mapping Sciences Program (www.co.blm.gov/metadata/cothemes.htm). Bob Valehoss of the BLM Uncompahgre Field Office provided San Miguel River ACEC. Elaina Graham provided several ACEC coverages on the LaJara and Saguache Field Offices. Pete Zwaneveld provided coverages for three ACECs on the Royal Gorge Field Office of the BLM.

5) State Wildlife Areas shape file = ST_WILD
Extent: WY, CO and NM
Conservation Protection Categories (TNC Rank): 2 or 3
Sources:
WY: Statewide land management coverage (see reference at end of this section).
CO: Rob Billerbeck (Colorado Natural Areas Program, Colorado State Parks, Denver, CO) and Amy Lavender (Colorado Natural Heritage Program, Colorado State University, Ft. Collins, CO) and/or derived from the state-wide coverage of land management (see reference at end of this section). Tim Morales of the Colorado Department of Wildlife provided coverage for the Bosque del Oso SWA.
NM: derived from the state-wide coverage of land coverage (see reference at end of this section)
Spatial Accuracy: variable, but generally 1:100,000

6) National Recreation Areas/National Conservation Areas shape file = NRA_NCA
Extent: WY, CO and NM
Conservation Protection Categories (TNC Rank): 2 or 3
Sources:
WY & NM: There are no National Recreation Areas or National Conservation Areas in Wyoming or New Mexico that fall within the Southern Rocky Mountain Ecoregion
CO: Sarah Beetch (NPS, Denver) provided Gunnision Gorge NCA in Colorado. We obtained Curecanti National Recreation Area from the Federal and Indian Lands coverage available from the National Atlas website at www.nationalatlas.gov/atlasftp.html. Larry Gibbens, GIS Manager for the Arapaho-Roosevelt National Forest provided Arapaho National Recreation Area.
Spatial Accuracy: variable 1:100,000 to 1:500,000

7) National Park Service Lands shape file = NPS_NM
Extent: WY, CO and NM
Conservation Protection Categories (TNC Rank): 2
Sources:
WY: There are no National Parks or National Monuments in Wyoming that fall within the Southern Rocky Mountain Ecoregion
CO: Most boundaries were derived from the state-wide coverage of land coverage (see reference at end of this section). Sara Beetch (NPS, Denver) provided Black Canyon of the Gunnison National Park.

NM: derived from the state-wide coverage of land coverage (see reference at end of this section)
Spatial Accuracy: variable 1:100,000 to 1:500,000

***8)* Wilderness Study Areas (WSAs) shape File = WSA**
Extent: WY, CO and NM
Conservation Protection Categories (TNC Rank): 3
Sources:
WY: Holly Copeland, TNC of Wyoming GIS Specialist
CO: John Varner of the USFS Rocky Mountain Region, Denver, CO
NM: Richard Trujillo, New Mexico BLM State Office
Spatial Accuracy: 1:100,000

9) State Parks shape file = ST_PARK
Extent: WY, CO and NM
Conservation Protection Categories (TNC Rank): 3
Sources:
WY: Statewide land management coverage (see reference at end of this section).
CO: Rob Billerbeck, Colorado Natural Areas Program, Colorado State Parks, Denver, CO and/or the state-wide coverage of land coverage (see reference at end of this section). Several parks have not been digitized, including Barbour Ponds, Boyd Lake, Castlewood Canyon, Chatfield, Pueblo and Roxborough.
NM: RGIS Clearinghouse (New Mexico Resource Geographic Information System Program) at Earth Data Analysis Center, University of New Mexico. GIS data was unavailable for the following state parks: Morphy Lake, Sugarite Canyon and Fenton Lake.
Spatial Accuracy: variable, but generally 1:100,000

***10)* National Wildlife Refuges (NWR) shape file = NWR**
Extent: WY, CO and NM
Conservation Protection Categories (TNC Rank): 2 or 3
Sources:
CO: Federal and Indian Lands coverage available from the National Atlas website at
www.nationalatlas.gov/atlasftp.html
Spatial Accuracy: variable 1:100,000 to 1:500,000

11) Wild and Scenic Rivers (WSR) shapefile = WSR
Extent: WY, CO and NM
Conservation Protection Categories (TNC Rank): 2
Sources:
CO: Larry Gibbens, GIS Manager for the Arapaho-Roosevelt National Forest
NM: Richard Trujillo, BLM NM State Office, Edward Lucero, USFS Region 3
Spatial Accuracy: variable 1:100,000 to 1:500,000

12) *General Lands shape file = General*
Includes U.S. Forest Service, Bureau of Land Management, Bureau of Reclamation, some County lands, Department of Defense, Native lands, other State lands, Private lands and major water bodies. Contains area names for national forests, reservations and military lands.
Extent: WY, CO and NM
Conservation Protection Categories (TNC Rank): 4
Sources:
WY: the state-wide coverage of land coverage (see reference at end of this section)
CO: the state-wide coverage of land coverage (see reference at end of this section)
NM: the state-wide coverage of land coverage (see reference at end of this section)
Spatial Accuracy: variable, 1:100,000 to 1:500,000

Original State-wide coverages of land management
WYOMING
University of Wyoming Spatial Data and Visualization Center (SDVC) Clearinghouse

Metadata: refer to Documentation\wy_landmeta.html on this CD
Data: www.sdvc.uwyo.edu/clearinghouse/managed.html

COLORADO
Bureau of Land Management
Colorado State Office, Lakewood, CO
Metadata: refer to Documentation\co_landmeta.met on this CD
Website: http://www.co.blm.gov/metadata/cothemes.htm

NEW MEXICO
New Mexico Gap Analysis Program
NM Coop Fish and Wildlife Research Unit POB 30003
New Mexico State University, Las Cruces, NM
Metadata: refer to Documentation\nm_landmeta.zip on this CD

The following Five Shape Files are located in the PA_Layers on this CD:

1) *Ranks_Consolidated.shp:* Depicts all land units compiled into the four protection categories (TNC_RANK) 1 through 4. This comprehensive theme was developed by aggregating (dissolving) all polygons from the twelve individual layers (listed above) based on their TNC Rank. In some cases land units with different TNC ranks physically overlapped each other. For example: Deadman Creek RNA (rank = 1) in Southern Colorado overlaps Sangre de Cristo Wilderness Area (rank = 2). During the aggregation process, the unit with the highest level of protection always took precedence over any overlapping units with lower ranks; in other words, the polygon with the highest rank "floated" to the top.

2) *Rank_1.shp:* Depicts only those land units with a protection level (TNC_RANK) of '1'

3) *Rank_2.shp:* Depicts only those land units with a protection level (TNC_RANK) of '2'

4) *Rank_3.shp:* Depicts only those land units with a protection level (TNC_RANK) of '3'

5) Rank_4.shp = Depicts only those land units with a protection level (TNC_RANK) of '4'

The four conservation protection categories are defined in the final draft of the updated version of *Designing a Geography of Hope*. These categories are modified from those printed in the last published version of *Designing a Geography of Hope* (TNC, 1997), and are the categories used in and defined by the USGS Handbook for Conducting Gap Analysis, available on the USGS Gap Analysis website: (http://www.gap.uidaho.edu/handbook/stewardship/default.htp#table_2).

Category I (rank = 1): An area having permanent protection from conversion of natural land cover and a mandated management plan in operation to maintain a natural state within which disturbance events (of natural type, frequency, intensity, and legacy) are allowed to proceed without interference or are mimicked through management.

Category II (rank = 2): An area having permanent protection from conversion of natural land cover and a mandated management plan in operation to maintain a primarily natural state, but which may receive uses or management practices that degrade the quality of existing natural communities, including suppression of natural disturbance.

Category III (rank = 3): An area having permanent protection from conversion of natural land cover for the majority of the area, but subject to extractive uses of either a broad, low-intensity type (e.g., logging) or localized intense type (e.g., mining). It also confers protection to federally listed endangered and threatened species throughout the area.

Category IV (rank = 4): There are no known public or private institutional mandates or legally recognized easements or deed restrictions held by the managing entity to prevent conversion of natural habitat types to anthropogenic habitat types. The area generally allows conversion to unnatural land cover throughout.

Explanatory Notes on Initial Conservation Ranking of Southern Rocky Mountains Managed and Protected Areas

Shannon Kimball, with assistance from Betsy Neely, completed the initial set of ranks for the SRM managed and protected areas based on the system described above and in *Designing a Geography of Hope* (2000). In performing this work, Shannon consulted with selected experts throughout the ecoregion on evaluating the conditions and management of specific areas.

It is important to consider these rankings preliminary. The explanatory notes below will describe how the rankings were applied. Ecoregional planning team members will review these rankings and revise as necessary. Rankings for State Parks and State Wildlife Areas should be particularly scrutinized, as experts with detailed knowledge of these areas are scarce. There will most certainly be an opportunity to seek input from additional experts on these rankings as the team meets with experts throughout the ecoregion.

LAYER	***DESCRIPTION OF RANKINGS***
Federal Wilderness Areas and Wilderness Study Areas (WSAs)	Congressionally designated Wilderness Areas receive one of the highest levels of protection available on federally managed lands. However, they do receive impacts from recreation, and low levels of renewable resource use (i.e. grazing). Natural disturbance is sometimes allowed to proceed, but this is not always the case. With these facts in mind, a conservation rank of 2 was applied to all established Wilderness Areas. Wilderness Study Areas are also Congressionally designated to be managed as Wilderness until such time they are either designated as Wilderness or dropped from consideration. Actual management of WSAs on the ground has been variable, and they often do not receive the mandated level of protection. Given the tentative nature of the WSA designation these areas have been given a rank of 3.
Research Natural Areas (RNAs) and Areas of Critical Environmental Concern (ACECs)	ACECs were generally ranked based on the purpose/value of designation and management practices within the area. If areas were designated for biological reasons (plants, fish & wildlife, etc.) they were given a 2. Cultural or scenic ACECs that receive little biological protection were given a 3. If an ACEC received heavy recreation or extractive resource use it was also assigned a 3. Forest Service RNAs were assigned a value of 1.

State Parks (SP) and State Wildlife Areas (SWA)	A source for good information on the condition and management of individual state parks and state wildlife areas was difficult to locate. In general state parks have been ranked a 3 which implies at least a minimal level of biodiversity protection is in place. Team members who are familiar with state parks that receive heavy recreation use may consider moving these areas to a rank of 4. State Wildlife Areas were given a 2 if management generally promotes biodiversity, but may allow low levels of anthropogenic use, or a 3 if management activities do not generally favor biodiversity protection. It would be helpful to seek more specific input from experts on the actual condition of these areas with respect to biodiversity protection.
National Wildlife Refuges (NWR)	National Wildlife Areas were assigned either a rank of either 2 or 3, depending on the level of anthropogenic use in area, and how that use affected natural communities.
National Park Service Lands, and Wild and Scenic Rivers (WSR)	All National Parks, National Monuments and Wild and Scenic Rivers have been assigned a rank of 2. Several National Parks contain designated wilderness. These wilderness areas are displayed and attributed in the Wilderness Area layer.
National Recreation Areas (NRA) and National Conservation Areas (NCA)	Gunnison Gorge NCA is the only designated NCA within the ecoregion. Although a management plan has not been finalized for this area, preservation of biodiversity is a relatively high priority under the current management prescription. This area was assigned a 2. The two NRAs within the project area, Curecanti NRA and Arapaho NRA, are managed for a combination of recreational use, resource use and conservation. These areas were given a rank of 3.
Nature Conservancy Preserves, Cooperative Projects, and Conservation Easements	All TNC preserves, cooperative projects and conservation easements were ranked either a 1, 2 or 3, depending on the level of anthropogenic disturbance that occurred within these areas. Preserves were generally given a 1. Conservation easements were given a 2 if anthropogenic disturbance affected less than 5% of the total area protected by the easement. A 3 was assigned if more than 5% of the total area was impacted by anthropogenic disturbance.
General Lands (USFS, BLM, Native Lands, Department of Defense, other State Lands, Bureau of Reclamation and Private)	General lands managed by Federal and State Land Management Agencies, and Private parties have been assigned a rank of 4, since these lands are generally not managed for biodiversity preservation. Lands managed by the Forest Service probably have the highest level of protection of these managing entities. However, the majority of these lands are open to extractive resource use.

EXPLANATION OF FIELDS AND ATTRIBUTES CONTAINED IN INDIVIDUAL SHAPE FILES FOR THE SOUTHERN ROCKY MOUNTAINS ECOREGION

(Note: The actual set of attributes varies with each individual layer.)

TNC Rank and TNC Rank Comments (TNC_Rank, TNC_Rank_Comment)	These fields indicate the TNC categorization of the legal status of the protected area as described in the final draft of *Designing a Geography of Hope* (2000). Category rankings of 1 to 4 have been assigned to this field. Category 1 areas have the highest level of designation and protection for biological diversity (e.g. RNAs). Category 4 has no specific protection for biological diversity. In some cases TNC Rank Comments are provided to explain ranking decisions.
Area Name (Area_Name)	Name of the Protected Area or Managed Area.
Type	Type of Designation. The categories included in these layers are: ACEC – Area of Critical Environmental Concern Bureau of Land Management Land Bureau of Reclamation Land Department of Defense Land Forest Service Land ISA – Instant Study Area National Conservation Area National Historic Park National Monument National Park NNL - National Natural Landmark NRA - National Recreation Area NWR – National Wildlife Refuge Native American Land ONA – Outstanding Natural Area Private Land RNA – Research Natural Area State Land State Park State Wildlife Area TNC Preserve TNC Cooperative Project TNC Conservation Easement WSR – Wild and Scenic River Wilderness Area – Congressionally designated Wilderness on BLM, NPS, USFS WIU – Wilderness Inventory Unit – Proposed additions to WSA lands in Utah WSA – Wilderness Study Area – Congressionally designated on federal lands
Manager	The land manager or landowner. The following categories have been utilized. BLM - Bureau of Land Management USFS - USDA Forest Service USFWS - US Fish and Wildlife Service NPS - National Park Service BOR – Bureau of Reclamation State County Native American The Nature Conservancy
Unit	Administrative Office for a given land management agency.
State	Abbreviation of state in which area is located.

GIS Acres (GIS_Acres)	The GIS Acres is the total acreage within each individual polygon. Several of the managed areas are portrayed as multiple polygons. In this situation a note has been made in the Area Comments field, indicating the total number of units (or polygons) that are included in the site. This arrangement allows for totaling acreage figures in this column, without overlap.
Area Comments (Area_Comments)	For protected areas that are portrayed with multiple polygons, the total number of units that make up the protected area is listed in this column. Protected areas that lie within larger protected areas (i.e. RNAs that lie within a Wilderness Area) may also be noted here.
General Comments (Gen_Comm)	This field is used for a variety of general comments on a given managed area. For example it has been utilized to list the primary values of ACECs.
TNC_Code	A unique identifier code to link polygon with attribute information.

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APPENDIX 6: SOUTHERN ROCKY MOUNTAINS SPECIES CONSERVATION TARGETS

TaxGrp	Scientific Name	Common Name	Grank	CO*	NM*	WY*	ESA List	FS / BLM	Rationale	ER Distrib	Partners In Flight >18	Comment
AMPHIB/REPT	BUFO BOREAS	WESTERN TOAD	G4T1Q	X		X	C	FS	DECLINING; IMPERILED; LIMITED	WIDESPREAD ?		
AMPHIB/REPT	BUFO COGNATUS	GREAT PLAINS TOAD	G5	X					DISJUNCT	DISJUNCT		SLV TARGET
AMPHIB/REPT	CHRYSEMYS PICTA	PAINTED TURTLE	G5	X	X				DISJUNCT	DISJUNCT		
AMPHIB/REPT	EUMECES (MULTIVIRGATUS) EPIPLEUROTUS	VARIABLE SKINK	G5	X	X				LIMITED	LIMITED		
AMPHIB/REPT	PHRYNOSOMA HERNANDESI	SHORT-HORNED LIZARD	G5	X	X				DISJUNCT	WIDESPREAD		SLV TARGET
AMPHIB/REPT	PLETHODON NEOMEXICANUS	JEMEZ MOUNTAINS SALAMANDER	G2		X			FS	IMPERILED (INCL G1-G3)	ENDEMIC		
AMPHIB/REPT	RANA PIPIENS	NORTHERN LEOPARD FROG	G5	X	X	X		FS BLM	DECLINING	WIDESPREAD		
AMPHIB/REPT	RANA SYLVATICA	WOOD FROG	G5	X		X		FS	DISJUNCT	DISJUNCT		
BIRDS	BUCEPHALA ALBEOLA	BUFFLEHEAD	G5	X					DISJUNCT	DISJUNCT		
BIRDS	BUCEPHALA ISLANDICA	BARROW'S GOLDENEYE	G5	X				BLM	DISJUNCT	DISJUNCT		
BIRDS	BUTEO ALBONOTATUS	ZONE-TAILED HAWK	G4	X	X				VULNERABLE			
BIRDS	BUTEO REGALIS	FERRUGINOUS HAWK	G4	X	X	X		FS BLM	VULNERABLE	WIDESPREAD		
BIRDS	BUTEO SWAINSONI	SWAINSON'S HAWK	G5	X	X	X			PARTNERS IN FLIGHT	WIDESPREAD		
BIRDS	HALIAEETUS LEUCOCEPHALUS	BALD EAGLE	G4T?Q	X	X	X	LT		THREATENED/ ENDANGERED	WIDESPREAD		
BIRDS	FALCO PEREGRINUS ANATUM	AMERICAN PEREGRINE FALCON	G4T3	X	X	X	LE PDL		THREATENED/ ENDANGERED	WIDESPREAD	19	
BIRDS	CENTROCERCUS MINIMUS	GUNNISON SAGE GROUSE	G1	X				BLM	IMPERILED, PARTNERS IN FLIGHT	ENDEMIC	24	
BIRDS	CENTROCERCUS UROPHASIANUS	GREATER SAGE GROUSE	G5	X		X		BLM	PARTNERS IN FLIGHT	WIDESPREAD	24	
BIRDS	TYMPANUCHUS PHASIANELLUS COLUMBIANUS	COLUMBIAN SHARP-TAILED GROUSE	G4T3	X		X		FS BLM	IMPERILED (INCL G1-G3)	WIDESPREAD		
BIRDS	GRUS CANADENSIS	SANDHILL CRANE	G5T4	X		X		FS	VULNERABLE	WIDESPREAD		
BIRDS	CHARADRIUS MONTANUS	MOUNTAIN PLOVER	G2	X	X	X	PT	FS BLM	IMPERILED,THREATENED OR ENDANGERED, PARTNERS IN FLIGHT	WIDESPREAD	26	
BIRDS	ASIO FLAMMEUS	SHORT-EARED OWL	G5	X		X			PARTNERS IN FLIGHT	WIDESPREAD	19	
BIRDS	STRIX OCCIDENTALIS LUCIDA	MEXICAN SPOTTED OWL	G3T3	X	X		LT		IMPERILED,THREATENED OR ENDANGERED	WIDESPREAD	22	
BIRDS	CYPSELOIDES NIGER	BLACK SWIFT	G4	X	X			FS	PARTNERS IN FLIGHT	WIDESPREAD	23	

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APPENDIX 6: SOUTHERN ROCKY MOUNTAINS SPECIES CONSERVATION TARGETS

TaxGrp	Scientific Name	Common Name	Grank	CO*	NM*	WY*	ESA List	FS / BLM	Rationale	ER Distrib	Partners In Flight >18	Comment
BIRDS	EMPIDONAX TRAILLII	SOUTHWESTERN WILLOW FLYCATCHER	G5T2	X	X		LE	FS	IMPERILED	WIDESPREAD		
BIRDS	PROGNE SUBIS	PURPLE MARTIN	G5	X	X				RARE	WIDESPREAD		
BIRDS	CINCLUS MEXICANUS	AMERICAN DIPPER	G5	X	X	X			PARTNERS IN FLIGHT	WIDESPREAD	21	
BIRDS	AMPHISPIZA BELLI	SAGE SPARROW	G5	X		X			COBCP	WIDESPREAD	20	
BIRDS	PASSERINA AMOENA	LAZULI BUNTING	G5	X	X	X			PARTNERS IN FLIGHT	WIDESPREAD	20	FRONT RANGE TARGET
BIRDS	SPIZELLA BREWERI	BREWER'S SPARROW	G5	X	X	X			PARTNERS IN FLIGHT	WIDESPREAD	19	
BIRDS	VERMIVORA VIRGINIAE	VIRGINIA'S WARBLER	G5	X	X	X			PARTNERS IN FLIGHT	LIMITED	23	FRONT RANGE TARGET
BIRDS	LEUCOSTICTE AUSTRALIS	BROWN-CAPPED ROSY FINCH	G4	X	X	X			PARTNERS IN FLIGHT	ENDEMIC	24	
FISH	CATOSTOMUS PLEBEIUS	RIO GRANDE SUCKER	G3G4	X	X				IMPERILED (INCL G1-G3)	LIMITED		
FISH	GILA PANDORA	RIO GRANDE CHUB	G3	X	X			BLM	IMPERILED (INCL G1-G3)	LIMITED		
FISH	GILA ROBUSTA	ROUNDTAIL CHUB	G2G3	X				BLM	IMPERILED (INCL G1-G3)	LIMITED		
FISH	ONCORHYNCHUS CLARKI PLEURITICUS	COLORADO RIVER CUTTHROAT TROUT	G4T3	X		X		FS BLM	IMPERILED,THREATENED OR ENDANGERED	LIMITED		
FISH	ONCORHYNCHUS CLARKI STOMIAS	GREENBACK CUTTHROAT TROUT	G4T2T3	X			LT		IMPERILED,THREATENED OR ENDANGERED	LIMITED		
FISH	ONCORHYNCHUS CLARKI VIRGINALIS	RIO GRANDE CUTTHROAT TROUT	G4T3	X	X			FS BLM	IMPERILED (INCL G1-G3)	LIMITED		
FISH	PHOXINUS ERYTHROGASTER	SOUTHERN REDBELLY DACE	G5	X	X			FS	DISJUNCT	DISJUNCT		
FISH	PTYCHOCHEILUS LUCIUS	COLORADO PIKEMINNOW	G1T?Q	X			LE		IMPERILED,THREATENED OR ENDANGERED	LIMITED		
FISH	XYRAUCHEN TEXANUS	RAZORBACK SUCKER	G1	X			LE			LIMITED		
INVERTEBRATI	ACERPENNA PYGMAEA	A MAYFLY	G5	X					DISJUNCT	DISJUNCT		
INVERTEBRATI	AGRYPNIA COLORATA HAGEN 1873	A CADDISFLY	G2	X					IMPERILED (INCL G1-G3)	LIMITED		
INVERTEBRATI	ALLOPERLA PILOSA	A STONEFLY	G3	X					IMPERILED, ENDEMIC	ENDEMIC		
INVERTEBRATI	AMBLYDERUS TRIPLEHORNI	ANTHICID BEETLE	G?	X					ENDEMIC	ENDEMIC		
INVERTEBRATI	AMBLYDERUS WERNERI	GREAT SAND DUNES ANTHICID BEETLE	G1?	X					IMPERILED	ENDEMIC		
INVERTEBRATI	ANDRENA DURANGOENSIS	ANDRENID BEE		X								
INVERTEBRATI	APHELIA SPECIES			X								

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TaxGrp	Scientific Name	Common Name	Grank	CO*	NM*	WY*	ESA List	FS / BLM	Rationale	ER Distrib	Partners In Flight >18	Comment
INVERTEBRATI	APHONOPELMA ECHINUM (ARANEAE; THERAPHOSIDAE)	TARANTULA		X					ENDEMIC	ENDEMIC		
INVERTEBRATI	ARCTIA UNDESCRIBED SP	A TIGER MOTH		X					ENDEMIC	ENDEMIC		
INVERTEBRATI	ARCYNOPTERYX COMPACTA	A STONEFLY	G4	X					DISJUNCT	DISJUNCT, WIDESPREAD		
INVERTEBRATI	BAETIS ADONIS	A MAYFLY	G3		X	X			IMPERILED, DISJUNCT	DISJUNCT		
INVERTEBRATI	BAETIS BUNDYAE LEHMKUHL					X						
INVERTEBRATI	BAETIS VIRILE	A MAYFLY	G3	X					IMPERILED, ENDEMIC	ENDEMIC		
INVERTEBRATI	BOLORIA IMPROBA ACROCNEMA	UNCOMPAHGRE FRITILLARY	G2	X			LE		IMPERILED, ENDEMIC	ENDEMIC		
INVERTEBRATI	BOLSHECAPNIA MILAMI	A STONEFLY	G3	X	X				IMPERILED, DISJUNCT	DISJUNCT, WIDESPREAD		
INVERTEBRATI	BRACHYCERCUS PRUDENS	A MAYFLY	G3	X					IMPERILED, DISJUNCT	DISJUNCT, WIDESPREAD		
INVERTEBRATI	CALLOPHRYS MOSSII SCHRYVERI	MOSS' ELFIN	G4T3	X		X			ENDEMIC	ENDEMIC		
INVERTEBRATI	CAPNIA ARAPAHOE	A STONEFLY	G1	X					IMPERILED, ENDEMIC	ENDEMIC		
INVERTEBRATI	CAPNIA NELSONII UNDESCRIBED SP			X								
INVERTEBRATI	CAPNIA UINTAHI GAUFIN			X								
INVERTEBRATI	CAPNIA UNDESCRIBED SP			X								
INVERTEBRATI	CATOCALA COCCINATA SSP	A MOTH	G5	X					DISJUNCT	DISJUNCT		
INVERTEBRATI	CAUCHAS ELONGATA	INCURVARIID MOTH		X					IMPERILED	ENDEMIC		
INVERTEBRATI	CELASTRINA HUMULUS	HOPS AZURE	G2G3	X					IMPERILED, ENDEMIC	ENDEMIC		
INVERTEBRATI	CERACLEA ARIELLES	A CADDISFLY	G2	X		X			IMPERILED (INCL G1-G3), DISJUNCT			
INVERTEBRATI	CHROMAGRION CONDITUM	AURORA DAMSEL	G4		X				DISJUNCT	DISJUNCT, WIDESPREAD		
INVERTEBRATI	CICINDELA NEBRASKANA	A TIGER BEETLE	G4	X	X				DISJUNCT	WIDESPREAD		
INVERTEBRATI	CICINDELA THEATINA	SAN LUIS DUNES TIGER BEETLE	G1	X					IMPERILED, ENDEMIC	ENDEMIC		
INVERTEBRATI	CLISTORONIA MACULATA	A CADDISFLY	G2	X	X				IMPERILED (INCL G1-G3)	LIMITED		
INVERTEBRATI	COPABLEPHARON UNDESCRIBED SP			X					IMPERILED	ENDEMIC		GSD NATL MONUM.
INVERTEBRATI	CORDULEGASTER DORSALIS	PACIFIC SPIKETAIL	G3	X	X				IMPERILED, DISJUNCT	DISJUNCT, WIDESPREAD		
INVERTEBRATI	CORTICARIA UNDESCRIBED	A BEETLE			X				ENDEMIC	ENDEMIC		
INVERTEBRATI	DAIHINIBAENETES GIGANTEUS	GIANT SAND TREADER CRICKET	G?	X					IMPERILED (INCL G1-G3)	LIMITED		
INVERTEBRATI	DAIHINIOIDES LARVALE	STROHECKER'S CAMEL CRICKET	G?		X				ENDEMIC	ENDEMIC		

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APPENDIX 6: SOUTHERN ROCKY MOUNTAINS SPECIES CONSERVATION TARGETS

TaxGrp	Scientific Name	Common Name	Grank	CO*	NM*	WY*	ESA List	FS / BLM	Rationale	ER Distrib	Partners In Flight >18	Comment
INVERTEBRAT	DASYLOPHIA ANGUINA SSP SATYRATA	PROMINENT MOTH		X					ENDEMIC	ENDEMIC		
INVERTEBRAT	DECODES STEVENSI	STEVENS' TORTRICID	G?	X					ENDEMIC	ENDEMIC		
INVERTEBRAT	DISTICHLICOCCUS FONTANUS	A MEALYBUG			X				ENDEMIC	ENDEMIC		
INVERTEBRAT	EPHEMERA SIMULANS	A MAYFLY	G5	X						ENDEMIC		
INVERTEBRAT	EPHEMERELLA APOPSIS	A MAYFLY	G1	X					IMPERILED, ENDEMIC, VULNERABLE	ENDEMIC		
INVERTEBRAT	EREBIA THEANO ETHELA	BANDED ALPINE	G4G5	X					ENDEMIC	ENDEMIC		
INVERTEBRAT	ETHMIA MONACHELLA	LOST ETHMID MOTH	GH	X					IMPERILED	ENDEMIC		
INVERTEBRAT	EUCHLOA LOTTA UNDESCRIBED POP	DESERT MARBLE BUTTERFLY		X					ENDEMIC	ENDEMIC		
INVERTEBRAT	EUCOSMA DAPSILIS	TORTRICID MOTH		X								
INVERTEBRAT	EUCOSMA FANDANA	A MOTH	G?	X					ENDEMIC	ENDEMIC		
INVERTEBRAT	EUCOSMA FOFANA	TORTRICID MOTH		X								
INVERTEBRAT	EUHYPARPAX ROSEA	PROMINENT MOTH		X		X			IMPERILED	WIDESPREAD		
INVERTEBRAT	EUPHILOTES ELLISI	ELLIS DOTTED-BLUE	G4G5	X					IMPERILED (INCL G1-G3)	LIMITED		
INVERTEBRAT	EUPHILOTES RITA EMMELI	EMMEL'S BLUE	G3G4T2	X	X							
INVERTEBRAT	EUPHYES BIMACULA	TWO-SPOTTED SKIPPER	G4	X					DISJUNCT	LIMITED		
INVERTEBRAT	EUPROSERPINUS WIESTI	WIEST'S SPHINX MOTH	G3G4	X	X				IMPERILED	LIMITED		
INVERTEBRAT	GAZORYCTRA UNDESCRIBED SP	GHOST MOTH		X		X			IMPERILED	ENDEMIC		
INVERTEBRAT	GLOSSOSOMA ALASCENSE	A CADDISFLY	G3	X					IMPERILED (INCL G1-G3)	DISJUNCT		
INVERTEBRAT	GNOPHAELA CLAPPIANA		G?	X								
INVERTEBRAT	GRAMMIA CERVINOIDES	ALPINE TIGER MOTH		X					IMPERILED	ENDEMIC		
INVERTEBRAT	GRAMMIA UNDESCRIBED SP	A MOTH	G?	X					ENDEMIC	ENDEMIC		
INVERTEBRAT	GRAMMIA UNDESCRIBED SP	A MOTH		X					ENDEMIC			
INVERTEBRAT	GRAMMIA UNDESCRIBED SP	A MOTH		X					ENDEMIC			
INVERTEBRAT	HESPERIA LEONARDUS MONTANA	PAWNEE MONTANE SKIPPER	G4T1	X			LT		ENDEMIC	ENDEMIC		
INVERTEBRAT	HETEROCAMPA RUFINANS			X								
INVERTEBRAT	HETEROCLOEON FRIVOLUM	A MAYFLY	G4	X					DISJUNCT	DISJUNCT, WIDESPREAD		
INVERTEBRAT	HYPOCHILUS BONNETI	LAMPSHADE SPIDER		X								
INVERTEBRAT	HYPOCHILUS JEMEZ	JEMEZ LAMPSHADE	G?		X					ENDEMIC		
INVERTEBRAT	HYPTIOTES SP	TRIANGLE WEBSPIDER		X								
INVERTEBRAT	LEPIDOSTOMA CINEREUM	A CADDISFLY	G4	X					ENDEMIC	ENDEMIC		
INVERTEBRAT	LEUCROCUTA PETERSI	A MAYFLY	G1		X				IMPERILED, DISJUNCT	LIMITED		
INVERTEBRAT	LIBELLULA NODISTICTA	HOARY SKIMMER	G3		X				IMPERILED (INCL G1-G3)	WIDESPREAD		
INVERTEBRAT	LYCIA UNDESCRIBED SP	A GEOMETRID MOTH	G1	X					ENDEMIC	DISJUNCT		
INVERTEBRAT	LYMNAEA CAPERATA	SAY'S PONDSNAIL		X						DISJUNCT, PERIPHERAL		
INVERTEBRAT	MACDUNNOA PERSIMPLEX	A MAYFLY	G3	X					IMPERILED, DISJUNCT	DISJUNCT, WIDESPREAD		
INVERTEBRAT	MELEMAEA UNDESCR	A GEOMETRID MOTH		X					ENDEMIC	ENDEMIC		
INVERTEBRAT	MEXIMACHILIS N. SP.	A BRISTLETAIL			X				ENDEMIC	ENDEMIC		

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APPENDIX 6: SOUTHERN ROCKY MOUNTAINS SPECIES CONSERVATION TARGETS

TaxGrp	Scientific Name	Common Name	Grank	CO*	NM*	WY*	ESA List	FS / BLM	Rationale	ER Distrib	Partners In Flight >18	Comment
INVERTEBRAT	NEOARCTIA BRUCE	ALPINE TIGER MOTH		X						ENDEMIC		
INVERTEBRAT	NEOCYRTUSA N. SP.	A BEETLE			X				ENDEMIC	ENDEMIC		
INVERTEBRAT	NEOMINOIS RIDINGSII UNDESCRIBED SP	RIDINGS' SATYR	G5	X								
INVERTEBRAT	NEOMINOIS WYOMINGO	SWALE SATYR	G3G4	X		X			IMPERILED	LIMITED		
INVERTEBRAT	NEOTRICHIA DOWNSI	A CADDISFLY	G1	X					IMPERILED (INCL G1-G3)	ENDEMIC		
INVERTEBRAT	OCHLODES YUMA ANASAZI	YUMA SKIPPER	G5T1		X				ENDEMIC, DISJUNCT	ENDEMIC, DISJUNCT		
INVERTEBRAT	OCHROTRICHIA SUSANAE	A CADDISFLY	G2	X					IMPERILED (INCL G1-G3)	ENDEMIC		
INVERTEBRAT	OCHROTRICHIA TRAPOIZA	A CADDISFLY	G2	X		X			IMPERILED (INCL G1-G3)	LIMITED		
INVERTEBRAT	OENEIS ALBERTA CAPULINENSIS	CAPULIN MOUNTAIN ARCTIC			X				IMPERILED	LIMITED		
INVERTEBRAT	OENEIS ALBERTA SSP	ALBERTA ARCTIC	G5	X	X				ENDEMIC, DISJUNCT	ENDEMIC		
INVERTEBRAT	OENEIS BORE EDWARDSII	WHITE-VEINED ARCTIC	T1T2	X					ENDEMIC, IMPERILED (INCL G1-G3)	ENDEMIC		
INVERTEBRAT	PAPILIO INDRA MINORI	MINOR'S SWALLOWTAIL	G5T1T2	X								
INVERTEBRAT	PARALEPTOPHLEBIA TEMPORALIS	A MAYFLY	G4	X					DISJUNCT	DISJUNCT, WIDESPREAD		
INVERTEBRAT	PARALEUCTRA JEWETTI	A STONEFLY	G4	X					DISJUNCT	LIMITED		
INVERTEBRAT	PARALEUCTRA PROJECTA (=P.RICKERI AS RECORDED FROM NM)	A STONEFLY			X							
INVERTEBRAT	PARALEUCTRA RICKERI	A STONEFLY	G4		X				DISJUNCT	DISJUNCT		
INVERTEBRAT	PHANETA INSIGNATA	TORTRICID MOTH	G?									
INVERTEBRAT	PHANETA UNDESCRIBED SPECIES			X								
INVERTEBRAT	PHRAGMATOBIA ASSIMILANS	TIGER MOTH	G5	X					DISJUNCT	DISJUNCT		
INVERTEBRAT	PHYCIODES BATESI ANASAZI	CANYON CRESCENT	G4T2T3	X								
INVERTEBRAT	PHYLLOGOMPHOIDES ALBRIGHTI	FIVE-STRIPED LEAFTAIL	G4		X				DISJUNCT	DISJUNCT, WIDESPREAD		
INVERTEBRAT	PISIDIUM LILLJEBORGI	LILLJEBORG'S PEACLAM			X					DISJUNCT		
INVERTEBRAT	PISIDIUM SANGUINICHRISTI	SANGRE DE CRISTO PEACLAM	G1Q		X					ENDEMIC		
INVERTEBRAT	PLAUDITUS CESTUS	A MAYFLY	G3	X					IMPERILED	DISJUNCT, WIDESPREAD		
INVERTEBRAT	POANES HOBOMOK WETONA	HOBOMOK SKIPPER	G5(SP)	X	X				ENDEMIC	LIMITED		
INVERTEBRAT	POLITES ORIGENES RHENA	CROSS-LINE SKIPPER	G5	X	X				ENDEMIC	ENDEMIC		
INVERTEBRAT	PRODOXUS PHYLLORYCTIS	YUCCA MOTH		X								
INVERTEBRAT	PROSERPINUS FLAVOFASCIATA	YELLOW BANDED DAY SPHINX	G4	X					PERIPHERAL	PERIPHERAL		
INVERTEBRAT	PSEUDEXERITERA UNDESCR SPP	TORTRICID MOTH		X					ENDEMIC			
INVERTEBRAT	PSYCHORONIA BROOKSI RUITER 1999	CADDISFLY			X							

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INVERTEBRAT	PTERONARCELLA REGULARIS	A STONEFLY	G3		X				IMPERILED, DISJUNCT	DISJUNCT		
INVERTEBRAT	RHYACIONIA SALMONICOLOR	PINETIP MOTH	G?	X					IMPERILED	DISJUNCT		
INVERTEBRAT	RITHROGENA FLAVIANULA	A MAYFLY	G1	X					IMPERILED, DISJUNCT	DISJUNCT		
INVERTEBRAT	RITHROGENA PELLUCIDA	A MAYFLY	G5	X					DISJUNCT	DISJUNCT, WIDESPREAD		
INVERTEBRAT	SCHINIA AVEMENSIS	A FLOWER MOTH	G1	X					DISJUNCT	DISJUNCT		
INVERTEBRAT	SCHINIA CARMINATRA	A FLOWER MOTH	G1G2	X					ENDEMIC	ENDEMIC		
INVERTEBRAT	SCHINIA MASONI	MASON'S FLOWER MOTH	G2G3	X					ENDEMIC	ENDEMIC		
INVERTEBRAT	SCHINIA UNDESCR SP	HARDWICK'S FLOWER MOTH		X					IMPERILED	ENDEMIC		
INVERTEBRAT	SERICODERUS LATERALIS	A BEETLE			X				ENDEMIC	ENDEMIC		
INVERTEBRAT	SOMATOCHLORA HUDSONICA	HUDSONIAN EMERALD	G5	X		X			VULNERABLE	LIMITED		
INVERTEBRAT	SPEYERIA HESPERIS RATONENSIS	NORTHWESTERN FRITILLARY	G5(SP)	X	X				ENDEMIC	ENDEMIC		
INVERTEBRAT	SPEYERIA NOKOMIS NOKOMIS	GREAT BASIN FRITILLARY	G4T2	X	X			BLM	IMPERILED, DECLINING, VULNERABLE	WIDESPREAD		
INVERTEBRAT	SPHINX ASELLA		G3	X	X				IMPERILED	LIMITED		
INVERTEBRAT	STYGOBROMUS COLORADENSIS	A CAVE OBLIGATE AMPHIPOD	G1G2	X					ENDEMIC	ENDEMIC		
INVERTEBRAT	STYGOBROMUS HOLSINGERI	A CAVE OBLIGATE AMPHIPOD	G1G2	X					IMPERILED	ENDEMIC		
INVERTEBRAT	STYGOBROMUS PENNAKI	A CAVE OBLIGATE AMPHIPOD	G3	X					ENDEMIC, IMPERILED	ENDEMIC		
INVERTEBRAT	SUWALLIA WARDI	A STONEFLY	G3	X					IMPERILED, DISJUNCT	LIMITED		
INVERTEBRAT	SWELTSA HONDO	A STONEFLY	G3		X				IMPERILED, ENDEMIC	LIMITED		
INVERTEBRAT	TAENIOPTERYX PARVULA	A STONEFLY	G5	X	X	X			DISJUNCT	DISJUNCT, WIDESPREAD		
INVERTEBRAT	TRACHYSMIA GRANDIS	A MOTH		X								
INVERTEBRAT	TRIMEROTROPIS FRATERCULA	GRASSHOPPER	G?	X					IMPERILED	ENDEMIC		
INVERTEBRAT	UTACAPNIA PODA	GUNNISON SNOWFLY		X						LIMITED		
MAMMALS	ZAPUS HUDSONIUS LUTEUS	NEW MEXICAN JUMPING MOUSE	G5T2	X	X				DECLINING, ENDEMIC, VULNERABLE	ENDEMIC		
MAMMALS	ZAPUS HUDSONIUS PREBLEI	PREBLE'S JUMPING MOUSE	G5T2	X		X	LT		DECLINING, ENDEMIC, VULNERABLE	ENDEMIC		
MAMMALS	THOMOMYS BOTTAE CULTELLUS	BOTTA'S POCKET GOPHER SUBSP.	G5T3Q	X	X				ENDEMIC	ENDEMIC		
MAMMALS	THOMOMYS BOTTAE INTERNATUS	A POCKET GOPHER	G5T?	X								
MAMMALS	THOMOMYS BOTTAE PERVAGUS	BOTTA'S POCKET GOPHER SUBSP.	G5T3	X	X				ENDEMIC	ENDEMIC		
MAMMALS	THOMOMYS BOTTAE RUBIDUS	BOTTA'S POCKET GOPHER SUBSP.	G5T1	X					ENDEMIC, VULNERABLE	LIMITED		

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MAMMALS	THOMOMYS TALPOIDES AGRESTIS	NORTHERN POCKET GOPHER SUBSP.	G5T3	X					ENDEMIC	ENDEMIC		
MAMMALS	DIPODOMYS ORDII EVEXUS	ORD'S KANGAROO RAT	G5T2	X					ENDEMIC	ENDEMIC		
MAMMALS	DIPODOMYS ORDII MONTANUS	SAN LUIS KANGAROO RAT	G5T3	X					ENDEMIC	ENDEMIC		
MAMMALS	PEROGNATHUS FLAVESCENS RELICTUS	PLAINS POCKET MOUSE SUBSP.	G5T2	X					ENDEMIC	ENDEMIC		
MAMMALS	PEROGNATHUS FLAVUS SANLUISI	SILKY POCKET MOUSE SUBSP.	G5T3	X					ENDEMIC	ENDEMIC		
MAMMALS	LEPUS AMERICANUS	SNOWSHOE HARE	G5		X	X			DISJUNCT	DISJUNCT		NM TARGET
MAMMALS	LEMMISCUS CURTATUS	SAGEBRUSH VOLE	G5	X	X	X			DECLINING	WIDESPREAD		
MAMMALS	TADARIDA BRASILIENSIS	MEXICAN FREE-TAILED	G5	X	X				COBCP	PERIPHERAL		
MAMMALS	MICROTUS MOGOLLONENSIS	MOGOLLON VOLE	G4G5Q	X	X					DISJUNCT		
MAMMALS	REITHRODONTOMYS MEGALOTIS CARYI	WESTERN HARVEST MOUSE	G5T?	X	?				ENDEMIC	LIMITED, PERIPHERAL		
MAMMALS	MUSTELA NIGRIPES	BLACK-FOOTED FERRET	G1				LE		IMPERILED	EXTIRPATED		
MAMMALS	OCHOTONA PRINCEPS NIGRESCENS	GOAT PEAK PIKA	G5T1		X				IMPERILED, ENDEMIC	ENDEMIC		
MAMMALS	CYNOMYS GUNNISONI	GUNNISON'S PRAIRIE DOG	G5	X	X				DECLINING, FOCAL SPECIES (KEYSTONE OR WIDE-RANGING)	WIDESPREAD		
MAMMALS	CYNOMYS LEUCURUS	WHITE-TAILED PRAIRIE DOG	G4	?		X			DECLINING, FOCAL SPECIES, SPECIAL CONSIDERATION (SPP AGGREGATIONS, SPP GROUPS)	PERIPHERAL		
MAMMALS	EUTAMIAS MINIMUS CARYI	SAN LUIS LEAST CHIPMUNK	G5T3	X					IMPERILED, ENDEMIC	ENDEMIC		
MAMMALS	SPERMOPHILUS TRIDECEMLINEATUS BLANCA	THIRTEEN-LINED GROUND SQUIRREL SUBSP.	G5T3	X					IMPERILED, ENDEMIC	ENDEMIC		
MAMMALS	SOREX HOYI MONTANUS	PYGMY SHREW	G5T2T3	X		X		FS	IMPERILED (INCL G1-G3)	DISJUNCT		
MAMMALS	SOREX PREBLEI	PREBLE'S SHREW	G4	X		X			DISJUNCT	DISJUNCT		
MAMMALS	CORYNORHINUS TOWNSENDII PALLESCENS	WESTERN BIG-EARED BAT	G4T4	X	X	X		BLM	VULNERABLE	WIDESPREAD		
MAMMALS	MARTES AMERICANA CAURINA	PINE MARTEN	G5	X	X	X			VULNERABLE	WIDESPREAD		
MAMMALS, WR	BOS BISON	AMERICAN BISON	G4 X							EXTIRPATED		
MAMMALS, WR	OVIS CANADENSIS	BIGHORN SHEEP	G4G5	X	X	X			DECLINING, VULNERABLE	WIDESPREAD		WY TARGET

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APPENDIX 6: SOUTHERN ROCKY MOUNTAINS SPECIES CONSERVATION TARGETS

TaxGrp	Scientific Name	Common Name	Grank	CO*	NM*	WY*	ESA List	FS / BLM	Rationale	ER Distrib	Partners In Flight >18	Comment
MAMMALS, WR	CANIS LUPUS	GRAY WOLF	G5TX				LE		FOCAL SPECIES (KEYSTONE/WIDE-RANGING), THREATENED/ ENDANGERED	EXTIRPATED		
MAMMALS, WR	LYNX CANADENSIS	LYNX	G5	X		X	LT	FS	FOCAL SPECIES (KEYSTONE/WIDE-RANGING)	PERIPHERAL		
MAMMALS, WR	GULO GULO	WOLVERINE	G4	X		X	Petitioi	FS	FOCAL SPECIES (KEYSTONE/WIDE-RANGING); PETITIONED FOR LISTING	PERIPHERAL		
MAMMALS, WR	URSUS ARCTOS	BROWN BEAR	G4				LT		FOCAL SPECIES (KEYSTONE/WIDE-RANGING), THREATENED/ ENDANGERED.	EXTIRPATED		
MOLLUSKS	ACROLOXUS COLORADENSIS	ROCKY MOUNTAIN CAPSHELL	G?	X				FS BLM	IMPERILED	ENDEMIC		
MOLLUSKS	ANODONTOIDES FERUSSACIANUS	CYLINDRICAL PAPERSHELL	G5	X								
MOLLUSKS	LYMNAEA STAGNALIS	SWAMPY LYMNAEA	G5	X								
MOLLUSKS	PHYSA CUPREONITENS	HOT SPRINGS PHYSA	G?	X								
MOLLUSKS	PHYSA SKINNERI	GLASS PHYSA	G?	X					VULNERABLE	LIMITED		
MOLLUSKS	PHYSA UTAHENSIS	BANDED PHYSA	G1	X								
MOLLUSKS	PROMENETUS EXACUOUS	SHARP SPRITE	G?	X								
MOLLUSKS	PROMENETUS	UMBILICATE SPRITE	G?	X								
MOLLUSKS	VALVATA SINCERA	MOSSY VALVATA	G?	X								
PLANTS	AGASTACHE FOENICULUM	LAVENDER HYSSOP	G4G5	X					IMPERILED (INCL G1-G3)	DISJUNCT, WIDESPREAD		
PLANTS	ALETES HUMILIS	LARIMER ALETES	G2G3	X		X		FS	IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	ALSINANTHE MACRANTHA (= ARENARIA OR MINUARTIA)		G3?	X					IMPERILED (INCL G1-G3)	LIMITED		
PLANTS	AQUILEGIA LARAMIENSIS	LARAMIE COLUMBINE	G2			X			IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	AQUILEGIA SAXIMONTANA	ROCKY MOUNTAIN COLUMBINE	G3	X					IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	ARABIS CRANDALII (=BOECHERA)		G4	X				BLM	IMPERILED (INCL G1-G3)	LIMITED		
PLANTS	ARABIS GUNNISONIANA (=BOECHERA)		G3	X					IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	ARMERIA SCABRA SSP SIBIRICA	SEA PINK	G5T5	X				FS	DISJUNCT	DISJUNCT		

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APPENDIX 6: SOUTHERN ROCKY MOUNTAINS SPECIES CONSERVATION TARGETS

TaxGrp	Scientific Name	Common Name	Grank	CO*	NM*	WY*	ESA List	FS / BLM	Rationale	ER Distrib	Partners In Flight >18	Comment
PLANTS	ARTEMISIA PATTERSONII	PATTERSON'S WORMWOOD	G3	X	X				IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	ASCLEPIAS UNCIALIS	DWARF MILKWEED	G3?	X	X			FS BLM	IMPERILED (INCL G1-G3)	WIDESPREAD		
PLANTS	ASTER ALPINUS VAR VIERHAPPERI	ALPINE ASTER	G5TU	X					DISJUNCT	DISJUNCT		
PLANTS	ASTRAGALUS ANISUS	GUNNISON MILKVETCH	G2	X				FS BLM	IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	ASTRAGALUS CERUSSATUS	POWDERY MILKVETCH	G3G4	X	X				IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	ASTRAGALUS CYANEUS	CYANIC MILKVETCH	G3		X				RARE	LIMITED		
PLANTS	ASTRAGALUS DEBEQUAEUS	DEBEQUE MILKVETCH	G2	X				BLM	IMPERILED (INCL G1-G3)	LIMITED		
PLANTS	ASTRAGALUS FEENSIS	SANTA FE MILKVETCH	G3		X				IMPERILED (INCL G1-G3)	LIMITED		
PLANTS	ASTRAGALUS HALLII VAR HALLII	HALL'S MILKVETCH	G4T4	X	X				ENDEMIC	ENDEMIC		
PLANTS	ASTRAGALUS IODOPETALUS	VIOLET MILKVETCH	G3G4	X	X				ENDEMIC	ENDEMIC		
PLANTS	ASTRAGALUS LEPTALEUS	PARK MILK-VETCH	G4	X		X			DISJUNCT	LIMITED		
PLANTS	ASTRAGALUS LINIFOLIUS	GRAND JUNCTION MILKVETCH	G3Q	X				BLM	IMPERILED (INCL G1-G3)	LIMITED; PERIPHERAL		
PLANTS	ASTRAGALUS MICROCYMBUS	SKIFF MILKVETCH	G1	X				BLM	IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	ASTRAGALUS MICROMERIUS	CHACO MILKVETCH	G2		X				IMPERILED (INCL G1-G3)	LIMITED		
PLANTS	ASTRAGALUS MISSOURIENSIS VAR HUMISTRATUS	MISSOURI MILKVETCH	G5T2	X					IMPERILED (INCL G1-G3)			
PLANTS	ASTRAGALUS MOLYBDENUS	MOLYBDENUM MILKVETCH	G3	X				FS	IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	ASTRAGALUS OSTERHOUTII	OSTERHOUT MILKVETCH	G1	X			LE		IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	ASTRAGALUS PUNICEUS VAR GERTRUDIS	TAOS MILKVETCH	G4T3?Q		X				IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	ASTRAGALUS RIPLEYI	RIPLEY MILKVETCH	G3	X	X			FS BLM	IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	ASTRAGALUS SPARSIFLORUS	FRONT RANGE MILKVETCH	G3?	X					IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	ASTRAGALUS WETHERILLII	WETHERILL MILKVETCH	G3	X					IMPERILED (INCL G1-G3)	LIMITED		
PLANTS	AZALEASTRUM ALBIFLORUM	WHITE FLOWERED	G4	X					DISJUNCT			
PLANTS	BESSEYA RITTERIANA	RITTER'S CORALDROPS	G3?	X					IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	BOTRYCHIUM CAMPESTRE	PRAIRIE MOONWORT	G3	X				FS	IMPERILED (INCL G1-G3)	WIDESPREAD		
PLANTS	BOTRYCHIUM ECHO	REFLECTED MOONWORT	G2	X				FS	IMPERILED (INCL G1-G3)	WIDESPREAD		
PLANTS	BOTRYCHIUM HESPERIUM	WESTERN MOONWORT	G3	X					IMPERILED (INCL G1-G3)	WIDESPREAD		
PLANTS	BOTRYCHIUM LINEARE	NARROWLEAF GRAPEFERN	G1	X				FS	IMPERILED (INCL G1-G3)	WIDESPREAD		

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TaxGrp	Scientific Name	Common Name	Grank	CO*	NM*	WY*	ESA List	FS / BLM	Rationale	ER Distrib	Partners In Flight >18	Comment
PLANTS	BOTRYCHIUM PALLIDUM	PALE MOONWORT	G2	X				FS	IMPERILED (INCL G1-G3)	DISJUNCT		
PLANTS	BOTRYCHIUM PINNATUM	NORTHWESTERN MOONWORT	G4?	X					DISJUNCT	DISJUNCT		
PLANTS	BOTRYPUS VIRGINIANUS	FERN	G5	X	X				DISJUNCT	DISJUNCT		
PLANTS	BRAYA GLABELLA VAR GLABELLA	ARCTIC BRAYA	G5	X				FS	DISJUNCT	DISJUNCT		
PLANTS	BRAYA HUMILIS	ALPINE BRAYA	G4	X					DISJUNCT	DISJUNCT		
PLANTS	CALOCHORTUS GUNNISONII VAR PERPULCHER	PECOS MARIPOSA LILY	G5T4?		X				ENDEMIC	ENDEMIC		
PLANTS	CAREX CONCINNA	LOW NORTHERN SEDGE	G4G5	X				BLM	DISJUNCT	DISJUNCT		
PLANTS	CAREX LASIOCARPA	SLENDER SEDGE	G5	X					DISJUNCT	DISJUNCT		
PLANTS	CAREX LIVIDA	LIVID SEDGE	G5	X				FS BLM	DISJUNCT	DISJUNCT		
PLANTS	CAREX NELSONII	NELSON'S SEDGE	G3?	X		X			IMPERILED (INCL G1-G3)	LIMITED		
PLANTS	CAREX OREOCHARIS	A SEDGE	G3	X	X	X			IMPERILED (INCL G1-G3)	LIMITED		
PLANTS	CAREX PERGLOBOSA	GLOBE SEDGE	G3G4	X					VULNERABLE	LIMITED		
PLANTS	CAREX VIRIDULA	GREEN SEDGE	G5?	X				BLM	DISJUNCT; PERIPHERAL	DISJUNCT		
PLANTS	CASTILLEJA LINEATA	MARSH MEADOW INDIAN PAINTBRUSH	G4?	X	X				ENDEMIC	ENDEMIC		
PLANTS	CASTILLEJA PUBERULA	DOWNY INDIAN-PAINTBRUSH	G2G3	X					IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	CHONDROPHYLLA NUTANS	SIBERIAN GENTIAN	?	X					DISJUNCT	DISJUNCT		
PLANTS	CIRSIUM PERPLEXANS	ROCKY MOUNTAIN THISTLE	G2	X				BLM	IMPERILED (INCL G1-G3)	LIMITED		
PLANTS	CIRSIUM SCAPANOLEPIS	MOUNTAIN SLOPE THISTLE	G1	X					IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	CLEOME MULTICAULIS	MANY STEMMED SPIDERFLOWER	G2G3	X				BLM	IMPERILED (INCL G1-G3)	WIDESPREAD		
PLANTS	CRATAEGUS SALIGNA	WILLOW HAWTHORN	G2	X					ENDEMIC	ENDEMIC		
PLANTS	CRYPTANTHA WEBERI	WEBER'S CATS-EYE	G2	X					IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	CYSTOPTERIS MONTANA	MOUNTAIN BLADDER-	G5	X					DISJUNCT	DISJUNCT		
PLANTS	DELPHINIUM ALPESTRE	COLORADO LARKSPUR	G3	X	X				IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	DELPHINIUM ROBUSTUM	WAHATOYA CREEK LARKSPUR	G2?	X	X				IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	DELPHINIUM SAPELLONIS	SAPELLO CANYON LARKSPUR	G4?		X				ENDEMIC	LIMITED		
PLANTS	DESCURAINIA RAMOSISSIMA	VILLA GROVE TANSY-MUSTARD	G3?	X					IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	DRABA GLOBOSA	ROCKCRESS DRABA	G3	X		X			IMPERILED (INCL G1-G3)	LIMITED		
PLANTS	DRABA GRAMINEA	SAN JUAN WHITLOW-GRASS	G2	X					IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	DRABA GRAYANA	GRAY'S PEAK WHITLOW-GRASS	G2	X					IMPERILED (INCL G1-G3)	ENDEMIC		

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APPENDIX 6: SOUTHERN ROCKY MOUNTAINS SPECIES CONSERVATION TARGETS

TaxGrp	Scientific Name	Common Name	Grank	CO*	NM*	WY*	ESA List	FS / BLM	Rationale	ER Distrib	Partners In Flight >18	Comment
PLANTS	DRABA PORSILDII VAR PORSILDII	PORSILD'S WHITLOWGRASS	G3G4T3T4						DISJUNCT	DISJUNCT		
PLANTS	DRABA RECTIFRUCTA	MOUNTAIN WHITLOW-GRASS	G3?	X					IMPERILED (INCL G1-G3)	DISJUNCT		
PLANTS	DRABA SMITHII	SMITH WHITLOW-GRASS	G2	X				FS	IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	DRABA SPECTABILIS VAR OXYLOBA	SHOWY DRABA	G3T3Q	X	X	X			IMPERILED (INCL G1-G3)	LIMITED		
PLANTS	DRABA STREPTOBRACHIA	COLORADO DIVIDE WHITLOW-GRASS	G3	X					IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	DRABA VENTOSA	WIND RIVER WHITLOW-GRASS	G3	X					IMPERILED (INCL G1-G3)	LIMITED		
PLANTS	DRABA WEBERI	WEBER'S DRABA	G1	X					IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	DROSERA ROTUNDIFOLIA	ROUND-LEAVED SUNDEW	G5	X					DISJUNCT	DISJUNCT		
PLANTS	DRYOPTERIS EXPANSA	NORTHERN WOOD FERN	G5	X					DISJUNCT	DISJUNCT		
PLANTS	ERICAMERIA MICROCEPHALA=HAPLOPAPPUS	SMALL HEAD GOLDENWEED	G3?		X				IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	ERIGERON LANATUS	WOOLLY FLEABANE	G3G4	X				FS	DISJUNCT	DISJUNCT		
PLANTS	ERIGERON SUBGLABER	PECOS FLEABANE	G3		X				IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	ERIOGONUM BRANDEGEI	BRANDEGEE WILD BUCKWHEAT	G1G2	X				FS BLM	IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	ERIOGONUM COLORADENSE	COLORADO WILD BUCKWHEAT	G2	X				BLM	IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	ERIOGONUM EXILIFOLIUM	DROPLEAF BUCKWHEAT	G3	X		X			IMPERILED (INCL G1-G3)	LIMITED		
PLANTS	ERIOGONUM LACHNOGYNUM	LONGROOT WILD BUCKWHEAT	G4?	X					DISJUNCT	DISJUNCT		
PLANTS	ERIOPHORUM ALTAICUM VAR NEOGAEUM	ALTAI COTTONGRASS	G4T?	X				FS	IMPERILED (INCL G1-G3)	WIDESPREAD		
PLANTS	ERIOPHORUM GRACILE	SLENDER COTTONGRASS	G5	X				BLM	DISJUNCT	DISJUNCT		
PLANTS	EUTREMA EDWARDSII SP. PENLANDII	PENLAND ALPINE FEN MUSTARD	G1G2	X			LT		IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	FESTUCA HALLII	HALL FESCUE	G3G4	X		X		FS	VULNERABLE	WIDESPREAD		
PLANTS	GILIA PENSTEMONOIDES	BEARDTONGUE GILIA	G3	X				FS	IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	GILIA SEDIFOLIA	STONECROP GILIA	G1	X					IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	GRINDELIA ACUTIFOLIA	RATON GUMWEED	G3?	X	X				IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	GRINDELIA DECUMBENS VAR. SUBINCISA	STEYERMARK RECLINED GUMWEED	G4T3?	X	X				IMPERILED (INCL G1-G3)	E?		
PLANTS	ILIAMNA CRANDALLII	CRANDALL'S WILD-HOLLYHOCK	GHQ	X					IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	ILIAMNA GRANDIFLORA	LARGE-FLOWER GLOBE-MALLOW	G3?Q	X	X				IMPERILED (INCL G1-G3)	LIMITED		
PLANTS	IPOMOPSIS AGGREGATA SSP WEBERI	WEBER'S SCARLET GILIA	G5T1T2Q	X		X		FS	IMPERILED (INCL G1-G3)	LIMITED		

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PLANTS	IPOMPSIS GLOBULARIS	GLOBE GILIA	G2	X				FS	IMPERILED	ENDEMIC		
PLANTS	IPOMOPSIS POLYANTHA	PAGOSA GILIA	G1	X				FS BLM	IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	IPOMOPSIS SANCTI-SPIRITUS	HOLY GHOST IPOMOPSIS	G1		X		LE		IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	JUNCUS TWEEDYI	TWEEDY RUSH	G3Q	X					IMPERILED (INCL G1-G3)	DISJUNCT		
PLANTS	LESQUERELLA ALPINA SSP PARVULA	NARROWLEAVED BLADDERPOD	G4T3?	X		X			IMPERILED (INCL G1-G3)	LIMITED		
PLANTS	LESQUERELLA PRUINOSA	FROSTY BLADDERPOD	G2	X				FS, BLM	IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	LOMATIUM BICOLOR VAR LEPTOCARPUM	WASATCH BISCUITROOT	G4T?	X		X			IMPERILED (INCL G1-G3)	DISJUNCT		
PLANTS	LUPINUS CRASSUS	PAYSON LUPINE	G2	X				BLM	IMPERILED (INCL G1-G3)	LIMITED; PERIPHERAL		
PLANTS	LUZULA SUBCAPITATA	COLORADO WOOD-RUSH	G3?	X					IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	MACHAERANTHERA COLORADOENSIS	COLORADO TANSY-ASTER	G2?	X		X		FS	IMPERILED (INCL G1-G3)	LIMITED		
PLANTS	MENTZELIA CHRYSANTHA	GOLDEN BLAZING STAR	G1G2	X				BLM	IMPERILED (INCL G1-G3)	LIMITED		
PLANTS	MENTZELIA CONSPICUA	CHAMA BLAZING STAR	G2		X				IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	MENTZELIA DENSA	ROYAL GORGE STICKLEAF	G2	X				BLM	IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	MENTZELIA MULTICAULIS	MANY STEM STICKLEAF	G2G3	X					IMPERILED (INCL G1-G3)	LIMITED		
PLANTS	MENTZELIA SPRINGERI	SANTA FE STICKLEAF	G?		X				ENDEMIC	ENDEMIC		
PLANTS	MIMULUS GEMMIPARUS	WEBER MONKEY-FLOWER	G2	X				FS	IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	MYRIOPHYLLUM VERTICILLATUM	WATER MILFOIL	G5	X					DISJUNCT; PERIPHERAL	DISJUNCT, PERIPHERAL		
PLANTS	NEOPARRYA LITHOPHILA=ALETES LITHOPHILUS	ROCK-LOVING ALETES	G3	X				FS BLM	IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	OPUNTIA VIRIDIFLORA	SANTA FE CHOLLA	G1Q		X				IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	OREOXIS ALPINA SSP. PUBERULENTA	ALPINE OREOXIS	G4T?	X					ENDEMIC	ENDEMIC		
PLANTS	OREOXIS BAKERI		G3G4	X					VULNERABLE	LIMITED		
PLANTS	OREOXIS HUMILIS	PIKES PEAK SPRING PARSLEY	G1	X					IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	PACKERA PAUCIFLORA	ALPINE GROUNDSEL	G4G5	X				BLM	DISJUNCT	DISJUNCT		
PLANTS	PAPAVER KLUANENSIS	ALPINE POPPY	G3?Q	X	X				IMPERILED (INCL G1-G3)	DISJUNCT		
PLANTS	PARONYCHIA PULVINATA	ROCKY MOUNTAIN NAILWORT	G3	X	X	X			ENDEMIC	ENDEMIC		
PLANTS	PARTHENIUM TETRANEURIS	BARNBEY'S FEVERFEW	G3	X					IMPERILED (INCL G1-G3)	LIMITED		

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PLANTS	PEDICULARIS SCOPULORUM=P. SUDETICA	SUDETIC LOUSEWORT	G5T?	X	X	X			ENDEMIC	ENDEMIC		
PLANTS	PENSTEMON BRANDEGEI=P. GLABER SSP. BRANDEGEI	BRANDEGEE BEARDTONGUE	G5T?	X	X				ENDEMIC	ENDEMIC		
PLANTS	PENSTEMON CRANDALLII VAR GLABRESCENS	CRANDALL'S BEARDTONGUE	G4	X	X				ENDEMIC	ENDEMIC		
PLANTS	PENSTEMON CYATHOPHORUS	MIDDLE PARK	G3G4	X		X			ENDEMIC	ENDEMIC		
PLANTS	PENSTEMON DEGENERI	DEGENER BEARDTONGUE	G2	X				FS BLM	IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	PENSTEMON GLABER VAR ALPINUS	ALPINE WESTERN PENSTEMON	G5T?	X		X			IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	PENSTEMON HALLII	HALL'S BEARDTONGUE	G3G4	X					ENDEMIC	ENDEMIC		
PLANTS	PENSTEMON HARBOURII	HARBOUR'S BEARDTONGUE	G3G4	X					ENDEMIC	ENDEMIC		
PLANTS	PENSTEMON HARRINGTONII	HARRINGTON BEARDTONGUE	G3	X				FS BLM	IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	PENSTEMON MENSARUM	TIGER BEARDTONGUE	G3	X					IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	PENSTEMON PENLANDII	PENLAND BEARDTONGUE	G1	X			LE		IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	PENSTEMON SAXOSORUM	UPLAND BEARDTONGUE	G3G4	X		X			VULNERABLE	ENDEMIC, LIMITED		
PLANTS	PHACELIA DENTICULATA	ROCKY MOUNTAIN PHACELIA	G3?	X	X	X			IMPERILED (INCL G1-G3)	ENDEMIC OR LIMITED		
PLANTS	PHACELIA FORMOSULA	NORTH PARK PHACELIA	G1	X			LE		IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	PHACELIA SCOPULINA VAR SUBMUTICA	DEBEQUE PHACELIA	G4T2	X				FS	IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	PHIPPSIA ALGIDA	SNOW GRASS	G5	X					DISJUNCT	DISJUNCT		
PLANTS	PHLOX CARYOPHYLLA	PAGOSA PHLOX	G4	X	X				ENDEMIC	ENDEMIC		
PLANTS	PHLOX CONDENSATA		G3G5	X	X				VULNERABLE	LIMITED		
PLANTS	PHLOX KELSEYI SSP. SALINA	MARSH PHLOX	G4T3?	X					IMPERILED, DISJUNCT	DISJUNCT, WIDESPREAD		
PLANTS	PHYSARIA ALPINA	AVERY PEAK TWINPOD	G2?	X					IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	PHYSARIA BELLII	BELL'S TWINPOD	G2	X					IMPERILED (INCL G1-G3)	LIMITED		
PLANTS	PHYSARIA ROLLINSII	ROLLIN'S TWINPOD	G2	X					IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	PLATANTHERA SPARSIFLORA VAR ENSIFOLIA	CANYON BOG-ORCHID	G4G5T3?	X	X				IMPERILED (INCL G1-G3)	LIMITED		
PLANTS	PODISTERA EASTWOODIAE	EASTWOOD'S PODISTERA	G4	X	X				VULNERABLE	LIMITED		
PLANTS	POLEMONIUM CONFERTUM	ROCKY MOUNTAIN JACOBS LADDER	G4	X					ENDEMIC	ENDEMIC		
PLANTS	POLYPODIUM SAXIMONTANUM	POLYPODY	G3?	X		X			IMPERILED, ENDEMIC	ENDEMIC		
PLANTS	POTENTILLA AMBIGENS	SOUTHERN ROCKY MOUNTAIN CINQUEFOIL	G3	X	X	X			IMPERILED (INCL G1-G3)	LIMITED		
PLANTS	POTENTILLA RUPINCOLA	ROCKY MOUNTAIN CINQUEFOIL	G5?T2Q	X				FS	IMPERILED (INCL G1-G3)	LIMITED		

*An "X" in the state column indicates the target is known within that state's portion of the Southern Rocky Mountain ecoregion

APPENDIX 6: SOUTHERN ROCKY MOUNTAINS SPECIES CONSERVATION TARGETS

TaxGrp	Scientific Name	Common Name	Grank	CO*	NM*	WY*	ESA List	FS / BLM	Rationale	ER Distrib	Partners In Flight >18	Comment
PLANTS	PRIMULA EGALIKSENSIS	GREENLAND PRIMROSE	G4	X				FS	DISJUNCT	DISJUNCT		
PLANTS	PTILAGROSTIS MONGHOLICA SSP PORTERI	PORTER FEATHERGRASS	T2	X				FS BLM	IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	RHODODENDRON	CASCADE AZALEA	G4	X					DISJUNCT	DISJUNCT		
PLANTS	RIBES COLORADENSE	COLORADO CURRANT		X	X				ENDEMIC	ENDEMIC		
PLANTS	RIBES NIVEUM	SNOW GOOSEBERRY	G3?	X					IMPERILED, DISJUNCT	DISJUNCT		
PLANTS	RUBUS ARCTICUS SPP	NAGOON BERRY	G5T5	X				FS	DISJUNCT	DISJUNCT		
PLANTS	SALIX ARIZONICA	ARIZONA WILLOW	G3	X	X				IMPERILED (INCL G1-G3)	LIMITED		
PLANTS	SALIX CALCICOLA	LIMESTONE WILLOW	G4					FS	DISJUNCT	DISJUNCT		
PLANTS	SALIX CANDIDA	SAGE WILLOW	G5	X		X		BLM	DISJUNCT	LIMITED, DISJUNCT		
PLANTS	SALIX MYRTILLIFOLIA	BLUEBERRY WILLOW	G5	X				BLM	DISJUNCT	DISJUNCT		
PLANTS	SALIX SERISSIMA	AUTUMN WILLOW	G4	X		X		FS BLM	VULNERABLE	WIDESPREAD		
PLANTS	SAUSSUREA WEBERI	WEBER SAUSSUREA	G3Q	X				BLM	IMPERILED (INCL G1-G3)	DISJUNCT		
PLANTS	SCIRPUS ROLLANDII	LITTLE BULRUSH	G3Q	X				FS BLM	IMPERILED, DISJUNCT	DISJUNCT		
PLANTS	SENECIO CROCATUS	SAFFRON GROUNDSEL	G3	X		X			IMPERILED (INCL G1-G3)	LIMITED		
PLANTS	SENECIO DIMORPHOPHYLLUS VAR INTERMEDIUS	DIFFERENT GROUNDSEL	G4T2	X					IMPERILED (INCL G1-G3)	LIMITED		
PLANTS	SENECIO SOLDANELLA	COLORADO RAGWORT	G?	X	X				IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	SENECIO TARAXACOIDES (=LIGULARIA)	GREENE DANDELION RAGWORT	G3G4	X					ENDEMIC	ENDEMIC		
PLANTS	SISYRINCHIUM PALLIDUM	PALE BLUE-EYED GRASS	G3	X		X		BLM	IMPERILED (INCL G1-G3)			
PLANTS	SPHAEROMERIA SIMPLEX	LARAMIE FALSE SAGEBRUSH	G2			X			IMPERILED (INCL G1-G3)	LIMITED		
PLANTS	SPIRANTHES DILUVIALIS	UTE LADIES' TRESSES	G2	X			LT		IMPERILED (INCL G1-G3)	WIDESPREAD		
PLANTS	STELLARIA IRRIGUA	ALTAI CHICKWEED	G4?	X	X				DISJUNCT	DISJUNCT		
PLANTS	SULLIVANTIA HAPEMANII VAR PURPUSII	PURPUS' SULLIVANTIA	G3T3	X				FS	IMPERILED (INCL G1-G3)	LIMITED		
PLANTS	TELESONIX JAMESII	JAMES' TELESONIX	G4	X	X				DISJUNCT	DISJUNCT		
PLANTS	THELYPODIUM PANICULATUM	NORTHWESTERN THELYPODY	G2G3	X		X			IMPERILED (INCL G1-G3)	LIMITED		
PLANTS	TOWNSENDIA GYPSOPHILA	GYPSUM TOWNSEND'S ASTER	G2		X				IMPERILED	ENDEMIC		
PLANTS	TOWNSENDIA ROTHROCKII	ROTHROCK TOWNSEND-DAISY	G2?	X	X				IMPERILED (INCL G1-G3)	ENDEMIC		
PLANTS	TRIFOLIUM ATTENUATUM	ROCKY MOUNTAIN CLOVER	G3G4	X	X				ENDEMIC	ENDEMIC		
PLANTS	TRIFOLIUM BRANDEGEI	BRANDEGEE ALPINE CLOVER	G5	X	X				ENDEMIC	ENDEMIC		
PLANTS	TRIFOLIUM DASYPHYLLUM VAR ANEMOPHILUM	WINDLOVING ALPINE CLOVER	G4G5T?			X			ENDEMIC	ENDEMIC		

*An "X" in the state column indicates the target is known within that state's portion of the Southern Rocky Mountain ecoregion

APPENDIX 6: SOUTHERN ROCKY MOUNTAINS SPECIES CONSERVATION TARGETS

TaxGrp	Scientific Name	Common Name	Grank	CO*	NM*	WY*	ESA List	FS / BLM	Rationale	ER Distrib	Partners In Flight >18	Comment
PLANTS	TRIFOLIUM DASYPHYLLUM VAR DASYPHYLLUM	ALPINE CLOVER	G4G5T?	X		X			VULNERABLE	LIMITED		
PLANTS	TRIFOLIUM SALICTORUM=T.PARRYI SSP. SALICTORUM	PARRY'S CLOVER	G4T?	X					ENDEMIC	ENDEMIC		
PLANTS	TRILLIUM OVATUM	WESTERN TRILLIUM	G5	X		X			DISJUNCT	DISJUNCT		
PLANTS	UTRICULARIA OCHROLUECA	BLADDERWORT	G4?	X					DISJUNCT; PERIPHERAL	DISJUNCT		

*An "X" in the state column indicates the target is known within that state's portion of the Southern Rocky Mountain ecoregion

LEGEND TO CONSERVATION TARGETS LIST

Rationale

1	Imperiled (includes G1-G3)
2	Threatened or endangered (listed by US Fish and Wildlife Service
3	Declining
4	Endemic
5	Disjunct
6	Vulnerable
7	Partners in Flight
8	Focal Species (wide-ranging or keystone)
9	Special consideration (species aggregations, species groups)
10	COBCP (Colorado Bird Observatory Conservation Plan)

ESA List (Endangered Species List)

LT Listed Threatened—defined as a species, subspecies, or variety likely to become endangered in the foreseeable future throughout all or a significant portion of its range

LE Listed Endangered—defined as a species, subspecies or variety in danger of extinction throughout all or a significant portion of its range

E Endangered—treated as endangered due to its similarity of appearance with a listed species

P Proposed—taxa formally proposed for listing a Endangered or Threatened (a proposal has been published in the Federal Register, but not a final rule)

C Candidate—taxa for which substantial biological information exists on file to support a proposal to list as Endangered or Threatened but no proposal has yet been published in the Federal Register

FS/BLM (US Forest Service/Bureau of Land Management)

FS Sensitive—plants and animal species identified by the Regional Forester for which population viability is a concern as evidenced by 1) significant current or predicted downward trends in population numbers or density and 2) significant current or predicted downward trends in habitat that would reduce a species/ existing distribution

BLM Sensitive—species found on public lands, designated by a State Director, that could easily become endangered or extinct in a state. The protection provided for sensitive species is the same as that provided for C (candidate) species.

ER Distribution

E	Endemic (primarily or only occurring in the ecoregion)
L	Limited (occurs in the ecoregion and within a few other adjacent ecoregions)
D	Disjunct (found a significant distance from its primary range)
W	Widespread (typically found in the ecoregion, but common in other ecoregions; bulk of the distribution is elsewhere)

Partners in Flight

PIF AI	Area importance
PIF PT	Population trend
PIF Total	Total conservation priority ranking

Global Heritage Status Ranks

Listed below are definitions for interpreting the global, (range-wide) status ranks. Global ranks are assigned by Association for Biodiversity Information scientists or by a designated lead office in the Natural Heritage Network.

Global Heritage Status Rank Definitions (Where no distinction is made, definition is identical for species and ecological communities*). T# (trinomial) rank is used for subspecies or varieties. These taxa are ranked on the same criteria as G1-G5.

Rank	Definition
G1	**Critically Imperiled—**Critically imperiled globally because of extreme rarity or because of some factor(s) making it especially vulnerable to extinction. Typically 5 or fewer occurrences or very few remaining individuals (<1,000) or acres (<2,000) or linear miles (<10).
G2	**Imperiled—**Imperiled globally because of rarity or because of some factor(s) making it very vulnerable to extinction or elimination. Typically 6 to 20 occurrences or few remaining individuals (1,000 to 3,000) or acres (2,000 to 10,000) or linear miles (10 to 50).
G3	**Vulnerable—**Vulnerable globally either because very rare and local throughout its range, found only in a restricted range, or because of other facots making it vulnerable to extinction or elimination. Typically 21-100 occurences or between 3,000 and 10,000 individuals.
G4	**Apparently Secure—**Uncommon but not rare (although it may be rare in parts of its most of its range) but possibly cause for long-term concern. Typically more than 100 occurrences and more than 10,000 individuals.
G5	**Secure—**Common, widespread, and abundant (although it may be rare in parts of its range, particularly on the periphery). Not vulnerable in most of its range. Typically with considerably more than 100 occurrences and more than 10,000 individuals.
GX	**Presumed Extinct (species)—**Believed to be extinct throughout its range. Not located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered. **Eliminated (ecological communities)—**Eliminated throughout its range, with no restoration potential due to extinction of dominant or characteristic species.
GH	**Possibly Extinct (species)—**Known from only historical occurrences, but may nevertheless still be extant; further searching needed. **Presumed Eliminated (Historic, ecological communities)—**Presumed eliminated throughout its range, with no or virtually no likelihood that it will be rediscovered, but with the potential for restoration, for example, American Chestnut (Forest).

* Acreage and distance measures for global ranking of ecological communities consider typical spatial pattern knowledge of long-term trends in relative extent. Acreage and distance estimates listed in the table above refer to G1 and G2 communities that typically occur as discrete patches on the landscape. Communities may occur today with acreage or distance greater than when originally recorded; these occurrences are still ranked G1 or G2 because of strong decline in extent or condition.

APPENDIX 7

SPECIES WATCH LIST

A number of species were under consideration to be included on the list of conservation targets for the SRM ecoregional assessment. The technical teams reviewed these species and discussed them at the experts workshops (see Appendix 1). These species did not fit all of the criteria for targets, but were of conservation concern due to their limited distribution, endemism, or other reason. The experts and technical teams decided that these species would be adequately protected through the coarse-filter approach (by targeting ecological systems and communities). Follow-up analysis is needed to evaluate how well they are captured in the portfolio. Experts determined that there were 13 species considered worthy of including as indicators to measure conservation success at a site. Conservation of the watch list species should be addressed during site conservation planning.

Common Name	Latin Name
Plants	
Gray's Angelica	*Angelica grayi*
Porter's Aster	*Aster porteri*
Parry's Milkvetch	*Astragalus parryi*
Rocky Mountain Milkvetch	*Astragalus scopulorum*
Alpine Kittentail	*Besseya alpina*
Kittentail	*Besseya plantaginea*
Sedge	*Carex arapahoensis*
Hayden's Paintbrush	*Castilleja haydenii*
James' Snowlover	*Chionophila jamesii*
Brandegee Smokeweed	*Corydalis caseana* ssp. *Brandegi*
Cat's Eye	*Cryptantha virgata*
Cymopterus	*Cymopterus planosus*
Purple Lady's Slipper	*Cypripedium fasciculatum*
Thick leaf Whitlow Grass	*Draba crassa*
Clawless Whitlow Grass	*Draba exunguiculata*
Whitlow Grass	*Draba streptocarpa*
Tall Fleabane	*Erigeron elaitor*
Pinnate Fleabane	*Erigeron pinnatisectus*
Gumweed	*Grindelia subalpina*
Stickseed	*Hackelia hirsuta*
Whiskbroom Parsely	*Harbouria trachypleura*
Golden Aster	*Heterotheca pumila*
Alum-root	*Heuchera bracteata*
Alum-root	*Heuchera hallii*
Colorado Tansy Aster	*Machaeranthera pattersonii*
Blazing Star	*Mentzelia sinuata*
Jeweled Blazing Star	*Mentzelia speciosa*
Griffin's Beardtongue	*Penstemon griffinii*
Larch-leaf Beardtonge	*Penstemon laricifolius* ssp. *Exilifolius*
Green Beardtongue	*Penstemon virens*
Primrose	*Primula angustifolia*
Buttercup	*Ranunculus macaulei*
Selaginella	*Selaginella weatherbiana*

Common Name	Latin Name
Golden Banner	*Thermopsis divaricarpa*
Brandegee Clover	*Trifolium brandegei*
Birds	
White-tailed ptarmigan	*Lagopus leucurus*
Flammulated Owl	*Otus flammeolus*
Broad-tailed Hummingbird	*Selasphorus platycercus*
Grace’s Warbler	*Dendroica graciae*
MacGillivray’s Warbler	*Oporornis tolmiei*
Green-tailed Towhee	*Pipilo chlorurus*
Boreal Owl	*Aegolius funereus*
Spotted Towhee	*Pipilo erythrophthalmus*
Northern Goshawk	*Accipiter gentilis*
Gray Flycatcher	*Empidonax wrightii*
Violet green Swallow	*Tachycineta thalassina*
Lazuli bunting (Western Slope)	*Passerina amoena*
Brewer’s Sparrow	*Spizella pusilla*
Birds-Measures of Success	
Lewis’ Woodpecker	*Melerpes lewis*
Red-naped Sapsucker	*Sphyrapicusnachalis*
Williamson’s Sapsucker	*Sphyrapicus thyroideus*
Three-toed Woodpecker	*Picoides tridactylus*
Hammond’s Flycatcher	*Empidonax hammondii*
Cordilleran Flycatcher	*Empidonax occidentalis*
Olive-sided Flycatcher	*Contopus borealis*
Pygmy Nuthatch	*Sitta pygmaea*
Western Bluebird	*Sialia mexicana*
Wilson’s Warbler	*Wilsonia pusilla*
Pinyon Jay	*Gymnorhinus cyanocephalus*
Virginia’s Warbler (Western Slope)	*Vermivora virginiae*
Mammals	
Dwarf Shrew	*Sorex nanus*
Water Shrew	*Sorex palustris*
Spotted Bat	*Euderma maculata*
Abert’s Squirrel	*Sciurus aberti*
Pennsylvania Vole	*Microtis pennsylvanicus*
Fringed Myotis	*Myotis thysanodes*
Mink	*Mustela vison*
Bighorn Sheep (CO and NM)	*Ovis canadensis*

APPENDIX 8: SOUTHERN ROCKY MOUNTAINS TERRESTRIAL ECOLOGICAL SYSTEMS/PLANT COMMUNITY TARGETS

Working Classification: Terrestrial Ecological Systems - Southern Rocky Mountain Ecoregion

ECOLOGICAL ZONE (4): broad climatic zone, for organizational purposes only

ECOLOGICAL SYSTEM (39): vegetation or other communities found with similar environments/processes

Plant Community (411): distinct physiognomic/floristic assemblages, for detailed ground mapping

Targeted Plant Communities (79) are in bold

TNC National Vegetation Classification Standard

NVC ALLIANCE	Community (NVC ASSOCIATION)	Common Name	G RANK BOLD are targets	Dist. *	Patch Type **
ALPINE ZONE					
ALPINE SUBSTRATE/ICE FIELD (SOROGRP001)				W	LP
NEW	Glacier	Glacier	GU	W	LP
NEW	Ice Field	Ice Field	GU	W	LP
NEW	Sparse non-vascular vegetation (on rock and unconsolidated substrates)	Sparse non-vascular vegetation	GU	W	LP
NEW	Sparse cushion plant vegetation	Sparse cushion plant vegetation	GU	W	LP
ALPINE TUNDRA DRY MEADOW(SOROGRP002)				W	M
AQUILEGIA COERULEA HERBACEOUS ALLIANCE	Aquilegia coerulea - Cirsium scopulorum Scree Herbaceous Vegetation	COLORADO BLUE COLUMBINE-ALPINE THISTLE	GU	W	LP
ARTEMISIA ARCTICA HERBACEOUS ALLIANCE	Artemisia arctica ssp. saxicola Herbaceous Vegetation	BOREAL SAGEBRUSH	GU	W	LP
CAREX ELYNOIDES HERBACEOUS ALLIANCE	Carex elynoides - Oreoxis spp. Herbaceous Vegetation	BLACK ROOT SEDGE-ALPINE-PARSLEY	G4	W	M
CAREX FOENEA HERBACEOUS ALLIANCE	Carex foenea - Geum rossii Herbaceous Vegetation	DRY-SPIKE SEDGE-ROSS' AVENS	GU	W	SP
CAREX RUPESTRIS HERBACEOUS ALLIANCE	Carex rupestris - Geum rossii Herbaceous Vegetation	CURLY SEDGE-ROSS' AVENS	G4	W	M
CAREX RUPESTRIS HERBACEOUS ALLIANCE	Carex rupestris-Trifolium dasyphyllum Herbaceous Vegetation?	CURLY SEDGE-UINTA CLOVER	G3G4	W	LP
CAREX VERNACULA HERBACEOUS ALLIANCE	Carex vernacula Herbaceous Vegetation	NATIVE SEDGE	GU	W	LP
FESTUCA BRACHYPHYLLA HERBACEOUS ALLIANCE	Festuca brachyphylla - Geum rossii var. turbinatum Herbaceous Vegetation	SHORT-LEAF FESCUE-ROSS' AVENS	GUQ	W	LP
FESTUCA IDAHOENSIS HERBACEOUS ALLIANCE	Festuca idahoensis - Elymus trachycaulus Herbaceous Vegetation	IDAHO FESCUE-SLENDER WIILDRYE	G4	W	LP
FESTUCA IDAHOENSIS HERBACEOUS ALLIANCE	Festuca idahoensis - Festuca thurberi Herbaceous Vegetation	IDAHO FESCUE-THURBER'S FESCUE	G3G4	W	LP
FESTUCA IDAHOENSIS HERBACEOUS ALLIANCE	**Festuca idahoensis - Geranium viscosissimum Herbaceous Vegetation**	**IDAHO FESCUE-STICKY GERANIUM**	**G2G3**	**W**	**LP**
FESTUCA THURBERI HERBACEOUS ALLIANCE	**Festuca thurberi Subalpine Grassland Herbaceous Vegetation**	**THURBER'S FESCUE SUBALPINE GRASSLAND HERBACEOUS VEGETATION**	**G3**	**W**	**LP**
DESCHAMPSIA CESPITOSA HERBACEOUS ALLIANCE	Deschampsia cespitosa Herbaceous Vegetation	TUFTED HAIRGRASS	G4?	W	LP
KOBRESIA MYOSUROIDES HERBACEOUS ALLIANCE	Kobresia myosuroides - Geum rossii Herbaceous Vegetation	PACIFIC BOG SEDGE - ROSS' AVENS HERBACEOUS VEGETATION	G5	W	M
MINUARTIA OBTUSILOBA HERBACEOUS ALLIANCE	Minuartia obtusiloba Herbaceous Vegetation	ALPINE STICHWORT	G4	W	SP

SAXIFRAGA CHRYSANTHA HERBACEOUS ALLIANCE	Saxifraga chrysantha Herbaceous Vegetation	GOLDEN SAXIFRAGE	GU		LP
SIBBALDIA PROCUMBENS HERBACEOUS ALLIANCE	Sibbaldia procumbens - Polygonum bistortoides Herbaceous Vegetation	CREEPING-GLOW-WORT-AMERICAN BISTORT	G3?	W	LP
TRIFOLIUM DASYPHYLLUM VEGETATION ALLIANCE	Trifolium dasyphyllum Herbaceous Vegetation	UINTA CLOVER	G4	W	M
TRIFOLIUM PARRYI HERBACEOUS ALLIANCE	Trifolium parryi Herbaceous Vegetation	PARRY'S CLOVER	GU	W	SP
RIBES MONTIGENUM SHRUBLAND ALLIANCE	Ribes montigenum Shrubland	WESTERN PRICKLY GOOSEBERRY	GU	W	SP
ALPINE TUNDRA FELL-FIELD (SORORGRP009)				W	SP
PARONYCHIA PULVINATA DWARF-SHRUBLAND ALLIANCE	Paronychia pulvinata - Silene acaulis Dwarf-shrubland	ROCKY MOUNTAIN NAILWORT-CUSHION-PINK	G5	W	SP
RUBUS IDAEUS VAR. STRIGOSUS SHRUBLAND ALLIANCE	Rubus idaeus Scree Shrubland	COMMON RED RASPBERRY SCREE	GU	W	SP
ALPINE/SUBALPINE DWARF SHRUBLAND (SORORGRP004)				W	LP
SALIX ARCTICA DWARF-SHRUBLAND ALLIANCE	Salix arctica - Salix reticulata ssp. nivalis Dwarf-shrubland	ARCTIC WILLOW-NET-VEIN WILLOW	G2Q	W	LP
SALIX ARCTICA DWARF-SHRUBLAND ALLIANCE	Salix arctica / Geum rossii Dwarf-shrubland	ARCTIC WILLOW/ROSS' AVENS	G4	W	M
VACCINIUM (CESPITOSUM, SCOPARIUM) DWARF-SHRUBLAND ALLIANCE	Vaccinium (cespitosum, scoparium) Dwarf shrubland	(DWARF BLUEBERRY - GROUSEBERRY)	G4	W	LP
SUBALPINE ZONE					
MOIST SUBALPINE/ALPINE MEADOW (SOROGRP003)				W	SP
GLYCERIA BOREALIS SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE	Glyceria borealis Herbaceous Vegetation	SMALL FLOATING MANNAGRASS	G4	W	SP
CAREX (BIPARTITA, CAPILLARIS, ILLOTA) SEASONALLY FLOODED HERBACEOUS ALLIANCE	Carex illota Herbaceous Vegetation	SMALL HEAD SEDGE	GUQ	W	SP
CAREX MICROPTERA SEASONALLY FLOODED HERBACEOUS ALLIANCE	Carex microptera Herbaceous Vegetation	SMALL-WING SEDGE HERBACEOUS VEGETATION	G4	W	SP
CAREX SCOPULORUM SEASONALLY FLOODED HERBACEOUS ALLIANCE	Carex scopulorum - Caltha leptosepala Herbaceous Vegetation	HOLM'S ROCKY MOUNTAIN SEDGE-WHITE MARSH MARIGOLD	G4	W	SP
ELEOCHARIS QUINQUEFLORA SEASONALLY FLOODED HERBACEOUS ALLIANCE	Eleocharis quinqueflora Herbaceous Vegetation	FEW-FLOWER SPIKERUSH	G4	W	SP
DESCHAMPSIA CESPITOSA SEASONALLY FLOODED HERBACEOUS ALLIANCE	Deschampsia cespitosa Herbaceous Vegetation	TUFTED HAIRGRASS	G4?	W	SP
DESCHAMPSIA CESPITOSA SEASONALLY FLOODED HERBACEOUS ALLIANCE	Deschampsia cespitosa - Carex nebrascensis Herbaceous Vegetation	TUFTED HAIRGRASS-NEBRASKA SEDGE	G3?Q	W	SP
DESCHAMPSIA CESPITOSA SEASONALLY FLOODED HERBACEOUS ALLIANCE	Deschampsia cespitosa - Ligusticum tenuifolium Herbaceous Vegetation	TUFTED HAIRGRASS-SLENDER-LEAF WILD LOVAGE	GU	W	SP
DESCHAMPSIA CESPITOSA TEMPORARILY FLOODED HERBACEOUS ALLIANCE	Deschampsia cespitosa - Geum rossii Herbaceous Vegetation	TUFTED HAIRGRASS-ROSS' AVENS	G5	W	SP

APPENDIX 8: SOUTHERN ROCKY MOUNTAINS TERRESTRIAL ECOLOGICAL SYSTEMS/PLANT COMMUNITY TARGETS

DESCHAMPSIA CESPITOSA TEMPORARILY FLOODED HERBACEOUS ALLIANCE	Deschampsia cespitosa - Phleum alpinum Herbaceous Vegetation	TUFTED HAIRGRASS-MOUNTAIN TIMOTHY	G3?	W	SP
SAXIFRAGA ODONTOLOMA TEMPORARILY FLOODED HERBACEOUS ALLIANCE	Saxifraga odontoloma Herbaceous Vegetation	STREAMBANK SAXIFRAGE	GU	W	SP
CALAMAGROSTIS STRICTA TEMPORARILY FLOODED HERBACEOUS ALLIANCE	Calamagrostis stricta	WESTERN BLUEJOINT	GU	W	SP
CALTHA LEPTOSEPALA SATURATED HERBACEOUS ALLIANCE	**Caltha leptosepala - Deschampsia cespitosa Herbaceous Vegetation**	**WHITE MARSH MARIGOLD-TUFTED HAIRGRASS**	**G3**	**W**	**SP**
CALTHA LEPTOSEPALA SATURATED HERBACEOUS ALLIANCE	**Caltha leptosepala - Polygonum bistortoides Herbaceous Vegetation**	**WHITE MARSH MARIGOLD-AMERICAN BISTORT**	**G2**	**W**	**SP**
CALTHA LEPTOSEPALA SATURATED HERBACEOUS ALLIANCE	Caltha leptosepala - Sedum rhodanthum Herbaceous Vegetation	WHITE MARSH MARIGOLD-QUEEN'S CROWN	G?Q	W	SP
CALTHA LEPTOSEPALA SATURATED HERBACEOUS ALLIANCE	Caltha leptosepala Herbaceous Vegetation	WHITE MARSH-MARIGOLD HERBACEOUS VEGETATION	G4	W	SP
CARDAMINE CORDIFOLIA SATURATED HERBACEOUS ALLIANCE	Cardamine cordifolia - Caltha leptosepala Herbaceous Vegetation	LARGE MOUNTAIN BITTERCRESS-WHITE MARSH MARIGOLD	GU	W	SP
CARDAMINE CORDIFOLIA SATURATED HERBACEOUS ALLIANCE	Cardamine cordifolia - Mertensia ciliata Herbaceous Vegetation	LARGE MOUNTAIN BITTERCRESS-MOUNTAIN BLUEBELLS	G4	W	SP
PHIPPSIA ALGIDA SATURATED HERBACEOUS ALLIANCE	Phippsia algida Herbaceous Vegetation	PHIPPSIA ALPINE WETLAND	GU	L	SP
RORIPPA ALPINA SATURATED HERBACEOUS ALLIANCE	Rorippa alpina Herbaceous Vegetation	YELLOWCRESS	GU	W	SP
CAREX RUPESTRIS HERBACEOUS ALLIANCE	Carex rupestris - Trifolium dasyphyllum Herbaceous Vegetation	CURLY SEDGE - UINTA CLOVER	G3G4	W	SP
GEUM ROSSII HERBACEOUS ALLIANCE	Geum rossii - Sibbaldia procumbens Herbaceous Vegetation	ROSS' AVENS-CREEPING GLOW-WORT	GU	W	SP
GEUM ROSSII HERBACEOUS ALLIANCE	Geum rossii - Trifolium spp. Herbaceous Vegetation	ROSS' AVENS-SWEET CLOVER	G3G4	W	SP
PENTAPHYLLOIDES FLORIBUNDA TEMPORARILY FLOODED SHRUBLAND ALLIANCE	Pentaphylloides floribunda / Deschampsia cespitosa Shrubland	SHRUBBY CINQUEFOIL/TUFTED HAIRGRASS	G4	W	SP
PENTAPHYLLOIDES FLORIBUNDA TEMPORARILY FLOODED SHRUBLAND ALLIANCE	Pentaphylloides floribunda Shrubland [Provisional]	SHRUBBY CINQUEFOIL	G5Q	W	SP
BETULA GLANDULOSA TEMPORARILY FLOODED SHRUBLAND ALLIANCE	Betula glandulosa / Mesic forb-mesic graminoid	BOG BIRCH / MESIC FORB MESIC GRAMINOID	G3G4	W	SP
RIBES MONTIGENUM SHRUBLAND ALLIANCE	Ribes montigenum Shrubland	WESTERN PRICKLY GOOSEBERRY	GU	W	SP
BRISTLECONE-LIMBER PINE FOREST AND WOODLAND (SOROGRP005)				L	LP
PINUS ARISTATA WOODLAND ALLIANCE	Pinus aristata / Festuca thurberi Woodland	BRISTLE-CONE PINE/THURBER'S FESCUE	G5	L	LP

PINUS ARISTATA WOODLAND ALLIANCE	Pinus aristata / Ribes montigenum Woodland	BRISTLE-CONE PINE/WESTERN PRICKLY GOOSEBERRY	G3?	L	LP
PINUS ARISTATA WOODLAND ALLIANCE	Pinus aristata / Festuca arizonica Woodland	BRISTLE-CONE PINE/ARIZONA FESCUE	G4	L	LP
PINUS ARISTATA WOODLAND ALLIANCE	Pinus aristata / Juniperus communis Woodland	BRISTLE-CONE PINE/COMMON JUNIPER	GU	L	LP
PINUS ARISTATA WOODLAND ALLIANCE	**Pinus aristata / Trifolium dasyphyllum Woodland**	**BRISTLE-CONE PINE/UINTA CLOVER**	**G2**	**E**	**LP**
PINUS ARISTATA WOODLAND ALLIANCE	Pinus aristata / Vaccinium myrtillus Woodland	BRISTLE-CONE PINE/WHORTLEBERRY	GU	L	LP
PINUS FLEXILIS WOODLAND ALLIANCE	Pinus flexilis / Arctostaphylos uva-ursi Woodland	LIMBER PINE/KINIKINNICK	G4	W	LP
PINUS FLEXILIS WOODLAND ALLIANCE	Pinus flexilis / Calamagrostis purpurascens Woodland	LIMBER PINE/PURPLE REEDGRASS	G4	W	LP
PINUS FLEXILIS WOODLAND ALLIANCE	**Pinus flexilis / Festuca kingii Woodland**	**LIMBER PINE/SPIKE FESCUE**	**G3**	**W**	**LP**
PINUS FLEXILIS WOODLAND ALLIANCE	Pinus flexilis / Juniperus communis Woodland	LIMBER PINE/COMMON JUNIPER	G5	W	LP
SPRUCE-FIR DRY- MESIC FOREST (SOROGRP006)				W	M
ABIES LASIOCARPA - (PICEA ENGLEMANII) WOODLAND ALLIANCE	Abies lasiocarpa / Saxifraga bronchialis Scree Woodland	SUBALPINE FIR / YELLOW-SPOT SAXIFRAGE SCREE WOODLAND	G4	W	SP
ABIES LASIOCARPA - (PICEA ENGLEMANII) FOREST ALLIANCE	Abies lasiocarpa / Vaccinium cespitosum Forest	SUBALPINE FIR/DWARF BLUEBERRY	G5	W	M
ABIES LASIOCARPA - (PICEA ENGLEMANII) FOREST ALLIANCE	Abies lasiocarpa / Vaccinium myrtillus Forest	SUBALPINE FIR/WHORTLE-BERRY	G5	W	M
ABIES LASIOCARPA - (PICEA ENGLEMANII) FOREST ALLIANCE	Abies lasiocarpa / Vaccinium scoparium Forest	SUBALPINE FIR/GROUSEBERRY	G5	W	M
PICEA ENGELMANNII FOREST ALLIANCE	Picea engelmannii / Moss Forest	ENGELMANN'S SPRUCE/MOSS	G4	W	LP
PICEA ENGELMANNII FOREST ALLIANCE	Picea engelmannii / Vaccinium myrtillus Forest	ENGELMANN'S SPRUCE / WHORTLEBERRY	G4Q	W	M
PICEA ENGELMANNII FOREST ALLIANCE	Picea engelmannii / Polemonium pulcherrimum Forest	ENGELMANN'S SPRUCE / BEAUTIFUL JACOB'S LADDER	G4	W	M
ABIES LASIOCARPA - (PICEA ENGLEMANII) WOODLAND ALLIANCE	Abies lasiocarpa / Juniperus communis Woodland	SUBALPINE FIR / COMMON JUNIPER WOODLAND	G4G5	W	LP
ABIES LASIOCARPA - POPULUS TREMULOIDES FOREST ALLIANCE	Populus tremuloides - Abies lasiocarpa / Juniperus communis Forest	QUAKING ASPEN - SUBALPINE FIR / COMMON JUNIPER FOREST	G3G4	W	LP
ABIES LASIOCARPA - (PICEA ENGLEMANII) FOREST ALLIANCE	Abies lasiocarpa / Moss Forest	SUBALPINE FIR/MOSS	G4	W	M
ABIES LASIOCARPA - (PICEA ENGLEMANII) FOREST ALLIANCE	Abies lasiocarpa / Mahonia repens Forest	SUBALPINE FIR / CREEPING OREGON-GRAPE FOREST	G5	W	M
SPRUCE-FIR MOIST- MESIC FOREST (SOROGRP007)				W	M
ABIES LASIOCARPA - (PICEA ENGLEMANII) FOREST ALLIANCE	Abies lasiocarpa / Actaea rubra Forest	SUBALPINE FIR/RED BANEBERRY	G4?	W	M
ABIES LASIOCARPA - (PICEA ENGLEMANII) FOREST ALLIANCE	Abies lasiocarpa / Erigeron eximius Forest	SUBALPINE FIR/SPRUCE-FIR FLEABANE	G5	W	M

ABIES LASIOCARPA - (PICEA ENGLEMANII) FOREST ALLIANCE	Abies lasiocarpa / Rubus parviflorus Forest	SUBALPINE FIR/WESTERN THIMBLE-BERRY	G5	W	M
ABIES LASIOCARPA - (PICEA ENGLEMANII) FOREST ALLIANCE	Abies lasiocarpa - Picea engelmannii Ribbon Forest	SUBALPINE FIR-ENGELMANN'S SPRUCE RIBBON FOREST	GUQ	E	LP
ABIES LASIOCARPA - (PICEA ENGLEMANII) FOREST ALLIANCE	Abies lasiocarpa / Carex geyeri Forest	SUBALPINE FIR/ GEYER SEDGE FOREST	G5	W	M
PICEA ENGELMANNII FOREST ALLIANCE	**Picea engelmannii / Trifolium dasyphyllum Forest**	**ENGELMANN'S SPRUCE /UINTA CLOVER**	**G2?**	**L**	**LP**
ABIES LASIOCARPA - POPULUS TREMULOIDES FOREST ALLIANCE	Populus tremuloides - Abies lasiocarpa / Amelanchier alnifolia Forest	QUAKING ASPEN - SUBALPINE FIR / SASKATOON SERVICEBERRY FOREST	G3?	W	LP
ABIES LASIOCARPA - POPULUS TREMULOIDES FOREST ALLIANCE	Populus tremuloides - Abies lasiocarpa / Carex geyeri Forest	QUAKING ASPEN - SUBALPINE FIR / GEYER'S SEDGE FOREST	G3?	W	LP
UPPER MONTANE ZONE					
LODGEPOLE PINE FOREST (SOROGRP008)				W	M
PINUS CONTORTA WOODLAND ALLIANCE	Pinus contorta / Juniperus communis Woodland	LODGEPOLE PINE/COMMON JUNIPER	G5	W	M
PINUS CONTORTA FOREST ALLIANCE	Pinus contorta / Arctostaphylos uva-ursi Forest	LODGEPOLE PINE/KINIKINNICK	G5	W	M
PINUS CONTORTA FOREST ALLIANCE	Pinus contorta / Carex geyeri Forest	LODGEPOLE PINE/GEYER'S SEDGE	G4?	W	M
PINUS CONTORTA FOREST ALLIANCE	Pinus contorta / Carex rossii Forest	LODGEPOLE PINE/ROSS' AVENS	G5	W	M
PINUS CONTORTA FOREST ALLIANCE	Pinus contorta / Shepherdia canadensis Forest	LODGEPOLE PINE/RUSSET BUFFALO-BERRY	G3G4	W	LP
PINUS CONTORTA FOREST ALLIANCE	Pinus contorta / Vaccinium scoparium Forest	LODGEPOLE PINE/GROUSEBERRY	G5	W	M
ASPEN FOREST (SOROGRP010)				W	M
POPULUS TREMULOIDES FOREST ALLIANCE	Populus tremuloides (Pinus ponderosa) / Danthonia parryi	QUAKING ASPEN (PONDEROSA PINE) / PARRY'S OATGRASS	GU	L	LP
POPULUS TREMULOIDES FOREST ALLIANCE	**Populus tremuloides / Acer glabrum Forest**	**QUAKING ASPEN/ROCKY MOUNTAIN MAPLE**	**G1G2**	**L**	**LP**
POPULUS TREMULOIDES FOREST ALLIANCE	Populus tremuloides / Amelanchier alnifolia - Symphoricarpos oreophilus / Thalictrum fendleri Forest	QUAKING ASPEN/SASKATOON SERVICEBERRY-MOUNTAIN SNOWBERRY/ FENDLER'S MEADOW-RUE	G5	W	M
POPULUS TREMULOIDES FOREST ALLIANCE	Populus tremuloides / Calamagrostis rubescens Forest	QUAKING ASPEN/PINEGRASS	G5?	W	LP
POPULUS TREMULOIDES FOREST ALLIANCE	Populus tremuloides / Carex foenea Forest	QUAKING ASPEN/DRY SPIKE SEDGE	G4	W	LP
POPULUS TREMULOIDES FOREST ALLIANCE	Populus tremuloides / Carex geyeri Forest	QUAKING ASPEN / GEYER'S SEDGE FOREST	G4	W	M
POPULUS TREMULOIDES FOREST ALLIANCE	**Populus tremuloides / Ceanothus velutinus Forest**	**QUAKING ASPEN/TOBACCO-BRUSH**	**G2G3**	**W**	**LP**
POPULUS TREMULOIDES FOREST ALLIANCE	Populus tremuloides / Festuca thurberi Forest	QUAKING ASPEN / THURBER'S FESCUE FOREST	G4	W	LP
POPULUS TREMULOIDES FOREST ALLIANCE	Populus tremuloides / Juniperus communis Forest	QUAKING ASPEN/COMMON JUNIPER	G4	W	M
POPULUS TREMULOIDES FOREST ALLIANCE	Populus tremuloides / Lonicera involucrata Forest	QUAKING ASPEN/FOUR LINE HONEYSUCKLE	G3?	W	LP

POPULUS TREMULOIDES FOREST ALLIANCE	Populus tremuloides / Pteridium aquilinum Forest	QUAKING ASPEN/NORTHERN BRACKEN FERN	G4	W	LP
POPULUS TREMULOIDES FOREST ALLIANCE	Populus tremuloides / Shepherdia canadensis Forest	QUAKING ASPEN/RUSSET BUFFALO-BERRY	G3G4	W	LP
POPULUS TREMULOIDES FOREST ALLIANCE	Populus tremuloides / Symphoricarpos oreophilus / Calamagrostis rubescens Forest	QUAKING ASPEN / MOUNTAIN SNOWBERRY / PINEGRASS FOREST	G3G5	W	LP
POPULUS TREMULOIDES FOREST ALLIANCE	Populus tremuloides / Symphoricarpos oreophilus / Festuca thurberi Forest	QUAKING ASPEN / MOUNTAIN SNOWBERRY / FENDLER'S MEADOWRUE FOREST	G3?	W	LP
POPULUS TREMULOIDES FOREST ALLIANCE	Populus tremuloides / Symphoricarpos oreophilus / Thalictrum fendleri Forest	QUAKING ASPEN/MOUNTAIN SNOWBERRY/FENDLER'S MEADOW-RUE	G5	W	M
POPULUS TREMULOIDES FOREST ALLIANCE	Populus tremuloides / Symphoricarpos oreophilus Forest	QUAKING ASPEN/MOUNTAIN SNOWBERRY	G5Q	W	M
POPULUS TREMULOIDES FOREST ALLIANCE	Populus tremuloides / Tall Forbs Forest	QUAKING ASPEN / TALL FORBS FOREST	G5	W	M
POPULUS TREMULOIDES FOREST ALLIANCE	Populus tremuloides / Thalictrum fendleri Forest	QUAKING ASPEN/FENDLER'S MEADOW-RUE	G5	W	M
POPULUS TREMULOIDES FOREST ALLIANCE	**Populus tremuloides / Vaccinium myrtillus Forest**	**QUAKING ASPEN/WHORTLE-BERRY**	**G3**	**W**	**LP**
POPULUS TREMULOIDES TEMPORARILY FLOODED FOREST ALLIANCE	**Populus tremuloides / Senecio bigelovii var. bigelovii Forest**	**QUAKING ASPEN/NODDING RAGWORT**	**G2G3**	**L**	**LP**
MONTANE MOIST- MESIC MIXED CONIFER FOREST (SOROGRP011)				W	M
ABIES CONCOLOR WOODLAND ALLIANCE	Abies concolor / Galium triflorum Woodland	WHITE FIR/SWEETSCENTED BEDSTRAW	GU	W	M
ABIES CONCOLOR FOREST ALLIANCE	Abies concolor / Acer glabrum Forest	WHITE FIR / ROCKY MOUNTAIN MAPLE	G4	W	M
ABIES CONCOLOR FOREST ALLIANCE	Abies concolor / Acer grandidentatum Forest	WHITE FIR/CANYON MAPLE	G4	W	M
ABIES CONCOLOR FOREST ALLIANCE	Abies concolor / Erigeron eximius Forest	WHITE FIR/SPRUCE-FIR FLEABANE	G5	W	M
ABIES CONCOLOR FOREST ALLIANCE	Abies concolor / Symphoricarpos oreophilus Forest	WHITE FIR / MOUNTAIN SNOWBERRY	G5	W	M
ABIES CONCOLOR FOREST ALLIANCE	Abies concolor / Vaccinium myrtillus Forest	WHITE FIR/WHORTLE-BERRY	G5	W	M
PICEA PUNGENS FOREST ALLIANCE	Picea pungens / Carex foenea Forest	BLUE SPRUCE/DRY SPIKE SEDGE	G4	W	M
PICEA PUNGENS FOREST ALLIANCE	Picea pungens / Erigeron eximius Forest	BLUE SPRUCE/SPRUCE-FIR FLEABANE	G5	W	M
PICEA PUNGENS FOREST ALLIANCE	Picea pungens / Linnaea borealis Forest	BLUE SPRUCE/AMERICAN TWINFLOWER	G4	W	M
PSEUDOTSUGA MENZIESII FOREST ALLIANCE	Pseudotsuga menziesii / Bromus ciliatus Forest	DOUGLAS FIR/FRINGED BROME	G4	W	M
MONTANE DRY- MESIC MIXED CONIFER FOREST (SOROGRP012)				W	M
ABIES CONCOLOR WOODLAND ALLIANCE	Abies concolor / Robinia neomexicana Woodland	WHITE FIR/NEW MEXICO LOCUST	G4Q	W	M
ABIES CONCOLOR FOREST ALLIANCE	Abies concolor / Arctostaphylos uva-ursi Forest	WHITE FIR / KINIKINIK FOREST	G5	W	M
ABIES CONCOLOR FOREST ALLIANCE	Abies concolor / Mahonia repens Forest	WHITE FIR / CREEPING OREGON-GRAPE	G5	W	M

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ABIES CONCOLOR FOREST ALLIANCE	Abies concolor / Quercus gambelii Forest	WHITE FIR / GAMBEL'S OAK	G5	W	M
PICEA PUNGENS FOREST ALLIANCE	Picea pungens / Arctostaphylos uva-ursi Forest	BLUE SPRUCE/KINIKINNICK	G4	W	M
PICEA PUNGENS WOODLAND ALLIANCE	Picea pungens / Festuca arizonica Woodland	BLUE SPRUCE/ARIZONA FESCUE	G5	W	M
MONTANE GRASSLAND (SOROGRP013)				L	LP
DANTHONIA INTERMEDIA HERBACEOUS ALLIANCE	**Danthonia intermedia Herbaceous Vegetation**	**TIMBER OATGRASS**	**G2G3**	**L**	**LP**
DANTHONIA PARRYI HERBACEOUS ALLIANCE	**Danthonia parryi Herbaceous Vegetation**	**PARRY'S OATGRASS**	**G2?**	**L**	**LP**
DECHAMPSIA CESPITOSA HERBACEOUS ALLIANCE	Deschampsia cespitosa Herbaceous Vegetation	TUFTED HAIRGRASS	G4?	W	LP
FESTUCA ARIZONICA HERBACEOUS ALLIANCE	**Festuca arizonica - Muhlenbergia filiculmis Herbaceous Vegetation**	**ARIZONA FESCUE-SLIM-STEM MUHLY**	**G2**	**E**	**LP**
FESTUCA ARIZONICA HERBACEOUS ALLIANCE	**Festuca arizonica - Muhlenbergia montana Herbaceous Vegetation**	**ARIZONA FESCUE-MOUNTAIN MUHLY**	**G3**	**W**	**LP**
FESTUCA IDAHOENSIS HERBACEOUS ALLIANCE	Festuca idahoensis - Pseudoroegneria spicata Herbaceous Vegetation	IDAHO FESCUE - BLUEBUNCH WHEATGRASS	G4	W	LP
FESTUCA THURBERI HERBACEOUS ALLIANCE	Festuca thurberi - Lathyrus lanszwertii var. leucanthus Herbaceous Vegetation	THURBER FESCUE MONTANE GRASSLAND	G4	E?	LP
LEYMUS CINEREUS HERBACEOUS ALLIANCE	Leymus cinereus Herbaceous Vegetation [Provisional]	GREAT BASIN LYME GRASS	G2G3Q	W	SP
MUHLENBERGIA FILICULMIS HERBACEOUS ALLIANCE	**Muhlenbergia filiculmis Herbaceous Vegetation**	**SLIM-STEM MUHLY**	**G2**	**E**	**LP**
MUHLENBERGIA MONTANA HERBACEOUS ALLIANCE	**Muhlenbergia montana - Stipa comata Herbaceous Vegetation**	**MOUNTAIN MUHLY-NEEDLE-AND-THREAD**	**G2**	**E**	**LP**
MUHLENBERGIA MONTANA HERBACEOUS ALLIANCE	Muhlenbergia montana Herbaceous Vegetation	MOUNTAIN MUHLY HERBACEOUS VEGETATION	G3G4	E	LP
PASCOPYRUM SMITHII HERBACEOUS ALLIANCE	Pascopyrum smithii - Bouteloua gracilis Herbaceous Vegetation	WESTERN-WHEAT GRASS - BLUE GRAMA	G5	W	LP
PSEUDOROEGNERIA SPICATA - BOUTELOUA GRACILIS HERBACEOUS ALLIANCE	Pseudoroegneria spicata - Bouteloua gracilis Herbaceous Vegetation	BLUEBUNCH WHEATGRASS - BLUE GRAMA	G4	W	LP
PSEUDOROEGNERIA SPICATA HERBACEOUS ALLIANCE	**Pseudoroegneria spicata - Poa secunda Lithosolic Herbaceous Vegetation**	**BLUEBUNCH WHEATGRASS - CURLY BLUEGRASS**	**G3**	**W**	**LP**
PSEUDOROEGNERIA SPICATA HERBACEOUS ALLIANCE	**Pseudoroegneria spicata Herbaceous Vegetation**	**BLUEBUNCH WHEATGRASS**	**G2**	**W**	**LP**
SOUTH PARK MONTANE GRASSLAND (SOROGRP036)				L	M
FESTUCA ARIZONICA HERBACEOUS ALLIANCE	**Festuca arizonica - Muhlenbergia filiculmis Herbaceous Vegetation**	**ARIZONA FESCUE-SLIM-STEM MUHLY**	**G2**	**E**	**LP**
FESTUCA ARIZONICA HERBACEOUS ALLIANCE	**Festuca arizonica - Muhlenbergia montana Herbaceous Vegetation**	**ARIZONA FESCUE-MOUNTAIN MUHLY**	**G3**	**W**	**LP**
SAGEBRUSH SHRUBLAND (SOROGRP014)				W	M
ARTEMISIA ARBUSCULA DWARF-SHRUB HERBACEOUS ALLIANCE	Artemisia arbuscula / Pseudoroegneria spicata Dwarf-shrub Herbaceous Vegetation	DWARF SAGEBRUSH/BLUEBUNCH WHEATGRASS	G5	W	LP
ARTEMISIA CANA SHRUB HERBACEOUS ALLIANCE	Artemisia cana / Festuca idahoensis Shrub Herbaceous Vegetation	SILVER SAGEBRUSH / IDAHO FESCUE	G3?	W	LP

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ARTEMISIA CANA SHRUBLAND ALLIANCE	**Artemisia cana / Festuca thurberi Shrubland**	**SILVER SAGEBRUSH / THURBER'S FESCUE**	**G2G3**	**W**	**LP**
ARTEMISIA TRIDENTATA SSP. VASEYANA SHRUBLAND ALLIANCE	**Artemisia tridentata ssp. vaseyana / Carex geyeri Shrubland**	**MOUNTAIN BIG SAGEBRUSH/GEYER'S SEDGE**	**G3**	**W**	**LP**
ARTEMISIA TRIDENTATA SSP. VASEYANA SHRUB HERBACEOUS ALLIANCE	Artemisia tridentata ssp. vaseyana / Festuca idahoensis Shrub Herbaceous Vegetation	MOUNTAIN BIG SAGEBRUSH/IDAHO FESCUE	G5	W	LP
ARTEMISIA TRIDENTATA SSP. VASEYANA SHRUB HERBACEOUS ALLIANCE	**Artemisia tridentata ssp. vaseyana / Festuca kingii Shrub Herbaceous Vegetation**	**MOUNTAIN BIG SAGEBRUSH/SPIKE FESCUE**	**G3**	**W**	**LP**
ARTEMISIA TRIDENTATA SSP. VASEYANA SHRUBLAND ALLIANCE	Artemisia tridentata ssp. vaseyana / Festuca thurberi Shrubland	MOUNTAIN BIG SAGEBRUSH/THURBER'S FESCUE	G3G4	W	LP
ARTEMISIA TRIDENTATA SSP. VASEYANA SHRUBLAND ALLIANCE	Artemisia tridentata ssp. vaseyana / Pascopyrum smithii Shrubland	MOUNTAIN BIG SAGEBRUSH/WESTERN WHEATGRASS	G3?	W	LP
ARTEMISIA TRIDENTATA SSP. VASEYANA SHRUBLAND ALLIANCE	Artemisia tridentata ssp. vaseyana / Pseudoroegneria spicata Shrubland	MOUNTAIN BIG SAGEBRUSH/BLUEBUNCH WHEATGRASS	G5	W	M
ARTEMISIA TRIDENTATA SSP. WYOMINGENSIS SHRUBLAND ALLIANCE	Artemisia tridentata ssp. wyomingensis / Leymus ambiguus Shrubland	WYOMING BIG SAGEBRUSH/ROCKY MOUNTAIN LYME GRASS	G3Q	W	LP
ARTEMISIA TRIDENTATA SSP. WYOMINGENSIS SHRUBLAND ALLIANCE	Artemisia tridentata ssp. wyomingensis / Pascopyrum smithii Shrubland	WYOMING BIG SAGEBRUSH/WESTERN WHEATGRASS	G4	W	LP
ARTEMISIA TRIDENTATA SSP. TRIDENTATA SHRUBLAND ALLIANCE	**Artemisia tridentata ssp. tridentata / Leymus cinereus Shrubland**	**BIG SAGEBRUSH/GREAT BASIN LYME GRASS**	**G2**	**W**	**LP**
ARTEMISIA TRIDENTATA SSP. TRIDENTATA SHRUBLAND ALLIANCE	Artemisia tridentata ssp. tridentata / Pascopyrum smithii Shrubland	BASIN BIG SAGEBRUSH / WESTERN WHEATGRASS	G3?	W	LP
ARTEMISIA NOVA DWARF-SHRUBLAND ALLIANCE	Artemisia nova - Gutierrezia sarothrae / Bouteloua gracilis - Hilaria jamesii Dwarf-shrubland	BLACK SAGEBRUSH-KINDLINGWEED/BLUE GRAMA-JAMES' GALLETA	G4	W	LP
ARTEMISIA NOVA DWARF-SHRUBLAND ALLIANCE	Artemisia nova / Pseudoroegneria spicata Dwarf-shrubland	BLACK SAGEBRUSH / BLUEBUNCH WHEATGRASS	G4G5	W	LP
ARTEMISIA NOVA DWARF-SHRUBLAND ALLIANCE	Artemisia nova / Stipa comata Dwarf-shrubland	BLACK SAGEBRUSH / NEEDLE-AND-THREAD	G3?	W	LP
ARTEMISIA NOVA DWARF-SHRUBLAND ALLIANCE	Artemisia nova Dwarf-shrubland [Provisional]	BLACK SAGEBRUSH	G3G5	W	LP
MONTANE FEN (SOROGRP015)				L	SP
CAREX AQUATILUS TEMPORARILY FLOODED HERBACEOUS ALLIANCE	**Carex aquatilis -Sphagnum spp.**	**WATER SEDGE - SPHAGNUM MOSS**	**G2G3**	**W**	**SP**
BETULA GLANDULOSA TEMPORARILY FLOODED SHRUBLAND ALLIANCE	Betula glandulosa/ Sphagnum spp.	BOG BIRCH / SPHAGNUM MOSS	GU	W	SP
KOBRESIA MYOSUROIDES HERBACEOUS ALLIANCE	**Kobresia myosuroides - Thalictrum alpinum**	**PACIFIC BOG SEDGE - ALPINE MEADOWRUE**	**G1?**	**E**	**SP**
KOBRESIA MYOSUROIDES HERBACEOUS ALLIANCE	**Kobresia simplicuscula - Scirpus pumilus**	**PACIFIC BOG SEDGE - RUSH**	**G2?**	**E**	**SP**
UPPER MONTANE RIPARIAN FOREST AND WOODLAND (SOROGRP017)				W	L
ABIES LASIOCARPA - (PICEA ENGLEMANII) FOREST ALLIANCE	Abies lasiocarpa / Acer glabrum Forest	SUBALPINE FIR/ROCKY MOUNTAIN MAPLE	G5	W	L

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ABIES LASIOCARPA SEASONALLY FLOODED FOREST ALLIANCE	Abies lasiocarpa / Calamagrostis canadensis Forest	SUBALPINE FIR/BLUEJOINT REEDGRASS	G5	W	L
ABIES LASIOCARPA SEASONALLY FLOODED FOREST ALLIANCE	**Abies lasiocarpa / Trautvetteria caroliniensis Forest**	**SUBALPINE FIR / CAROLINA TASSEL-RUE**	**G3**	**W**	**SP**
ABIES LASIOCARPA - (PICEA ENGLEMANII) TEMPORARILY FLOODED FOREST ALLIANCE	Abies lasiocarpa / Mertensia ciliata Forest	SUBALPINE FIR / TALL FRINGE BLUEBELLS FOREST	G5	W	L
ABIES LASIOCARPA - (PICEA ENGLEMANII) TEMPORARILY FLOODED WOODLAND ALLIANCE	Abies lasiocarpa-Picea engelmannii/Alnus incana Woodland	SUBALPINE FIR / SPECKLED ALDER WOODLAND	G5	W	L
ABIES LASIOCARPA - (PICEA ENGLEMANII) TEMPORARILY FLOODED WOODLAND ALLIANCE	Abies lasiocarpa-Picea engelmannii/Salix drummondiana Woodland	SUBALPINE FIR / DRUMMOND'S WILLOW WOODLAND	G5	W	L
PICEA ENGELMANNII TEMPORARILY FLOODED FOREST ALLIANCE	Picea engelmannii / Calamagrostis canadensis Forest	ENGELMANN'S SPRUCE/BLUEJOINT	G4	W	L
PICEA ENGELMANNII TEMPORARILY FLOODED FOREST ALLIANCE	Picea engelmannii / Cornus sericea Forest	ENGELMANN'S SPRUCE/RED-OSIER DOGWOOD	G3?	W	L
PICEA ENGELMANNII SEASONALLY FLOODED FOREST ALLIANCE	Picea engelmannii / Caltha leptosepala Forest	ENGELMANN'S SPRUCE/WHITE MARSH MARIGOLD	G3?	W	L
PICEA ENGELMANNII SEASONALLY FLOODED FOREST ALLIANCE	Picea engelmannii / Equisetum arvense Forest	ENGELMANN'S SPRUCE/FIELD HORSETAIL	G4	W	L
PICEA PUNGENS TEMPORARILY FLOODED WOODLAND ALLIANCE	Picea pungens / Alnus incana Woodland	BLUE SPRUCE / SPECKLED ALDER WOODLAND	G3	W	L
PICEA PUNGENS TEMPORARILY FLOODED WOODLAND ALLIANCE	Picea pungens / Cornus sericea Woodland	BLUE SPRUCE / RED-OSIER DOGWOOD WOODLAND	G4	W	L
PICEA PUNGENS TEMPORARILY FLOODED WOODLAND ALLIANCE	Picea pungens / Equisetum arvense Woodland	BLUE SPRUCE / FIELD HORSETAIL WOODLAND	G3?	W	L
POPULUS TREMULOIDES TEMPORARILY FLOODED FOREST ALLIANCE	Populus tremuloides / Alnus incana - Cornus sericea Forest	QUAKING ASPEN / SPECKELED ALDER - RED-OSIER DOGWOOD	G3	W	L
POPULUS TREMULOIDES TEMPORARILY FLOODED FOREST ALLIANCE	Populus tremuloides / Betula occidentalis Forest	QUAKING ASPEN / RIVER BIRCH	G3	W	L
POPULUS TREMULOIDES SEASONALLY FLOODED FOREST ALLIANCE	Populus tremuloides / Calamagrostis canadensis Forest	QUAKING ASPEN/BLUEJOINT REEDGRASS	G3	W	L
POPULUS TREMULOIDES FOREST ALLIANCE	Populus tremuloides / Cornus sericea Forest	QUAKING ASPEN / RED-OSIER DOGWOOD FOREST	G4	W	L
POPULUS TREMULOIDES FOREST ALLIANCE	**Populus tremuloides / Corylus cornuta Forest**	**QUAKING ASPEN/BEAKED HAZEL**	**G3**	**W**	**LP**
POPULUS TREMULOIDES TEMPORARILY FLOODED FOREST ALLIANCE	**Populus tremuloides / Ribes montigenum Forest**	**QUAKING ASPEN/WESTERN PRICKLY GOOSEBERRY**	**G2**	**W**	**L**
POPULUS TREMULOIDES TEMPORARILY FLOODED FOREST ALLIANCE	Populus tremuloides / Salix drummondiana Forest	QUAKING ASPEN / DRUMMOND'S WILLOW	G3G4	W	L

APPENDIX 8: SOUTHERN ROCKY MOUNTAINS TERRESTRIAL ECOLOGICAL SYSTEMS/PLANT COMMUNITY TARGETS

ABIES CONCOLOR FOREST ALLIANCE	**Abies concolor - Picea pungens - Populus angustifolia / Acer glabrum Forest**	**WHITE FIR - BLUE SPRUCE -NARROW-LEAF COTTONWOOD / ROCKY MOUNTAIN MAPLE**	**G2**	**W**	**L**
SUBALPINE / MONTANE RIPARIAN SHRUBLAND (SOROGRP018)				W	L
ALNUS INCANA TEMPORARILY FLOODED SHRUBLAND ALLIANCE	Alnus incana - Salix drummondiana Shrubland	SPECKLED ALDER - DRUMMOND'S WILLOW SHRUBLAND	G3	W	L
ALNUS INCANA TEMPORARILY FLOODED SHRUBLAND ALLIANCE	Alnus incana -(Mixed Salix) Shrubland	SPECKLED ALDER - (MOUNTAIN WILLOW, WHIPLASH WILLOW, STRAPLEA	G3	W	L
ALNUS INCANA TEMPORARILY FLOODED SHRUBLAND ALLIANCE	Alnus incana / Cornus sericea Shrubland	SPECKLED ALDER / RED OSIER DOGWOOD	G?Q	W	L
ALNUS INCANA TEMPORARILY FLOODED SHRUBLAND ALLIANCE	Alnus incana / Mesic Forbs Shrubland	SPECKLED ALDER / MESIC FORBS SHRUBLAND	G3G4	W	L
ALNUS INCANA TEMPORARILY FLOODED SHRUBLAND ALLIANCE	Alnus incana / Mesic Graminoids Shrubland	SPECKELED ALDER / MESIC GRAMINOID	G3	W	L
ALNUS INCANA SEASONALLY FLOODED SHRUBLAND ALLIANCE	Alnus incana / Equisetum arvense Shrubland	SPECKELED ALDER / FIELD HORSETAIL	G3	W	L
BETULA OCCIDENTALIS TEMPORARILY FLOODED SHRUBLAND ALLIANCE	Betula occidentalis / Cornus sericea Shrubland	WATER BIRCH / RED OSIER DOGWOOD	G3?	W	L
BETULA OCCIDENTALIS SEASONALLY FLOODED SHRUBLAND ALLIANCE	Betula occidentalis / Mesic Forb Shrubland	WATER BIRCH / MESIC FORBS SHRUBLAND	G3	W	L
BETULA OCCIDENTALIS SEASONALLY FLOODED SHRUBLAND ALLIANCE	Betula occidentalis / Mesic Graminoid Shrubland	RIVER BIRCH / MESIC GRAMINOIDS SHRUBLAND	G3	W	L
CORNUS SERICEA TEMPORARILY FLOODED SHRUBLAND ALLIANCE	Cornus sericea Shrubland [Provisional]	REDOSIER DOGWOOD	G4Q	W	L
CORYLUS CORNUTA TEMPORARILY FLOODED SHRUBLAND ALLIANCE	Corylus cornuta	HAZELNUT SHRUBLAND	G3	L	L
SALIX PLANIFOLIA TEMPORARILY FLOODED SHRUBLAND ALLIANCE	Salix planifolia / Calamagrostis canadensis Shrubland	TEA-LEAF WILLOW/LEAFY TUSSOCK SEDGE	G3	W	SP
SALIX PLANIFOLIA SEASONALLY FLOODED SHRUBLAND ALLIANCE	Salix planifolia / Carex aquatilis Shrubland	TEA-LEAF WILLOW/WATER SEDGE	G5	W	SP
SALIX PLANIFOLIA SEASONALLY FLOODED SHRUBLAND ALLIANCE	Salix planifolia / Deschampsia caespitosa Shrubland	TEA-LEAF WILLOW/HAIRGRASS	G2G3	W	SP
SALIX PLANIFOLIA SEASONALLY FLOODED SHRUBLAND ALLIANCE	Salix planifolia / Caltha leptosepala Shrubland	TEA-LEAF WILLOW/ WHITE MARSH-MARIGOLD	G4	W	SP
SALIX PLANIFOLIA SEASONALLY FLOODED SHRUBLAND ALLIANCE	Salix planifolia / Carex scopulorum Shrubland	TEA-LEAF WILLOW/HOLM'S ROCKY MOUNTAIN SEDGE	G4	W	SP
SALIX PLANIFOLIA SEASONALLY FLOODED SHRUBLAND ALLIANCE	Salix planifolia / mesic forb	TEA-LEAF WILLOW/ MESIC FORB	G4	W	SP

APPENDIX 8: SOUTHERN ROCKY MOUNTAINS TERRESTRIAL ECOLOGICAL SYSTEMS/PLANT COMMUNITY TARGETS

SALIX BRACHYCARPA TEMPORARILY FLOODED SHRUBLAND ALLIANCE	Salix brachycarpa / Calamagrostis canadensis Shrubland	BARREN-GROUND WILLOW/BLUEJOINT REEDGRASS	GU	W	SP
SALIX BRACHYCARPA SEASONALLY FLOODED SHRUBLAND ALLIANCE	Salix brachycarpa / Carex aquatilis Shrubland	BARREN-GROUND WILLOW/ WATER SEDGE	G2G3	W	SP
SALIX BRACHYCARPA SEASONALLY FLOODED SHRUBLAND ALLIANCE	Salix brachycarpa / Mesic Forbs Shrubland	BARREN-GROUND WILLOW/MESIC FORBS	G4	W	SP
SALIX WOLFII SEASONALLY FLOODED SHRUBLAND ALLIANCE	Salix wolfii / Calamagrostis canadensis Shrubland	IDAHO WILLOW/ BLUEJOINT REEDGRASS	G3	W	SP
SALIX WOLFII SEASONALLY FLOODED SHRUBLAND ALLIANCE	Salix wolfii / Carex aquatilis Shrubland	IDAHO WILLOW/WATER SEDGE	G4	W	SP
SALIX WOLFII SEASONALLY FLOODED SHRUBLAND ALLIANCE	Salix wolfii / Carex rostrata Shrubland	IDAHO WILLOW/ BEAKED SEDGE	G4	W	SP
SALIX WOLFII TEMPORARILY FLOODED SHRUBLAND ALLIANCE	Salix wolfii / Deschampsia cespitosa Shrubland	IDAHO WILLOW/ HAIRGRASS	G3	W	SP
SALIX WOLFII TEMPORARILY FLOODED SHRUBLAND ALLIANCE	Salix wolfii / Mesic Forbs Shrubland	IDAHO WILLOW/ MESIC FORB	G3	W	SP
SALIX BEBBIANA TEMPORARILY FLOODED SHRUBLAND ALLIANCE	Salix bebbiana / Mesic Graminoids Shrubland	GRAY WILLOW / MESIC GRAMINOIDS SHRUBLAND	G3?	W	L
SALIX BEBBIANA TEMPORARILY FLOODED SHRUBLAND ALLIANCE	Salix bebbiana Shrubland	GRAY WILLOW	G3?	W	L
SALIX BOOTHII SEASONALLY FLOODED SHRUBLAND ALLIANCE	Salix boothii / Calamagrostis canadensis Shrubland	BOOTH'S WILLOW / BLUEJOINT	G3G4Q	W	L
SALIX BOOTHII TEMPORARILY FLOODED SHRUBLAND ALLIANCE	Salix boothii / Carex rostrata Shrubland	BOOTH'S WILLOW / BEAKED SEDGE	G4	W	L
SALIX BOOTHII TEMPORARILY FLOODED SHRUBLAND ALLIANCE	Salix boothii / Deschampsia cespitosa-Geum rossii Shrubland	BOOTH'S WILLOW / HAORGRASS	G4	W	L
SALIX BOOTHII TEMPORARILY FLOODED SHRUBLAND ALLIANCE	Salix boothii / Mesic Forbs Shrubland	BOOTH'S WILLOW / MESIC FORBS SHRUBLAND	G3	W	L
SALIX BOOTHII TEMPORARILY FLOODED SHRUBLAND ALLIANCE	Salix boothii / Mesic Graminoids Shrubland	BOOTH'S WILLOW/MESIC GRAMINOIDS	G3?	W	L
SALIX DRUMMONDIANA TEMPORARILY FLOODED SHRUBLAND ALLIANCE	Salix drummondiana - Salix monticola / Mesic Forbs Shrubland	DRUMMOND'S WILLOW-PARK WILLOW/MESIC FORBS	G?Q	W	L
SALIX DRUMMONDIANA TEMPORARILY FLOODED SHRUBLAND ALLIANCE	Salix drummondiana - Salix planifolia / Calamagrostis canadensis Shrubland	DRUMMOND'S WILLOW-TEA-LEAF WILLOW/BLUEJOINT REEDGRASS	G2	W	L
SALIX DRUMMONDIANA TEMPORARILY FLOODED SHRUBLAND ALLIANCE	Salix drummondiana / Calamagrostis canadensis Shrubland	DRUMMOND'S WILLOW / BLUEJOINT	G3	W	L
SALIX DRUMMONDIANA SEASONALLY FLOODED SHRUBLAND ALLIANCE	Salix drummondiana / Carex utriculata Shrubland	DRUMMOND'S WILLOW / NORTHWEST TERRITORY SEDGE	G3	W	L

SALIX LIGULIFOLIA TEMPORARILY FLOODED SHRUBLAND ALLIANCE	Salix eriocephala var. ligulifolia Shrubland	STRAP-LEAF WILLOW SHRUBLAND	G2G3	L	L
SALIX GEYERIANA TEMPORARILY FLOODED SHRUBLAND ALLIANCE	Salix geyeriana - Salix monticola / Calamagrostis canadensis Shrubland	GEYER'S WILLOW-PARK WILLOW/BLUEJOINT REEDGRASS	G3	L	L
SALIX GEYERIANA TEMPORARILY FLOODED SHRUBLAND ALLIANCE	Salix geyeriana / Mesic Forbs Shrubland	GEYER'S WILLOW / MESIC FORB	G3	W	L
SALIX GEYERIANA TEMPORARILY FLOODED SHRUBLAND ALLIANCE	Salix geyeriana - Salix monticola / Mesic Forb Shrubland	GEYER'S WILLOW-PARK WILLOW/ MESIC FORB	G3	L	L
SALIX GEYERIANA TEMPORARILY FLOODED SHRUBLAND ALLIANCE	Salix geyeriana - Salix monticola / Carex aquatilis Shrubland	GEYER'S WILLOW-PARK WILLOW/WATER SEDGE	GU	L	L
SALIX GEYERIANA TEMPORARILY FLOODED SHRUBLAND ALLIANCE	Salix geyeriana - Salix monticola / Mesic graminoid Shrubland	GEYER'S WILLOW-PARK WILLOW/MESIC GRAMINOID	GU	L	L
SALIX GEYERIANA SEASONALLY FLOODED SHRUBLAND ALLIANCE	Salix geyeriana / Calamagrostis canadensis Shrubland	GEYER'S WILLOW/BLUEJOINT REEDGRASS	G5	W	L
SALIX GEYERIANA SEASONALLY FLOODED SHRUBLAND ALLIANCE	Salix geyeriana / Carex aquatilis Shrubland	GEYER'S WILLOW / WATER SEDGE	G3	W	L
SALIX GEYERIANA SEASONALLY FLOODED SHRUBLAND ALLIANCE	Salix geyeriana / Carex rostrata Shrubland	GEYER'S WILLOW/SWOLLEN BEAKED SEDGE	G5	W	L
SALIX GEYERIANA TEMPORARILY FLOODED SHRUBLAND ALLIANCE	Salix geyeriana / Mesic Graminoids Shrubland	GEYER'S WILLOW / MESIC GRAMINOIDS SHRUBLAND	G2G3Q	W	L
SALIX LIGULIFOLIA TEMPORARILY FLOODED SHRUBLAND ALLIANCE	Salix ligulifolia - Cornus sericea Shrubland	STRAP-LEAF WILLOW-REDOSIER DOGWOOD	G?Q	L	L
SALIX LUCIDA TEMPORARILY FLOODED SHRUBLAND ALLIANCE	Salix lucida ssp. caudata Shrubland [Provisional]	SHINING WILLOW SHRUBLAND	G3Q	W	L
SALIX MONTICOLA TEMPORARILY FLOODED SHRUBLAND ALLIANCE	Salix monticola / Calamagrostis canadensis Shrubland	PARK WILLOW/BLUEJOINT REEDGRASS	G?	L	L
SALIX MONTICOLA TEMPORARILY FLOODED SHRUBLAND ALLIANCE	Salix monticola / Carex aquatilis Shrubland	PARK WILLOW / WATER SEDGE	G3	L	L
SALIX MONTICOLA TEMPORARILY FLOODED SHRUBLAND ALLIANCE	Salix monticola / Carex utriculata Shrubland	PARK WILLOW / NORTHWEST TERRITORY SEDGE	G3	L	L
SALIX MONTICOLA TEMPORARILY FLOODED SHRUBLAND ALLIANCE	Salix monticola / Mesic Forb Shrubland	MOUNTAIN WILLOW / MESIC FORBS SHRUBLAND	G3	L	L
SALIX MONTICOLA TEMPORARILY FLOODED SHRUBLAND ALLIANCE	Salix monticola / Mesic Graminoids Shrubland	PARK WILLOW / MESIC GRAMINOID	G3	L	L
SALIX PSEUDOMONTICOLA TEMPORARILY FLOODED SHRUBLAND ALLIANCE	Salix pseudomonticola Thicket Shrubland	FALSE MOUNTAIN WILLOW THICKET	G2Q	W	L
SHEPHERDIA ARGENTEA TEMPORARILY FLOODED SHRUBLAND ALLIANCE	Shepherdia argentea Shrubland [Provisional]	SILVER BUFFALO-BERRY SHRUBLAND	G3G4	W	SP

APPENDIX 8: SOUTHERN ROCKY MOUNTAINS TERRESTRIAL ECOLOGICAL SYSTEMS/PLANT COMMUNITY TARGETS

ACER GLABRUM TEMPORARILY FLOODED SHRUBLAND ALLIANCE	Acer glabrum Drainage Bottom Shrubland	ROCKY MOUNTAIN MAPLE DRAINAGE BOTTOM	G4?	W	SP
LOWER MONTANE - FOOTHILLS ZONE					
DOUGLAS FIR - PONDEROSA PINE FOREST (SOROGRP019)				W	M
PSEUDOTSUGA MENZIESII WOODLAND ALLIANCE	Pseudotsuga menziesii / Festuca idahoensis Woodland	DOUGLAS FIR / IDAHO FESCUE	G4	W	LP
PSEUDOTSUGA MENZIESII WOODLAND ALLIANCE	Pseudotsuga menziesii / Festuca kingii Woodland	DOUGLAS FIR/SPIKE-FESCUE	G2G4	E	LP
PSEUDOTSUGA MENZIESII FOREST ALLIANCE	Pseudotsuga menziesii / Acer glabrum Forest	DOUGLAS FIR / ROCKY MOUNTAIN MAPLE	G4?	W	LP
PSEUDOTSUGA MENZIESII FOREST ALLIANCE	Pseudotsuga menziesii / Arctostaphylos uva-ursi Forest	DOUGLAS FIR/KINIKINNICK	G4	W	M
PSEUDOTSUGA MENZIESII FOREST ALLIANCE	Pseudotsuga menziesii / Carex geyeri Forest	DOUGLAS FIR/GEYER'S SEDGE	G4?	W	M
PSEUDOTSUGA MENZIESII FOREST ALLIANCE	Pseudotsuga menziesii / Carex rossii Forest	DOUGLAS FIR/ROSS' SEDGE	G3	W	M
PSEUDOTSUGA MENZIESII FOREST ALLIANCE	Pseudotsuga menziesii / Festuca arizonica Forest	DOUGLAS-FIR / ARIZONA FESCUE FOREST	G5	W	LP
PSEUDOTSUGA MENZIESII FOREST ALLIANCE	Pseudotsuga menziesii / Juniperus communis Forest	DOUGLAS FIR/COMMON JUNIPER	G4	W	M
PSEUDOTSUGA MENZIESII FOREST ALLIANCE	Pseudotsuga menziesii / Mahonia repens Forest	DOUGLAS FIR/CREEPING OREGON-GRAPE	G5	W	M
PSEUDOTSUGA MENZIESII FOREST ALLIANCE	Pseudotsuga menziesii / Muhlenbergia montana Forest	DOUGLAS FIR/MOUNTAIN MUHLY	G4	W	LP
PSEUDOTSUGA MENZIESII FOREST ALLIANCE	Pseudotsuga menziesii / Paxistima myrsinites Forest	DOUGLAS FIR/OREGON BOXLEAF	G2G3	P	LP
PSEUDOTSUGA MENZIESII WOODLAND ALLIANCE	Pseudotsuga menziesii / Purshia tridentata Woodland	DOUGLAS FIR / BITTERBRUSH	G3Q	W	LP
PSEUDOTSUGA MENZIESII FOREST ALLIANCE	Pseudotsuga menziesii / Quercus gambelii Forest	DOUGLAS FIR/GAMBEL'S OAK	G5	W	LP
PSEUDOTSUGA MENZIESII FOREST ALLIANCE	Pseudotsuga menziesii / Symphoricarpos oreophilus Forest	DOUGLAS FIR/MOUNTAIN SNOWBERRY	G5	W	M
PINUS PONDEROSA WOODLAND ALLIANCE	Pinus ponderosa / Arctostaphylos uva-ursi Woodland	PONDEROSA PINE/KINIKINNICK	G4	W	M
PINUS PONDEROSA WOODLAND ALLIANCE	Pinus ponderosa / Carex geyeri Woodland	PONDEROSA PINE / GEYER'S SEDGE	G3G4	W	
PINUS PONDEROSA WOODLAND ALLIANCE	Pinus ponderosa / Carex inops ssp. heliophila Woodland	PONDEROSA PINE/LONG-STOLON SEDGE	G3	W	LP
PINUS PONDEROSA FOREST ALLIANCE	Pinus ponderosa / Carex rossii Forest	PONDEROSA PINE/ROSS' SEDGE	G4G5	E	M
PINUS PONDEROSA FOREST ALLIANCE	Pinus ponderosa / Physocarpus monogynus Forest	PONDEROSA PINE / MOUNTAIN NINEBARK	G3	W	LP
PINUS FLEXILIS WOODLAND ALLIANCE	Pinus flexilis / Arctostaphylos uva-ursi Woodland	LIMBER PINE/KINIKINNICK	G4	W	LP
MONTANE / FOOTHILL CLIFF AND CANYON (SOROGRP032)				W	LP
NEW	Sparse non-vascular vegetation (on rock and unconsolidated substrates)	Sparse non-vascular vegetation	GU	W	LP
PSEUDOTSUGA MENZIESII WOODLAND ALLIANCE	Pseudotsuga menziesii / Holodiscus dumosus Scree Woodland	DOUGLAS FIR/GLANDULAR OCEANSPRAY SCREE	G3G4	W	LP
PSEUDOTSUGA MENZIESII FOREST ALLIANCE	Pseudotsuga menziesii / Jamesia americana Forest	DOUGLAS FIR/FIVE PETAL CLIFF BUSH	G3G4	E	LP
PSEUDOTSUGA MENZIESII FOREST ALLIANCE	Pseudotsuga menziesii / Physocarpus monogynus Forest	DOUGLAS FIR/MOUNTAIN NINEBARK	G4	W	LP
PINUS PONDEROSA WOODLAND ALLIANCE	Pinus ponderosa / Rockland Woodland	PONDEROSA PINE/ROCKLAND	G5	W	LP

APPENDIX 8: SOUTHERN ROCKY MOUNTAINS TERRESTRIAL ECOLOGICAL SYSTEMS/PLANT COMMUNITY TARGETS

ABIES CONCOLOR WOODLAND ALLIANCE	Abies concolor / Holodiscus dumosus Scree Woodland	WHITE FIR/GLANDULAR OCEANSPRAY	G4	W	M
PONDEROSA PINE WOODLAND (SOROGRP020)				W	LP
PINUS PONDEROSA WOODLAND ALLIANCE	Pinus ponderosa / Cercocarpus montanus Woodland	PONDEROSA PINE/ALDER-LEAF MOUNTAIN MAHOGANY	G4	L	LP
PINUS PONDEROSA WOODLAND ALLIANCE	Pinus ponderosa / Arctostaphylos patula Woodland	PONDEROSA PINE/GREENLEAF MANZANITA	G5	L	M
PINUS PONDEROSA WOODLAND ALLIANCE	Pinus ponderosa / Festuca arizonica Woodland	PONDEROSA PINE / ARIZONA FESCUE	G4	W	LP
PINUS PONDEROSA WOODLAND ALLIANCE	**Pinus ponderosa / Festuca kingii Woodland**	**PONDEROSA PINE/SPIKE-FESCUE**	**G2**	**E**	**LP**
PINUS PONDEROSA WOODLAND ALLIANCE	Pinus ponderosa / Muhlenbergia montana Woodland	PONDEROSA PINE/MOUNTAIN MUHLY	G4G5	W	M
PINUS PONDEROSA WOODLAND ALLIANCE	Pinus ponderosa / Pseudoroegneria spicata Woodland	PONDEROSA PINE/BLUEBUNCH WHEATGRASS	G4	W	LP
PINUS PONDEROSA WOODLAND ALLIANCE	Pinus ponderosa / Quercus gambelii Woodland	PONDEROSA PINE/GAMBEL'S OAK	G5	W	LP
PINUS PONDEROSA WOODLAND ALLIANCE	Pinus ponderosa / Quercus X pauciloba Woodland	PONDEROSA PINE / WAVYLEAF OAK WOODLAND	G5	W	LP
PINUS PONDEROSA FOREST ALLIANCE	Pinus ponderosa / Ribes cereum Forest	PONDEROSA PINE/WHITE SQUAW CURRANT	GU	W	LP
PONDEROSA PINE SAVANNA (SOROGRP034)				W	LP
PINUS PONDEROSA WOODED TALL HERBACEOUS ALLIANCE	**Pinus ponderosa / Cercocarpus montanus / Andropogon gerardii Wooded Herbaceous Vegetation**	**PONDEROSA PINE/ALDER-LEAF MOUNTAIN MAHOGANY/BIG BLUESTEM**	**G2**	**L**	**M**
PINUS PONDEROSA WOODLAND ALLIANCE	Pinus ponderosa / Bouteloua gracilis Woodland	PONDEROSA PINE / BLUE GRAMA	G4	W	LP
PINYON-JUNIPER WOODLAND SOROGRP021)				W	M
PINUS EDULUS - (JUNIPERUS SPP.) WOODLAND ALLIANCE	Pinus edulis - Juniperus scopulorum	TWO-NEEDLE PINYON / ROCKY MOUNTAIN JUNIPER	GU	E	M
PINUS EDULUS - (JUNIPERUS SPP.) WOODLAND ALLIANCE	Pinus edulis / Bouteloua curtipendula Woodland	TWO-NEEDLE PINYON/SIDE OATS GRAMA	G?	W	M
PINUS EDULUS - (JUNIPERUS SPP.) WOODLAND ALLIANCE	Pinus edulis / Bouteloua gracilis Woodland	TWO-NEEDLE PINYON/BLUE GRAMA	G5	W	M
PINUS EDULUS - (JUNIPERUS SPP.) WOODLAND ALLIANCE	Pinus edulis / Cercocarpus montanus Woodland	TWO-NEEDLE PINYON/ALDER-LEAF MOUNTAIN MAHOGANY	G5	W	LP
PINUS EDULUS - (JUNIPERUS SPP.) WOODLAND ALLIANCE	Pinus edulis / Leymus ambiguus	TWO-NEEDLE PINYON / ROCKY MOUNTAIN LYME GRASS	GU	E	LP
PINUS EDULUS - (JUNIPERUS SPP.) WOODLAND ALLIANCE	Pinus edulis / Poa fendleriana Woodland	TWO-NEEDLE PINYON/MUTTON GRASS	G5	W	LP
PINUS EDULUS - (JUNIPERUS SPP.) WOODLAND ALLIANCE	Pinus edulis / Pseudoroegneria spicata Woodland	TWO-NEEDLE PINYON/ BLUEBUNCH WHEATGRASS	G4	W	LP
PINUS EDULUS - (JUNIPERUS SPP.) WOODLAND ALLIANCE	Pinus edulis / Purshia tridentata Woodland	TWO-NEEDLE PINYON/BITTERBRUSH	G5	W	LP

PINUS EDULUS - (JUNIPERUS SPP.) WOODLAND ALLIANCE	Pinus edulis / Quercus gambelii Woodland	TWO-NEEDLE PINYON/GAMBEL'S OAK	G5	W	LP
PINUS EDULUS - (JUNIPERUS SPP.) WOODLAND ALLIANCE	Pinus edulis / Quercus x pauciloba Woodland	TWO-NEEDLE PINYON/WAVYLEAF OAK	G5	W	LP
PINUS EDULUS - (JUNIPERUS SPP.) WOODLAND ALLIANCE	Pinus edulis / Rockland Woodland	TWO-NEEDLE PINYON/ROCKLAND	G5	W	M
PINUS EDULUS - (JUNIPERUS SPP.) WOODLAND ALLIANCE	Pinus edulis / Sparse Understory Forest	TWO-NEEDLE PINYON/SPARSE	G5	W	M
PINUS EDULUS - (JUNIPERUS SPP.) WOODLAND ALLIANCE	**Pinus edulis / Stipa comata Woodland**	**TWO-NEEDLE PINYON/NEEDLE-AND-THREAD**	**G2?**	**E**	**LP**
PINUS EDULUS - (JUNIPERUS SPP.) WOODLAND ALLIANCE	**Pinus edulis / Stipa scribneri Woodland**	**TWO-NEEDLE PINYON/ SCRIBNER'S NEEDLEGRASS**	**G3**	**E**	**SP**
JUNIPER SAVANNA	**(SOROGRP022)**			W	LP
JUNIPERUS MONOSPERMA WOODLAND ALLIANCE	**Juniperus monosperma / Andropogon hallii Woodland**	**ONE-SEED JUNIPER/SAND BLUESTEM**	**G3**	**W**	**LP**
JUNIPERUS MONOSPERMA WOODLAND ALLIANCE	Juniperus monosperma / Bouteloua curtipendula Woodland	ONE-SEED JUNIPER / BLUE GRAMA WOODLAND	G5	W	LP
JUNIPERUS MONOSPERMA WOODLAND ALLIANCE	Juniperus monosperma / Bouteloua gracilis Woodland	ONE-SEED JUNIPER / RUBBER RABBITBRUSH - APACHE PLUME WOODLAND	G5	W	LP
JUNIPERUS MONOSPERMA WOODLAND ALLIANCE	Juniperus monosperma / Cercocarpus montanus - Ribes cereum Woodland	ONE-SEED JUNIPER/ALDER-LEAF MOUNTAIN MAHOGANY-WHITE SQUAW CURRANT	GU	E	LP
JUNIPERUS MONOSPERMA WOODLAND ALLIANCE	Juniperus monosperma / Kraschеninnikovia lanata Woodland	ONE-SEED JUNIPER/WINTER-FAT	G3G4	W	LP
JUNIPERUS MONOSPERMA WOODLAND ALLIANCE	Juniperus monosperma / Stipa neomexicana Woodland	ONE-SEED JUNIPER/NEW MEXICO NEEDLE GRASS	G4	P	LP
JUNIPERUS SCOPULORUM WOODLAND ALLIANCE	**Juniperus scopulorum / Artemisia tridentata Woodland**	**ROCKY MOUNTAIN JUNIPER/BIG SAGEBRUSH**	**G2?**	**W**	
JUNIPERUS SCOPULORUM WOODLAND ALLIANCE	**Juniperus scopulorum / Cercocarpus montanus Woodland**	**ROCKY MOUNTAIN JUNIPER/MOUNTAIN MAHOGANY**	**G2**	**W**	**LP**
JUNIPERUS SCOPULORUM WOODLAND ALLIANCE	Juniperus scopulorum / Pseudoroegneria spicata Woodland	ROCKY MOUNTAIN JUNIPER/BLUEBUNCH WHEATGRASS	G4	W	LP
JUNIPERUS SCOPULORUM WOODLAND ALLIANCE	**Juniperus scopulorum / Purshia tridentata Woodland**	**ROCKY MOUNTAIN JUNIPER/BITTERBRUSH**	**G2**	**W**	
JUNIPERUS OSTEOSPERMA	Juniperus osteosperma / Artemisia tridentata Woodland	ONE-SEED JUNIPER/ BIG SAGEBRUSH	G5?	W	LP
JUNIPERUS OSTEOSPERMA WOODED HERBACEOUS ALLIANCE	**Juniperus osteosperma / Leymus salinus ssp. salmonis Wooded Herbaceous Vegetation**	**ONE-SEED JUNIPER/ GREAT BASIN WILD RYE**	**G3**	**W**	**LP**
JUNIPERUS OSTEOSPERMA WOODLAND ALLIANCE	**Juniperus osteosperma / Stipa comata Wooded Herbaceous Vegetation**	**ONE-SEED JUNIPER/NEEEDLE-AND-THREAD**	**G2**	**W**	**LP**
JUNIPERUS OSTEOSPERMA	Juniperus osteosperma / Coleogyne ramosissima	ONE-SEED JUNIPER/BLACKBRUSH	GU	W	LP

APPENDIX 8: SOUTHERN ROCKY MOUNTAINS TERRESTRIAL ECOLOGICAL SYSTEMS/PLANT COMMUNITY TARGETS

LOWER MONTANE-FOOTHILLS SHRUBLAND (SOROGRP023)				L	LP
CERCOCARPUS MONTANUS SHRUBLAND ALLIANCE	Cercocarpus montanus / Elymus lanceolatus ssp. lanceolatus Shrubland	ALDER-LEAF MOUNTAIN MAHOGANY/STREAMSIDE WILD RYE	G?	L	LP
CERCOCARPUS MONTANUS SHRUBLAND ALLIANCE	**Cercocarpus montanus / Stipa comata Shrubland**	**ALDER-LEAF MOUNTAIN MAHOGANY/NEEDLE-AND-THREAD**	**G2**	**W**	**LP**
CERCOCARPUS MONTANUS SHRUBLAND ALLIANCE	**Cercocarpus montanus / Stipa neomexicana**	**ALDER-LEAF MOUNTAIN MAHOGANY/NEW MEXICO NEEDLE GRASS**	**G2G3**	**E**	**SP**
CERCOCARPUS MONTANUS SHRUBLAND ALLIANCE	**Cercocarpus montanus-Rhus trilobata / Andropogon gerardii Shrubland**	**MOUNTAIN MAHOGANY - SKUNKBUSH SUMAC / BIG BLUESTEM**	**G2G3**	**E**	**LP**
CERCOCARPUS MONTANUS SHRUBLAND ALLIANCE	**Cercocarpus montanus / Stipa scribneri**	**ALDER-LEAF MOUNTAIN MAHOGANY/SCRIBNER'S NEEDLE GRASS**	**G3**	**E**	**SP**
CERCOCARPUS MONTANUS SHRUBLAND ALLIANCE	Cercocarpus montanus / Pseudoroegneria spicata Shrubland	MOUNTAIN MAHOGANY/ BLUEBUNCH WHEATGRASS	G4	W	LP
CERCOCARPUS MONTANUS SHRUBLAND ALLIANCE	Cercocarpus montanus / Bouteloua curtipendula Shrubland	ALDER-LEAF MOUNTAIN MAHOGANY/SIDE OATS GRAMA	G5	W	LP
CERCOCARPUS MONTANUS SHRUBLAND ALLIANCE	Cercocarpus montanus / Muhlenbergia montana Shrubland	ALDER-LEAG MOUNTAIN MAHOGANY/MOUNTAIN MUHLY	GU	E	LP
PURSHIA TRIDENTATA SHRUBLAND ALLIANCE	**Purshia tridentata / Artemisia frigida / Stipa comata Shrubland**	**BITTERBRUSH/PRAIRIE SAGEBRUSH/NEEDLE-AND-THREAD**	**G1G2**	**E**	**LP**
PURSHIA TRIDENTATA SHRUBLAND ALLIANCE	**Purshia tridentata / Muhlenbergia montana Shrubland**	**BITTERBRUSH/MOUNTAIN MUHLY**	**G2**	**W**	**LP**
PURSHIA TRIDENTATA SHRUB HERBACEOUS ALLIANCE	**Purshia tridentata / Stipa comata Shrub Herbaceous Vegetation**	**BITTERBRUSH/NEEDLE-AND-THREAD**	**G2**	**W**	**LP**
RHUS TRILOBATA SHRUB HERBACEOUS ALLIANCE	**Rhus trilobata Shrubland**	**SKUNKBUSH SUMAC**	**G2**	**W**	**LP**
RIBES CEREUM SHRUBLAND ALLIANCE	**Ribes cereum / Leymus ambiguus Shrubland**	**WHITE SQUAW CURRANT/ROCKY MOUNTAIN LYME GRASS**	**G2**	**E**	**LP**
ARCTOSTAPHYLOS PATULA SHRUBLAND ALLIANCE	**Arctostaphylos patula / Ceanothus velutinus - Ceanothus prostratus Shrubland**	**GREENLEAF MANZANITA / SKUNKBUSH SUMAC-SQUAW CARPET**	**G3**	**W**	**LP**
SYMPHORICARPOS OCCIDENTALIS TEMPORARILY FLOODED SHRUBLAND ALLIANCE	Symphoricarpos occidentalis Shrubland [Provisional]	WESTERN SNOWBERRY	G4G5	W	LP
GAMBELL'S OAK / SERVICEBERRY SHRUBLAND (SOROGRP035)				W	LP
AMELANCHIER UTAHENSIS SHRUBLAND ALLIANCE	**Amelanchier utahensis - Cercocarpus montanus Shrubland**	**UTAH SERVICEBERRY - MOUNTAIN MAHOGANY**	**G1G2**	**E**	**LP**
AMELANCHIER UTAHENSIS SHRUBLAND ALLIANCE	**Amelanchier utahensis / Pseudoroegneria spicata Shrubland**	**UTAH SERVICEBERRY - BLUEBUNCH WHEATGRASS**	**G2G3**	**E**	**LP**
AMELANCHIER UTAHENSIS SHRUBLAND ALLIANCE	**Amelanchier utahensis / Carex geyeri Shrubland**	**UTAH SERVICEBERRY - GEYER'S SEDGE**	**G2G3**	**E**	**LP**
QUERCUS GAMBELII SHRUBLAND ALLIANCE	Quercus gambelii / Symphoricarpos oreophilus Shrubland	GAMBEL'S OAK / MOUNTAIN SNOWBERRY SHRUBLAND	G5	W	LP

QUERCUS GAMBELII SHRUBLAND ALLIANCE	Quercus gambelii / Pachystima myrsinites Shrubland	GAMBEL'S OAK / OREGON BOXLEAF SHRUBLAND	G?	W	LP
QUERCUS GAMBELII SHRUBLAND ALLIANCE	Quercus gambelii / Carex inops Shrubland	GAMBEL'S OAK/LONG-STOLEN SEDGE	GU	E	LP
QUERCUS GAMBELII SHRUBLAND ALLIANCE	Quercus gambelii / Robinia neomexicana / Symphoricarpos rotundifolius Shrubland	GAMBEL'S OAK/NEW MEXICO LOCUST/ROUNDLEAF SNOWBERRY	GU	E	LP
QUERCUS GAMBELII SHRUBLAND ALLIANCE	Quercus gambelii / Stipa comata	CHOKE CHERRY	GU	E	LP
QUERCUS GAMBELII SHRUBLAND ALLIANCE	Quercus gambelii - Cercocarpus montanus / Carex geyeri Shrubland	GAMBELL'S OAK - MOUNTAIN MAHOGANY / GEYER'S SEDGE	G3	E	LP
QUERCUS GAMBELII SHRUBLAND ALLIANCE	Quercus gambelii / Amelanchier utahensis Shrubland	GAMBELL'S OAK / UTAH SERVICEBERRY	G3G5	E	LP
SAGEBRUSH STEPPE (SOROGRP033)				W	LP
ARTEMISIA TRIDENTATA SHRUBLAND ALLIANCE	Artemisia tridentata / Bouteloua gracilis - Pascopyrum smithii Shrubland	BIG SAGEBRUSH/BLUE GRAMA-WESTERN-WHEAT GRASS	G5	W	LP
ARTEMISIA TRIDENTATA SHRUBLAND ALLIANCE	Artemisia tridentata / Stipa comata Shrubland	BIG SAGEBRUSH/NEEDLE-AND-THREAD	G4Q	W	LP
ARTEMISIA TRIDENTATA SSP. WYOMINGENSIS SHRUB HERBACEOUS ALLIANCE	Artemisia tridentata ssp. wyomingensis / Pseudoroegneria spicata Shrub Herbaceous Vegetation	WYOMING BIG SAGEBRUSH/BLUEBUNCH WHEATGRASS	G4	W	M
ARTEMISIA TRIPARTITA SHRUB HERBACEOUS ALLIANCE	**Artemisia tripartita / Festuca idahoensis Shrub Herbaceous Vegetation**	**THREETIP SAGEBRUSH/IDAHO FESCUE**	**G3**	**W**	**LP**
WINTERFAT SHRUB STEPPE (SOROGRP024)				W	LP
KRASCHENINNIKOVIA LANATA DWARF-SHRUB HERBACEOUS ALLIANCE	Krascheninnikovia lanata / Bouteloua gracilis Dwarf-shrub Herbaceous Vegetation	WINTER-FAT/BLUE GRAMA	G4	W	LP
KRASCHENINNIKOVIA LANATA DWARF-SHRUB HERBACEOUS ALLIANCE	Krascheninnikovia lanata / Pascopyrum smithii - Bouteloua gracilis Dwarf-shrub Herbaceous Vegetation	WINTER-FAT/WESTERN-WHEAT GRASS-BLUE GRAMA	G4	W	LP
KRASCHENINNIKOVIA LANATA DWARF-SHRUB HERBACEOUS ALLIANCE	Krascheninnikovia lanata / Oryzopsis hymenoides Dwarf-shrub Herbaceous Vegetation	WINTER-FAT/INDIAN MOUNTAIN RICE-GRASS	G4	W	LP
SAN LUIS VALLEY WINTERFAT SHRUB STEPPE (SOROGRP038)				W	M
KRASCHENINNIKOVIA LANATA DWARF-SHRUB HERBACEOUS ALLIANCE	Krascheninnikovia lanata / Pascopyrum smithii - Bouteloua gracilis Dwarf-shrub Herbaceous Vegetation	WINTER-FAT/WESTERN-WHEAT GRASS-BLUE GRAMA	G4	W	LP
KRASCHENINNIKOVIA LANATA DWARF-SHRUB HERBACEOUS ALLIANCE	Krascheninnikovia lanata / Bouteloua gracilis Dwarf-shrub Herbaceous Vegetation	WINTER-FAT/BLUE GRAMA	G4	W	LP
INTERMOUNTAIN / FOOTHILL GRASSLAND (SOROGRP025)				L	LP
ANDROPOGON GERARDII - (SORGHASTRUM NUTANS) HERBACEOUS ALLIANCE	**Andropogon gerardii - Schizachyrium scoparium Western Great Plains Herbaceous Vegetation**	**BIG BLUESTEM - LITTLE FALSE BLUESTEM WESTERN GREAT PLAINS**	**G2**	**P**	**SP**
ANDROPOGON GERARDII - (SORGHASTRUM NUTANS) HERBACEOUS ALLIANCE	**Andropogon gerardii - Sorghastrum nutans Western Great Plains Herbaceous Vegetation**	**BIG BLUESTEM-YELLOW INDIAN GRASS WESTERN GREAT PLAINS**	**G1**	**P**	**SP**
ANDROPOGON GERARDII - (SORGHASTRUM NUTANS) HERBACEOUS ALLIANCE	**Andropogon gerardii - Sporobolus heterolepis Western Great Plains Herbaceous Vegetation**	**BIG BLUESTEM-PRAIRIE DROPSEED WESTERN GREAT PLAINS**	**G2**	**P**	**SP**

BOUTELOUA GRACILIS HERBACEOUS ALLIANCE	Bouteloua gracilis - Bouteloua curtipendula Herbaceous Vegetation	BLUE GRAMA-SIDE OATS GRAMA	G5	W	LP
BOUTELOUA GRACILIS HERBACEOUS ALLIANCE	Bouteloua gracilis - Bouteloua hirsuta Herbaceous Vegetation	BLUE GRAMA-HAIRY GRAMA	G3G4	W	LP
BOUTELOUA GRACILIS HERBACEOUS ALLIANCE	Bouteloua gracilis - Buchloe dactyloides Herbaceous Vegetation	BLUE GRAMA-BUFFALO GRASS	G2?	W	LP
BOUTELOUA HIRSUTA HERBACEOUS ALLIANCE	Bouteloua hirsuta - Bouteloua curtipendula Herbaceous Vegetation	HAIRY GRAMA-SIDE OATS GRAMA	G4	W	LP
BOUTELOUA HIRSUTA HERBACEOUS ALLIANCE	Bouteloua hirsuta - Stipa neomexicana Herbaceous Vegetation	HAIRY GRAMA-NEW MEXICO NEEDLE GRASS	G?Q	L	LP
POLIOMINTHA INCANA SHRUBLAND ALLIANCE	**Poliomintha incana / Bouteloua gracilis Shrubland**	**HOARY ROSEMARY-MINT/BLUE GRAMA**	**G2**	**L**	**LP**
SCHIZACHYRIUM SCOPARIUM - BOUTELOUA CURTIPENDULA HERBACEOUS ALLIANCE	**Schizachyrium scoparium - Bouteloua curtipendula Western Great Plains Herbaceous Vegetation**	**LITTLE FALSE BLUESTEM-SIDE OATS GRAMA WESTERN GREAT PLAINS**	**G3**	**W**	**LP**
STIPA COMATA - BOUTELOUA GRACILIS HERBACEOUS ALLIANCE	Stipa comata - Bouteloua gracilis Herbaceous Vegetation	NEEDLE-AND-THREAD - BLUE GRAMA	G5	W	LP
STIPA COMATA - BOUTELOUA GRACILIS HERBACEOUS ALLIANCE	**Stipa comata - Bouteloua gracilis Colorado Front Range Herbaceous Vegetation**	**NEEDLE-AND-THREAD - BLUE GRAMA (FRONT RANGE VARIANT)**	**G2**	**E**	**LP**
STIPA COMATA BUNCH HERBACEOUS ALLIANCE	**Stipa comata - Oryzopsis hymenoides Herbaceous Vegetation**	**NEEDLE-AND-THREAD - INDIAN MOUNTIAN RICE GRASS**	**G2?**	**E**	**LP**
ATRIPLEX CONFERTIFOLIA SHRUBLAND ALLIANCE	Atriplex confertifolia / Hilaria jamesii Shrubland	SHADSCALE / JAMES' GALLETA GRASS	G3G5	W	SP
ATRIPLEX CANESCENS SHRUBLAND ALLIANCE	Atriplex canescens / Bouteloua gracilis	FOUR-WING SALTBUSH / BLUE GRAMA	G3	W	SP
STIPA NEOMEXICANA HERBACEOUS ALLIANCE	**Stipa neomexicana Herbaceous Vegetation**	**NEW MEXICO NEEDLE GRASS**	**G2**	**E**	**LP**
LOWER MONTANE RIPARIAN WOODLAND (SOROGRP026)				W	M
ACER NEGUNDO TEMPORARILY FLOODED WOODLAND ALLIANCE	Acer negundo / Cornus sericea Forest	ASHLEAF MAPLE / RED-OSIER DOGWOOD FOREST	G3?	W	L
ACER NEGUNDO TEMPORARILY FLOODED WOODLAND ALLIANCE	**Acer negundo - Populus angustifolia / Cornus sericea Forest**	**ASHLEAF MAPLE - NARROWLEAF COTTONWOOD / RED-OSIER DOGWOOD FOREST**	**G2**	**L**	**L**
PINUS PONDEROSA TEMPORARILY FLOODED WOODLAND ALLIANCE	Pinus ponderosa / Alnus incana Woodland	PONDEROSA PINE / SPECKLED ALDER	G2	L	L
POPULUS ANGUSTIFOLIA TEMPORARILY FLOODED FOREST ALLIANCE	Populus angustifolia - Populus deltoides - Salix amygdaloides Forest	NARROW-LEAF COTTONWOOD-EASTERN COTTONWOOD-PEACH-LEAF WILLOW	GU	L	L
POPULUS ANGUSTIFOLIA TEMPORARILY FLOODED FOREST ALLIANCE	Populus angustifolia / Alnus incana Forest	NARROW-LEAF COTTONWOOD / SPECKLED ALDER	G3	L	L
POPULUS ANGUSTIFOLIA TEMPORARILY FLOODED FOREST ALLIANCE	**Populus angustifolia / Betula occidentalis Forest**	**NARROW-LEAF COTTONWOOD / WATER BIRCH**	**G1G3**	**W**	**L**
POPULUS ANGUSTIFOLIA TEMPORARILY FLOODED WOODLAND ALLIANCE	Populus angustifolia / Cornus sericea Woodland	NARROW-LEAF COTTONWOOD/ RED OSIER DOGWOOD	G4	W	L

APPENDIX 8: SOUTHERN ROCKY MOUNTAINS TERRESTRIAL ECOLOGICAL SYSTEMS/PLANT COMMUNITY TARGETS

POPULUS ANGUSTIFOLIA TEMPORARILY FLOODED WOODLAND ALLIANCE	**Populus angustifolia / Crataegus rivularis Woodland**	**NARROWLEAF COTTONWOOD / RIVER HAWTHORN WOODLAND**	**G2?**	**W**	**L**
POPULUS ANGUSTIFOLIA TEMPORARILY FLOODED WOODLAND ALLIANCE	Oryzopsis hymenoides - Psoralidium lanceolatum Herbaceous Vegetation	NARROW-LEAF COTTONWOOD / CHOKE CHERRY	G2Q	W	L
POPULUS ANGUSTIFOLIA TEMPORARILY FLOODED FOREST ALLIANCE	Populus angustifolia / Rhus trilobata Forest	NARROW-LEAF COTTONWOOD / FRAGRANT SUMAC	G2G3	W	L
POPULUS ANGUSTIFOLIA TEMPORARILY FLOODED WOODLAND ALLIANCE	Populus angustifolia / Salix (monticola, drummondiana, lucida) Woodland	NARROW-LEAF COTTONWOOD/ MIXED WILLOW	G3	W	L
POPULUS ANGUSTIFOLIA TEMPORARILY FLOODED WOODLAND ALLIANCE	**Populus angustifolia / Salix drummondiana - Acer glabrum Woodland**	**NARROW-LEAF COTTONWOOD / ROCKY MOUNTAIN MAPLE**	**G1?**	**E**	**L**
POPULUS ANGUSTIFOLIA TEMPORARILY FLOODED WOODLAND ALLIANCE	Populus angustifolia / Salix exigua Woodland	NARROWLEAF COTTONWOOD / NARROWLEAF WILLOW WOODLAND	G4	W	L
POPULUS ANGUSTIFOLIA TEMPORARILY FLOODED WOODLAND ALLIANCE	**Populus angustifolia / Salix irrorata Woodland**	**NARROW-LEAF COTTONWOOD / BLUESTEM WILLOW**	**G2?**	**E**	**L**
POPULUS ANGUSTIFOLIA TEMPORARILY FLOODED WOODLAND ALLIANCE	**Populus angustifolia / Salix ligulifolia - Shepherdia argentea Woodland**	**NARROW-LEAF COTTONWOOD/ STRAPLEAF WILLOW - SILVER BUFFALOBERRY**	**G1**	**E**	**L**
POPULUS ANGUSTIFOLIA TEMPORARILY FLOODED WOODLAND ALLIANCE	Populus angustifolia / Symphoricarpos albus Woodland	NARROW-LEAF COTTONWOOD/ COMMON SNOWBERRY	G2Q	W	L
POPULUS ANGUSTIFOLIA TEMPORARILY FLOODED FOREST ALLIANCE	**Populus angustifolia Sand Dune Forest**	**NARROW-LEAF COTTONWOOD SAND DUNE FOREST**	**G1**	**E**	**L**
POPULUS ANGUSTIFOLIA TEMPORARILY FLOODED WOODLAND ALLIANCE	**Populus angustifolia-Juniperus scopulorum Woodland**	**NARROWLEAF COTTONWOOD - ROCKY MOUNTAIN JUNIPER WOODLAND**	**G2G3**	**W**	**L**
POPULUS ANGUSTIFOLIA TEMPORARILY FLOODED WOODLAND ALLIANCE	Populus angustifolia-Picea pungens / Alnus incana Woodland	NARROWLEAF COTTONWOOD - BLUE SPRUCE / SPECKLED ALDER	G4	W	L
POPULUS ANGUSTIFOLIA TEMPORARILY FLOODED WOODLAND ALLIANCE	Populus angustifolia-Pseudotsuga menziesii Woodland	NARROWLEAF COTTONWOOD - DOUGLAS-FIR WOODLAND	G2?	W	L
POPULUS ANGUSTIFOLIA TEMPORARILY FLOODED WOODLAND ALLIANCE	Populus balsamifera ssp. Candida	BALSAM POPLAR	GU	W	L
PSEUDOTSUGA MENZIESII TEMPORARILY FLOODED WOODLAND ALLIANCE	Pseudotsuga menziesii / Betula occidentalis Woodland	DOUGLAS FIR / RIVER BIRCH	G3?	W	L
PSEUDOTSUGA MENZIESII FOREST ALLIANCE	Pseudotsuga menziesii / Cornus sericea	DOUGLAS-FIR / RED-OSIER DOGWOOD WOODLAND	G4	W	L
JUNIPERUS SCOPULORUM TEMPORARILY FLOODED WOODLAND ALLIANCE	Juniperus scopulorum / Cornus sericea Woodland	ROCKY MOUNTAIN JUNIPER / RED-OSIER DOGWOOD WOODLAND	G4	W	L
JUNIPERUS SCOPULORUM TEMPORARILY FLOODED WOODLAND ALLIANCE	Juniperus scopulorum Woodland [Provisional]	ROCKY MOUNTAIN JUNIPER RIPARIAN WOODLAND	G2?	W	L

APPENDIX 8: SOUTHERN ROCKY MOUNTAINS TERRESTRIAL ECOLOGICAL SYSTEMS/PLANT COMMUNITY TARGETS

FOOTHILL RIPARIAN WOODLAND AND SHRUBLAND (SOROGRP027)				W	L
CRATAEGUS RIVULARIS TEMORARILY FLOODED SHRUBLAND ALLIANCE	Crataegus rivularis Shrubland	RIVER HAWTHORN FOOTHILLS RIPARIAN SHRUBLAND	GUQ	W	SP
FORESTIERA PUBESCENS TEMPORARILY FLOODED SHRUBLAND ALLIANCE	**Forestiera pubescens Shrubland**	**WILD-PRIVET**	**G1G2**	**W**	**SP**
PRUNUS VIRGINIANA SHRUBLAND ALLIANCE	Prunus virginiana Shrubland	CHOKE CHERRY	G4Q	W	LP
POPULUS DELTOIDES TEMPORARILY FLOODED WOODLAND ALLIANCE	Populus deltoides - (Salix amygdaloides) / Salix exigua Woodland	EASTERN COTTONWOOD - (PEACHLEAF WILLOW) / SANDBAR WILLOW	G3G4	W	L
POPULUS DELTOIDES TEMPORARILY FLOODED WOODLAND ALLIANCE	**Populus deltoides / Symphoricarpos occidentalis Woodland**	**EASTERN COTTONWOOD / WESTERN SNOWBERRY**	**G2G3**	**W**	**L**
POPULUS DELTOIDES TEMPORARILY FLOODED WOODLAND ALLIANCE	**Populus deltoides ssp. wislizeni / Rhus trilobata Woodland**	**EASTERN COTTONWOOD / SKUNKBUSH SUMAC**	**G2**	**L**	**L**
POPULUS FREMONTII TEMPORARILY FLOODED FOREST ALLIANCE	Populus fremontii / Salix exigua Forest	FREEMONT'S COTTONWOOD/NARROW-LEAF WILLOW	G?	L	L
RHUS TRILOBATA INTERMITTENTLY FLOODED SHRUBLAND	Rhus trilobata - Salix exigua Shrubland	ILL-SCENTED SUMAC-NARROW-LEAF WILLOW	G2Q	W	SP
SALIX AMYGDALOIDES TEMPORARILY FLOODED WOODLAND ALLIANCE	**Salix amygdaloides Woodland**	**PEACH-LEAF WILLOW**	**G3**	**L**	**L**
SALIX EXIGUA TEMPORARILY FLOODED SHRUBLAND ALLIANCE	Salix exigua / Mesic Graminoids Shrubland	NARROWLEAF WILLOW / MESIC GRAMINOIDS SHRUBLAND	G5	W	L
SALIX EXIGUA TEMPORARILY FLOODED SHRUBLAND ALLIANCE	Salix exigua / Agrostis stolonifera Shrubland	NARROW-LEAF WILLOW/SPREADING BENT	G4	W	L
SALIX EXIGUA TEMPORARILY FLOODED SHRUBLAND ALLIANCE	Salix exigua / Barren Shrubland	SANDBAR WILLOW	G5	W	L
SALIX EXIGUA TEMPORARILY FLOODED SHRUBLAND ALLIANCE	**Salix exigua / Elymus x pseudorepens Shrubland**	**NARROW-LEAF WILLOW/QUACKGRASS**	**G3**	**W**	**L**
SALIX EXIGUA TEMPORARILY FLOODED SHRUBLAND ALLIANCE	Salix exigua Shrubland [Provisional]	NARROW-LEAF WILLOW	G5Q	W	L
SALIX IRRORATA TEMPORARILY FLOODED SHRUBLAND ALLIANCE	Salix irrorata Shrubland	BLUESTEM WILLOW SHRUBLAND	G?	W	L
SAND DUNE AND SWALE COMPLEX (SOROGRP028)				L	LP
CAREX SIMULATA SATURATED HERBACEOUS ALLIANCE	Carex simulata Herbaceous Vegetation	ANALOGUE SEDGE HERBACEOUS VEGETATION	G4	W	SP
ORYZOPSIS HYMENOIDES HERBACEOUS ALLIANCE	Oryzopsis hymenoides - Psoralidium lanceolatum Herbaceous Vegetation	INDIAN MOUNTAIN RICE GRASS - LEMON SCURFPEA	G3Q	W	LP
SCIRPUS PUNGENS SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE	Scirpus pungens Herbaceous Vegetation	COMMON THREESQUARE HERBACEOUS VEGETATION	G3G4	W	SP
REDFIELDIA FLEXUOSA HERBACEOUS ALLIANCE	**Redfieldia flexuosa**	**REDFIELDIA**	**G1?**	**L**	**LP**

APPENDIX 8: SOUTHERN ROCKY MOUNTAINS TERRESTRIAL ECOLOGICAL SYSTEMS/PLANT COMMUNITY TARGETS

NORTH PARK SAND DUNE COMPLEX (SOROGRP037)				L	LP
PASCOPYRUM SMITHII HERBACEOUS ALLIANCE	Pascopyrum smithii Herbaceous Vegetation	Western Wheatgrass Herbaceous Vegetation	G3G5Q	W	LP
ORYZOPSIS HYMENOIDES HERBACEOUS ALLIANCE	Oryzopsis hymenoides - Psoralidium lanceolatum Herbaceous Vegetation	INDIAN MOUNTAIN RICE GRASS - LEMON SCURFPEA	G3Q	W	LP
STABILIZED SAND DUNE (SOROGRP016)				L	LP
CHRYSOTHAMNUS NAUSEOSUS SHRUB SHORT HERBACEOUS ALLIANCE	Chrysothamnus nauseosus / Muhlenbergia pungens-Oryzopsis hymenoides Shrubland	RABBITBRUSH - MUHLY STABILIZED SAND DUNE	G?	L	LP
STIPA COMATA BUNCH HERBACEOUS ALLIANCE	**Stipa comata - Oryzopsis hymenoides Herbaceous Vegetation**	**NEEDLE-AND-THREAD - INDIAN MOUNTIAN RICE GRASS**	**G2?**	**L**	**LP**
SARCOBATUS VERMICULATUS SHRUBLAND ALLIANCE	Sarcobatus vermiculatus Dune Shrub Herbaceous Vegetation	GREASEWOOD DUNE	G5?	W	LP
PINUS PONDEROSA SPARSELY VEGETATED ALLIANCE	**Pinus ponderosa / Oryzopsis hymenoides Sparse Vegetation**	**PONDEROSA PINE/INDIAN MOUNTAIN-RICE GRASS**	**G1?**	**E**	**SP**
GREASEWOOD FLATS AND EPHEMERAL MEADOW COMPLEX (SOROGRP029)				L	LP
ELEOCHARIS PALUSTRIS SEASONALLY FLOODED HERBACEOUS ALLIANCE	Eleocharis palustris Herbaceous Vegetation	PALE SPIKERUSH	G5	W	SP
SALICORNIA RUBRA SEASONALLY FLOODED HERBACEOUS ALLIANCE	**Salicornia rubra Herbaceous Vegetation**	**RED SALTWORT**	**G2**	**W**	**SP**
DISTICHLIS SPICATA INTERMITTENTLY FLOODED HERBACEOUS	Distichlis spicata Herbaceous Vegetation	SALT GRASS	G5	W	SP
DISTICHLIS SPICATA INTERMITTENTLY FLOODED HERBACEOUS	Distichlis spicata - (Scirpus nevadensis) Herbaceous Vegetation	SALTGRASS - NEVADA BULRUSH	G4	W	SP
PUCCINELLIA NUTTALLIANA INTERMITTENTLY FLOODED HERBACEOUS ALLIANCE	**Puccinellia nuttalliana Herbaceous Vegetation**	**NUTTALL'S ALKALI GRASS**	**G1?**	**L**	**SP**
SPOROBOLUS AIROIDES INTERMITTENTLY FLOODED HERBACEOUS	Sporobolus airoides - Distichlis spicata Herbaceous Vegetation	ALKALI-SACATON - SALTGRASS	G3G5	W	SP
SPOROBOLUS AIROIDES HERBACEOUS ALLIANCE	Sporobolus airoides Herbaceous Vegetation [Provisional]	ALKALI-SACATON	G2?Q	W	SP
SARCOBATUS VERMICULATUS INTERMITTENTLY FLOODED SHRUBLAND	Sarcobatus vermiculatus / Distichlis spicata Shrubland	GREASEWOOD / SALTGRASS	G4	W	LP
SARCOBATUS VERMICULATUS INTERMITTENTLY FLOODED SPARSELY VEGETATED ALLIANCE	Sarcobatus vermiculatus / Juncus balticus Sparse Vegetation	GREASEWOOD / BALTIC RUSH	G3?	W	LP
SARCOBATUS VERMICULATUS INTERMITTENTLY FLOODED SPARSELY VEGETATED ALLIANCE	Sarcobatus vermiculatus / Sporobolus airoides Sparse Vegetation	GREASEWOOD / ALKALI SACATON	G3?	W	LP

SARCOBATUS VERMICULATUS INTERMITTENTLY FLOODED SHRUBLAND	Sarcobatus vermiculatus / Suaeda moquinii Shrubland	GREASEWOOD / SHRUBBY SEEPWEED	GUQ	W	SP
SARCOBATUS VERMICULATUS INTERMITTENTLY FLOODED SHRUBLAND	Sarcobatus vermiculatus Shrubland	GREASEWOOD	G5	W	M
SARCOBATUS VERMICULATUS SHRUBLAND ALLIANCE	Sarcobatus vermiculatus / Bouteloua gracilis Shrubland	GREASEWOOD / BLUE GRAMA	G1Q	W	LP
CHRYSOTHAMNUS NAUSEOSUS SHRUBLAND ALLIANCE	Chrysothamnus nauseosus / Sporobolus airoides Shrubland	RUBER RABBITBRUSH / ALKALI SACATON	G3Q	W	LP
CROSS-ZONE RIPARIAN AND WETLAND SYSTEMS					
WET MEADOW (SOROGRP030)				W	SP
CALAMAGROSTIS CANADENSIS SEASONALLY FLOODED HERBACEOUS ALLIANCE	Calamagrostis canadensis Western Herbaceous Vegetation	BLUEJOINT REEDGRASS	G4Q	W	SP
PHRAGMITES AUSTRALIS SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE	Phragmites australis Temperate Herbaceous Vegetation		G4	W	SP
JUNCUS BALTICUS SEASONALLY FLOODED HERBACEOUS ALLIANCE	Juncus balticus Herbaceous Vegetation	BALTIC RUSH	G5	W	SP
CAREX AQUATILIS SEASONALLY FLOODED HERBACEOUS ALLIANCE	Carex aquatilis - Carex rostrata Herbaceous Vegetation	LEAFY TUSSOCK SEDGE-SWOLLEN BEAKED SEDGE	G3G4	W	SP
CAREX AQUATILIS SEASONALLY FLOODED HERBACEOUS ALLIANCE	Carex aquatilis Herbaceous Vegetation	LEAFY TUSSOCK SEDGE	G5	W	SP
CAREX LANUGINOSA SEASONALLY FLOODED HERBACEOUS ALLIANCE	Carex lanuginosa Herbaceous Vegetation	WOOLY SEDGE	G3?	W	SP
CAREX LASIOCARPA SEASONALLY FLOODED HERBACEOUS ALLIANCE	Carex lasiocarpa Herbaceous Vegetation	WIREGRASS SEDGE	G4	W	SP
CAREX LIMOSA SEASONALLY FLOODED HERBACEOUS ALLIANCE	Carex limosa Herbaceous Vegetation	MUD SEDGE	G3	W	SP
CAREX NEBRASCENSIS SEASONALLY FLOODED HERBACEOUS ALLIANCE	Carex nebrascensis - slope Herbaceous Vegetation [PROVISIONAL]	NEBRASKA SEDGE-SLOPE WETLAND	GU	E	SP
CAREX PRAEGRACILIS SEASONALLY FLOODED HERBACEOUS ALLIANCE	Carex praegracilis Herbaceous Vegetation	CLUSTERED FIELD SEDGE	G3	P	SP
CAREX (ROSTRATA, UTRICULATA) SEASONALLY FLOODED HERBACEOUS ALLIANCE	Carex rostrata perched wetland Herbaceous Vegetation[PROVISIONAL]	CAREX UTRICULATA PERCHED WETLAND	G3?	E	SP
CAREX (ROSTRATA, UTRICULATA) SEASONALLY FLOODED HERBACEOUS ALLIANCE	Carex rostrata Herbaceous Vegetation	SWOLLEN BEAKED SEDGE	G5	W	SP

CAREX SAXATILIS TEMPORARILY FLOODED HERBACEOUS ALLIANCE	Carex saxatilis Herbaceous Vegetation	RUSSET SEDGE	G3	W	SP
CAREX SIMULATA SATURATED HERBACEOUS ALLIANCE	Carex simulata Herbaceous Vegetation	ANALOGUE SEDGE	G4	W	SP
ELEOCHARIS ROSTELLAT SEASONALLY FLOODED HERBACEOUS ALLIANCE	**Carex rostellata Herbaceous Vegetation**	**BEAKED SPIKERUSH**	**G2G3**	**W**	**SP**
MARSH (SOROGRP031)				W	SP
MYRIOPHYLLUM SIBIRICUM PERMANENTLY FLOODED HERBACEOUS ALLIANCE	Myriophyllum sibiricum Herbaceous Vegetation	SIBERIAN WATER-MILFOIL	GUQ	W	SP
NUPHAR LUTEA PERMANENTLY FLOODED HERBACEOUS ALLIANCE	Nuphar lutea ssp. polysepala Herbaceous Vegetation	YELLOW POND-LILY	G5	W	SP
POLYGONUM AMPHIBIUM PERMANENTLY FLOODED HERBACEOUS ALLIANCE	Polygonum amphibium Herbaceous Vegetation [Provisional]	WATER SMARTWEED	G3Q	W	SP
POTAMOGETON SPP. - CERATOPHYLLUM SPP. - ELODEA SPP. PERMANENTLY FLOODED HERBACEOUS ALLIANCE	Potamogeton foliosus Herbaceous Vegetation	MONTANE FLOATING/SUBMERGENT PALUSTRINE WETLANDS	G3	W	SP
POTAMOGETON SPP. - CERATOPHYLLUM SPP. - ELODEA SPP. PERMANENTLY FLOODED HERBACEOUS ALLIANCE	Potamogeton natans Herbaceous Vegetation	MONTANE FLOATING/SUBMERGENT WELTAND	G5?	W	SP
RANUNCULUS AQUATILIS SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE	Ranunculus aquatilis - Callitriche palustris Herbaceous Vegetation	WHITE WATER CROWFOOT-VERNAL WATER SANDWORT	GU	W	SP
SALICORNIA RUBRA SEASONALLY FLOODED HERBACEOUS ALLIANCE	Salicornia rubra Herbaceous Vegetation	RED SALTWORT	GU	W	SP
SCIRPUS AMERICANUS SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE	Scirpus americanus - Eleocharis spp. Herbaceous Vegetation	CHAIRMAKER'S BULRUSH-SPIKERUSH	G?	W	SP
SCIRPUS MARITIMUS SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE	Scirpus maritimus Herbaceous Vegetation	SALTMARSH BULRUSH	G4	W	SP
SCIRPUS PUNGENS SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE	Scirpus pungens Herbaceous Vegetation	COMMON THREESQUARE HERBACEOUS VEGETATION	G3G4	W	SP
SCIRPUS TABERNAEMONTANI SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE	Scirpus tabernaemontani - Scirpus acutus	GREAT PLAINS MARSHES	G3	W	SP
SPARGANIUM ANGUSTIFOLIUM PERMANENTLY FLOODED HERBACEOUS ALLIANCE	Sparganium angustifolium Herbaceous Vegetation	NARROWLEAF BURR-REED	GU	W	SP

SPARGANIUM EUROCARPUM PERMANENTLY FLOODED ALLIANCE	Sparganium eurycarpum Herbaceous Vegetation	FOOTHILLS/PLAINS FLOATING/SUBMERGENT PALUSTRINE WETLANDS	GU	W	SP
SPARTINA GRACILIS SEASONALLY FLOODED HERBACEOUS ALLIANCE	Spartina gracilis Herbaceous Vegetation	ALKALI CORDGRASS HERBACEOUS VEGETATION	GU	W	SP
TRIGLOCHIN MARITIMUM SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE	Triglochin maritimum Herbaceous Vegetation	SEASIDE ARROW-GRASS	GU	W	SP
TYPHA (ANGUSTIFOLIA, LATIFOLIA) - (SCIRPUS SPP.) SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE	Typha angustifolia-Typha latifolia Herbaceous Vegetation	BROADLEAF CATTAIL WESTERN HERBACEOUS VEGETATION	G5	W	SP
TERRESTRIAL CAVE (SOROGRP39)				L	SP
UNDESCRIBED	UNDESCRIBED	UNDESCRIBED	GU	L	SP

*Distribution relative to ecoregion: E=endemic (>80% in ecoregion), L=limited (shared with few other ecoregions), W=w

** Patch Size: M=matrix forming, LP= Large Patch (1000+ ha), SP=Small Patch (10's-100's ha), L=Linear; e.g. ripa

APPENDIX 8: SOUTHERN ROCKY MOUNTAINS TERRESTRIAL ECOLOGICAL SYSTEMS/PLANT COMMUNITY TARGETS

CODE
CEGL00PLO1
CEGL00PL02
CEGL002888
CEGL00PL03
CEGL001938
CEGL001848
CEGL001855
CEGL001808
CEGL001861
CEGL002889
CEGL001868
CEGL001895
CEGL001614
CEGL001617
CEGL001618
CEGL001631
CEGL002920
CEGL001908
CEGL001919

CEGL001929

CEGL001933

CEGL001935

CEGL001936

CEGL001133

CEGL001976

CEGL001134

CEGL001432

CEGL001430

CEGL001140

CEGL001569

CEGL001876

CEGL001792

CEGL001823

CEGL001836

CEGL001599

CEGL001601

CEGL001885

CEGL001884

CEGL001888

CEGL001985

CEGL002891

CEGL001955

CEGL001956

CEGL001957

CEGL001954

CEGL001958

CEGL002662

CEGL002892

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CEGL001105

CEGL002890

CEGL001133

CEGL000760

CEGL000761

CEGL000759

CEGL002894

CEGL000762

CEGL002895

CEGL000802

CEGL000803

CEGL000810

CEGL000807

CEGL000924

CEGL000340

CEGL000343

CEGL000344

CEGL000371

CEGL000379

CEGL000373

CEGL000919

CEGL000527

CEGL000321

CEGL000318

CEGL000295

CEGL000310

CEGL000332

CEGL000328

CEGL000304

CEGL000377

CEGL000524

CEGL000525

CEGL000764

CEGL000134

CEGL000141

CEGL000144

CEGL000163

CEGL000172

CEGL000541

CEGL000563

CEGL000569

CEGL000575

CEGL000578

CEGL000579

CEGL000581

CEGL000585

CEGL000587

CEGL000592

CEGL000597

CEGL000606

CEGL000612

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CEGL000616

CEGL000610

CEGL000618

CEGL000619

CEGL000620

CEGL000590

CEGL000888

CEGL000240

CEGL000241

CEGL000247

CEGL000263

CEGL000265

CEGL000387

CEGL000390

CEGL000393

CEGL000428

CEGL000891

CEGL000243

CEGL000251

APPENDIX 8: SOUTHERN ROCKY MOUNTAINS TERRESTRIAL ECOLOGICAL SYSTEMS/PLANT COMMUNITY TARGETS

CEGL000261

CEGL000385

CEGL000895

CEGL001794

CEGL001795

CEGL002920

CEGL001605

CEGL001606

CEGL001624

CEGL001630

CEGL001479

CEGL001780

CEGL001647

CEGL001646

CEGL001578

CEGL001664

CEGL001677

CEGL001660

CEGL001605

CEGL001606

CEGL001412

CEGL001552

APPENDIX 8: SOUTHERN ROCKY MOUNTAINS TERRESTRIAL ECOLOGICAL SYSTEMS/PLANT COMMUNITY TARGETS

CEGL001071

CEGL002896

CEGL001533

CEGL002897

CEGL001024

CEGL001028

CEGL001030

CEGL001045

CEGL001047

CEGL001016

CEGL001017

CEGL001419

CEGL001424

CEGL001425

CEGL001417

CEGL002898

CEGL002899

CEGL002900

CEGL002901

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CEGL000300

CEGL000339

CEGL002663

CEGL000296

CEGL000327

CEGL000356

CEGL002677

CEGL000357

CEGL000363

CEGL000894

CEGL000388

CEGL000389

CEGL001150

CEGL002650

CEGL000574

CEGL000582

CEGL000583

CEGL000600

CEGL002902

APPENDIX 8: SOUTHERN ROCKY MOUNTAINS TERRESTRIAL ECOLOGICAL SYSTEMS/PLANT COMMUNITY TARGETS

CEGL000255

CEGL002652

CEGL002651

CEGL001145

CEGL001147

CEGL001148

CEGL001146

CEGL001161

CEGL001162

CEGL002654

CEGL001165

CEGL002903

CEGL001225

CEGL001227

CEGL001230

CEGL002665

CEGL001229

CEGL002893

APPENDIX 8: SOUTHERN ROCKY MOUNTAINS TERRESTRIAL ECOLOGICAL SYSTEMS/PLANT COMMUNITY TARGETS

CEGL001243

CEGL001244

CEGL001135

CEGL001226

CEGL001234

CEGL001237

CEGL001238

CEGL001240

CEGL001174

CEGL001173

CEGL001175

CEGL001178

CEGL002904

CEGL001180

CEGL001181

CEGL001192

CEGL001193

CEGL002667

CEGL002631

APPENDIX 8: SOUTHERN ROCKY MOUNTAINS TERRESTRIAL ECOLOGICAL SYSTEMS/PLANT COMMUNITY TARGETS

CEGL001218

CEGL001247

CEGL002666

CEGL001223

CEGL002905

CEGL002906

CEGL001205

CEGL001206

CEGL001207

CEGL001210

CEGL001218

CEGL001215

CEGL001222

CEGL002656

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CEGL001128

CEGL001062

CEGL000900

CEGL000904

CEGL000418

CEGL000424

CEGL000430

CEGL000431

CEGL000433

CEGL000439

CEGL000442

CEGL000443

CEGL000446

CEGL000909

CEGL000452

CEGL000462

CEGL000844

CEGL000182

CEGL000849

CEGL000183

CEGL000190

CEGL000802

CEGL00PL04

CEGL000902

CEGL000438

CEGL000449

CEGL000877

CEGL000889

CEGL000851

CEGL000842

CEGL000856

CEGL000186

CEGL000862

CEGL000865

CEGL000870

CEGL000874

CEGL000199

CEGL000852

CEGL000848

CEGL002907

CEGL000777

CEGL000778

CEGL000780

CEGL002908

CEGL000787

CEGL000788

CEGL000789

APPENDIX 8: SOUTHERN ROCKY MOUNTAINS TERRESTRIAL ECOLOGICAL SYSTEMS/PLANT COMMUNITY TARGETS

CEGL000791

CEGL000793

CEGL000794

CEGL000795

CEGL000797

CEGL000798

CEGL000704

CEGL000708

CEGL000710

CEGL000714

CEGL000712

CEGL000722

CEGL000743

CEGL000745

CEGL000748

CEGL000749

CEGL000730

CEGL001488

CEGL001489

CEGL002909

APPENDIX 8: SOUTHERN ROCKY MOUNTAINS TERRESTRIAL ECOLOGICAL SYSTEMS/PLANT COMMUNITY TARGETS

CEGL001087

CEGL001092

CEGL002911

CEGL002912

CEGL002913

CEGL001090

CEGL001086

CEGL002914

CEGL001055

CEGL001057

CEGL001498

CEGL002910

CEGL001124

CEGL000957

CEGL001131

CEGL001070

CEGL001069

CEGL001068

CEGL001117

CEGL001114

CEGL001112

CEGL001116

CEGL002915

CEGL001113

CEGL001110

CEGL000997

CEGL001010

CEGL001535

CEGL001540

CEGL001321

CEGL001324

CEGL001323

CEGL001324

CEGL001321

CEGL001463

CEGL001464

CEGL001465

CEGL001754

CEGL001755

CEGL001756

CEGL001764

CEGL001766

CEGL001339

CEGL001594

CEGL001699

CEGL001702

CEGL001703

CEGL001304

CEGL001283

CEGL001708

CEGL000625

CEGL000627

CEGL002638

CEGL000656

CEGL002642

CEGL000648

CEGL002664

CEGL002644

CEGL000651

CEGL000652

CEGL002645

CEGL002646

CEGL000654

CEGL002647

CEGL000655

CEGL002648

CEGL002643

CEGL002640

CEGL000934

CEGL002641

CEGL002916

CEGL002639

CEGL000899

CEGL000746

CEGL003550

APPENDIX 8: SOUTHERN ROCKY MOUNTAINS TERRESTRIAL ECOLOGICAL SYSTEMS/PLANT COMMUNITY TARGETS

COPL000010

CEGL001168

CEGL001108

CEGL000659

CEGL000660

CEGL000940

CEGL000666

CEGL001121

CEGL000947

CEGL001203

CEGL001199

CEGL001200

CEGL001198

CEGL001197

CEGL001214

CEGL001825

CEGL001650

CEGL001587

CEGL002917

APPENDIX 8: SOUTHERN ROCKY MOUNTAINS TERRESTRIAL ECOLOGICAL SYSTEMS/PLANT COMMUNITY TARGETS

CEGL001577
CEGL001650
CEGL002921
CEGL001703
CEGL001364
CEGL001490
CEGL001833
CEGL001999
CEGL001770
CEGL001773
CEGL001799
CEGL001687
CEGL001685
CEGL001363
CEGL002919
CEGL001368

CEGL001370

CEGL001357

CEGL001361

CEGL002918

CEGL001559

CEGL001475

CEGL001838

CEGL001803

CEGL001802

CEGL001809

CEGL001810

CEGL001811

CEGL001813

CEGL002660

CEGL002922

CEGL001562

APPENDIX 8: SOUTHERN ROCKY MOUNTAINS TERRESTRIAL ECOLOGICAL SYSTEMS/PLANT COMMUNITY TARGETS

CEGL001769

CEGL001825

CEGL002923

CEGL002000

CEGL002001

CEGL002002

CEGL002924

CEGL002925

CEGL001984

CEGL001999

CEGL001586

CEGL001843

CEGL001587

CEGL002030

CEGL001990

CEGL002926

CEGL001588

CEGL001995

CEGL002010

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APPENDIX 9: SOUTHERN ROCKY MOUNTAINS AQUATIC ECOLOGICAL SYSTEMS

NUMBER	AQ SYS CODE	AQ SYSTEM DESCRIPTION	ELEVATION	GRADIENT	STREAM SIZE	GEOLOGY	EDUs WHERE FOUND
1	1111	Alpine-Steep/Very Steep-Headwtr/Crk-Granite/Volcanic	Alpine	Steep & Very Steep Gradients Only	Headwaters, Creeks	Granite / Volcanic	Platte Basin, Arkansas/Canadian, Upper Colorado, Upper Rio Grande, Yampa/White Rivers
2	1112	Alpine-Steep/Very Steep-Headwtr/Crk-Shale/Sandst/Limest	Alpine	Steep & Very Steep Gradients Only	Headwaters, Creeks	Shales / Sandstones / Limestone	Platte Basin, Arkansas/Canadian, Upper Rio Grande, Pecos Basin
3	1211	Alpine-Mod/Low Gradient-Headwtr/Crk-Granite/Volcanic	Alpine	Moderate and Low Gradients	Headwaters, Creeks	Granite / Volcanic	Platte Basin, Arkansas/Canadian, Upper Colorado
4	1212	Alpine-Mod/Low Gradient-Headwtr/Crk-Shale/Sandst/Limest	Alpine	Moderate and Low Gradients	Headwaters, Creeks	Shales / Sandstones / Limestone	Platte Basin, Arkansas/Canadian
5	1213	Alpine-Mod/Low Gradient-Headwtr/Crk-Alluvium	Alpine	Moderate and Low Gradients	Headwaters, Creeks	Alluvium (Wide channels and basins)	Platte Basin, Arkansas/Canadian, Upper Colorado, Upper Rio Grande
6	2111	Alpine/Montane-Steep/Very Steep-Headwtr/Crk-Granite/Volcanic	Alpine/montane	Steep & Very Steep Gradients Only	Headwaters, Creeks	Granite / Volcanic	Platte Basin, Arkansas/Canadian, Upper Colorado, Yampa/White Rivers
7	2112	Alpine/Montane-Steep/Very Steep-Headwtr/Crk-Shale/Sandst/Limest	Alpine/montane	Steep & Very Steep Gradients Only	Headwaters, Creeks	Shales / Sandstones / Limestone	Platte Basin, Upper Colorado, Pecos Basin, Yampa/White Rivers
8	2211	Alpine/Montane-Mod/Low Gradient-Headwtr/Crk-Granite/Volcanic	Alpine/montane	Moderate and Low Gradients	Headwaters, Creeks	Granite / Volcanic	all
9	2212	Alpine/Montane-Mod/Low Gradient-Headwtr/Crk-Shale/Sandst/Limest	Alpine/montane	Moderate and Low Gradients	Headwaters, Creeks	Shales / Sandstones / Limestone	Platte Basin, Arkansas/Canadian, Upper Colorado, Upper Rio Grande, Pecos Basin, Yampa/White Rivers
10	2213	Alpine/Montane-Mod/Low Gradient-Headwtr/Crk-Alluvium	Alpine/montane	Moderate and Low Gradients	Headwaters, Creeks	Alluvium (Wide channels and basins)	Platte Basin, Arkansas/Canadian, Upper Colorado, Upper Rio Grande, Pecos Basin, Yampa/White Rivers
11	2222	Alpine/Montane-Mod/Low Gradient-Small Riv-Shale/Sandst/Limest	Alpine/montane	Moderate and Low Gradients	Small River	Shales / Sandstones / Limestone	Platte Basin, Arkansas/Canadian, Upper Rio Grande
12	2223	Alpine/Montane-Mod/Low Gradient-Small Riv-Alluvium	Alpine/montane	Moderate and Low Gradients	Small River	Alluvium (Wide channels and basins)	Upper Rio Grande
13	3111	Montane-Steep/Very Steep-Headwtr,Crk-Granite/Volcanic	Montane	Steep & Very Steep Gradients Only	Headwaters, Creeks	Granite / Volcanic	Platte Basin, Upper Colorado, Upper Rio Grande, Yampa/White Rivers

APPENDIX 9: SOUTHERN ROCKY MOUNTAINS AQUATIC ECOLOGICAL SYSTEMS

NUMBER	AQ SYS CODE	AQ SYSTEM DESCRIPTION	ELEVATION	GRADIENT	STREAM SIZE	GEOLOGY	EDUs WHERE FOUND
14	3112	Montane-Steep/Very Steep-Headwtr,Crk-Shale/Sandst/Limest	Montane	Steep & Very Steep Gradients Only	Headwaters, Creeks	Shales / Sandstones / Limestone	Platte Basin, Upper Colorado, Upper Rio Grande, Yampa/White Rivers
15	3132	Montane-Steep/Very Steep-Large Riv-Shale/Sandst/Limest	Montane	Steep & Very Steep Gradients Only	Large River	Shales / Sandstones / Limestone	Upper Colorado
16	3211	Montane-Mod/Low Gradient-Headwtr,Crk-Granite/Volcanic	Montane	Moderate and Low Gradients	Headwaters, Creeks	Granite / Volcanic	Platte Basin, Arkansas/Canadian, Upper Colorado, Colorado - San Juan, Upper Rio Grande
17	3212	Montane-Mod/Low Gradient-Headwtr,Crk-Shale/Sandst/Limest	Montane	Moderate and Low Gradients	Headwaters, Creeks	Shales / Sandstones / Limestone	all
18	3213	Montane-Mod/Low Gradient-Headwtr,Crk-Alluvium	Montane	Moderate and Low Gradients	Headwaters, Creeks	Alluvium (Wide channels and basins)	Platte Basin, Arkansas/Canadian, Upper Rio Grande, Pecos Basin
19	3221	Montane-Mod/Low Gradient-Small Riv-Granite/Volcanic	Montane	Moderate and Low Gradients	Small River	Granite / Volcanic	Platte Basin, Upper Colorado, Colorado - San Juan
20	3222	Montane-Mod/Low Gradient-Small Riv-Shale/Sandst/Limest	Montane	Moderate and Low Gradients	Small River	Shales / Sandstones / Limestone	Platte Basin, Arkansas/Canadian, Upper Colorado, Colorado - San Juan, Upper Rio Grande, Yampa/White Rivers
21	3223	Montane-Mod/Low Gradient-Small Riv-Alluvium	Montane	Moderate and Low Gradients	Small River	Alluvium (Wide channels and basins)	Platte Basin, Arkansas/Canadian, Upper Colorado, Colorado - San Juan, Upper Rio Grande
22	3231	Montane-Mod/Low Gradient-Large Riv-Granite/Volcanic	Montane	Moderate and Low Gradients	Large River	Granite / Volcanic	Platte Basin, Upper Colorado
23	3233	Montane-Mod/Low Gradient-Large Riv-Alluvium	Montane	Moderate and Low Gradients	Large River	Alluvium (Wide channels and basins)	Upper Rio Grande, Yampa/White Rivers
24	4112	Montane/Foothills,Foothills-Steep/Very Steep-Headwtr,Crk-Shale/Sandst/Limest	Montane/Foothills, Foothills	Steep & Very Steep Gradients Only	Headwaters, Creeks	Shales / Sandstones / Limestone	Upper Colorado
25	4212	Montane/Foothills,Foothills-Mod/Low Gradient-Headwtr,Crk-Shale/Sandst/Limest	Montane/Foothills, Foothills	Moderate and Low Gradients	Headwaters, Creeks	Shales / Sandstones / Limestone	Platte Basin, Arkansas/Canadian, Upper Colorado, Upper Rio Grande, Pecos Basin
26	4213	Montane/Foothills-Mod/Low Gradient-Headwtr,Crk-Alluvium	Montane/Foothills, Foothills	Moderate and Low Gradients	Headwaters, Creeks	Alluvium (Wide channels and basins)	Arkansas/Canadian

APPENDIX 9: SOUTHERN ROCKY MOUNTAINS AQUATIC ECOLOGICAL SYSTEMS

NUMBER	AQ SYS CODE	AQ SYSTEM DESCRIPTION	ELEVATION	GRADIENT	STREAM SIZE	GEOLOGY	EDUs WHERE FOUND
27	4222	Montane/Foothills,Foothills-Mod/Low Gradient-Small Riv-Shale/Sandst/Limest	Montane/Foothills, Foothills	Moderate and Low Gradients	Small River	Shales / Sandstones / Limestone	Arkansas/Canadian
28	4223	Montane/Foothills,Foothills-Mod/Low Gradient-Small Riv-Alluvium	Montane/Foothills, Foothills	Moderate and Low Gradients	Small River	Alluvium (Wide channels and basins)	Arkansas/Canadian, Upper Colorado, Upper Rio Grande
29	4231	Montane/Foothills,Foothills-Mod/Low Gradient-Large Riv-Granite/Volcanic	Montane/Foothills, Foothills	Moderate and Low Gradients	Large River	Granite / Volcanic	Platte Basin, Arkansas/Canadian
30	4232	Montane/Foothills,Foothills-Mod/Low Gradient-Large Riv-Shale/Sandst/Limest	Montane/Foothills, Foothills	Moderate and Low Gradients	Large River	Shales / Sandstones / Limestone	Upper Colorado
31	4233	Montane/Foothills,Foothills-Mod/Low Gradient-Large Riv-Alluvium	Montane/Foothills, Foothills	Moderate and Low Gradients	Large River	Alluvium (Wide channels and basins)	Platte Basin, Upper Colorado, Upper Rio Grande
32	12111	Alpine-Mod/Low Gradient-Headwtr/Crk-Granite/Volcanic	Alpine	Moderate and Low Gradients	Headwaters, Creeks	Granite / Volcanic	Upper Colorado, Pecos Basin
33	22211	Alpine/Montane-Mod/Low Gradient-Small Riv-Granite/Volcanic	Alpine/montane	Moderate and Low Gradients	Small River	Granite / Volcanic	Platte Basin, Arkansas/Canadian, Upper Colorado

APPENDIX 10: SOUTHERN ROCKY MOUNTAINS AQUATIC MACROHABITATS

NUMBER	CODE	AQUATIC MACROHABITAT DESCRIPTION	STREAM SIZE	DOMINANT GEOLOGY	ELEVATION	GRADIENT
1	1100	Headwater - link 1-30 / Granitic, basaltic, share (non-porous) / /	Headwater - link 1-30	Granitic, basaltic, share (non-porous)		
2	1120	Headwater - link 1-30 / Granitic, basaltic, share (non-porous) / Foothills - 3000 to 6000 ft /	Headwater - link 1-30	Granitic, basaltic, share (non-porous)	Foothills - 3000 to 6000 ft	
3	1121	Headwater - link 1-30 / Granitic, basaltic, share (non-porous) / Foothills - 3000 to 6000 ft / Low - less than 0.02	Headwater - link 1-30	Granitic, basaltic, share (non-porous)	Foothills - 3000 to 6000 ft	Low - less than 0.02
4	1122	Headwater - link 1-30 / Granitic, basaltic, share (non-porous) / Foothills - 3000 to 6000 ft / Moderate - 0.02 to 0.04	Headwater - link 1-30	Granitic, basaltic, share (non-porous)	Foothills - 3000 to 6000 ft	Moderate - 0.02 to 0.04
5	1123	Headwater - link 1-30 / Granitic, basaltic, share (non-porous) / Foothills - 3000 to 6000 ft / Steep - 0.04 to 0.10	Headwater - link 1-30	Granitic, basaltic, share (non-porous)	Foothills - 3000 to 6000 ft	Steep - 0.04 to 0.10
6	1124	Headwater - link 1-30 / Granitic, basaltic, share (non-porous) / Foothills - 3000 to 6000 ft / Very Steep - above 0.10	Headwater - link 1-30	Granitic, basaltic, share (non-porous)	Foothills - 3000 to 6000 ft	Very Steep - above 0.10
7	1130	Headwater - link 1-30 / Granitic, basaltic, share (non-porous) / Montane - 6000 to 9000 ft /	Headwater - link 1-30	Granitic, basaltic, share (non-porous)	Montane - 6000 to 9000 ft	
8	1131	Headwater - link 1-30 / Granitic, basaltic, share (non-porous) / Montane - 6000 to 9000 ft / Low - less than 0.02	Headwater - link 1-30	Granitic, basaltic, share (non-porous)	Montane - 6000 to 9000 ft	Low - less than 0.02
9	1132	Headwater - link 1-30 / Granitic, basaltic, share (non-porous) / Montane - 6000 to 9000 ft / Moderate - 0.02 to 0.04	Headwater - link 1-30	Granitic, basaltic, share (non-porous)	Montane - 6000 to 9000 ft	Moderate - 0.02 to 0.04
10	1133	Headwater - link 1-30 / Granitic, basaltic, share (non-porous) / Montane - 6000 to 9000 ft / Steep - 0.04 to 0.10	Headwater - link 1-30	Granitic, basaltic, share (non-porous)	Montane - 6000 to 9000 ft	Steep - 0.04 to 0.10
11	1134	Headwater - link 1-30 / Granitic, basaltic, share (non-porous) / Montane - 6000 to 9000 ft / Very Steep - above 0.10	Headwater - link 1-30	Granitic, basaltic, share (non-porous)	Montane - 6000 to 9000 ft	Very Steep - above 0.10
12	1140	Headwater - link 1-30 / Granitic, basaltic, share (non-porous) / Alpine - above 9000 ft /	Headwater - link 1-30	Granitic, basaltic, share (non-porous)	Alpine - above 9000 ft	
13	1141	Headwater - link 1-30 / Granitic, basaltic, share (non-porous) / Alpine - above 9000 ft / Low - less than 0.02	Headwater - link 1-30	Granitic, basaltic, share (non-porous)	Alpine - above 9000 ft	Low - less than 0.02
14	1142	Headwater - link 1-30 / Granitic, basaltic, share (non-porous) / Alpine - above 9000 ft / Moderate - 0.02 to 0.04	Headwater - link 1-30	Granitic, basaltic, share (non-porous)	Alpine - above 9000 ft	Moderate - 0.02 to 0.04
15	1143	Headwater - link 1-30 / Granitic, basaltic, share (non-porous) / Alpine - above 9000 ft / Steep - 0.04 to 0.10	Headwater - link 1-30	Granitic, basaltic, share (non-porous)	Alpine - above 9000 ft	Steep - 0.04 to 0.10
16	1144	Headwater - link 1-30 / Granitic, basaltic, share (non-porous) / Alpine - above 9000 ft / Very Steep - above 0.10	Headwater - link 1-30	Granitic, basaltic, share (non-porous)	Alpine - above 9000 ft	Very Steep - above 0.10
17	1200	Headwater - link 1-30 / Sedimentary - sandstone (porous-non alkaline) / /	Headwater - link 1-30	Sedimentary - sandstone (porous-non alkaline)		
18	1220	Headwater - link 1-30 / Sedimentary - sandstone (porous-non alkaline) / Foothills - 3000 to 6000 ft /	Headwater - link 1-30	Sedimentary - sandstone (porous-non alkaline)	Foothills - 3000 to 6000 ft	
19	1221	Headwater - link 1-30 / Sedimentary - sandstone (porous-non alkaline) / Foothills - 3000 to 6000 ft / Low - less than 0.02	Headwater - link 1-30	Sedimentary - sandstone (porous-non alkaline)	Foothills - 3000 to 6000 ft	Low - less than 0.02
20	1222	Headwater - link 1-30 / Sedimentary - sandstone (porous-non alkaline) / Foothills - 3000 to 6000 ft / Moderate - 0.02 to 0.04	Headwater - link 1-30	Sedimentary - sandstone (porous-non alkaline)	Foothills - 3000 to 6000 ft	Moderate - 0.02 to 0.04
21	1223	Headwater - link 1-30 / Sedimentary - sandstone (porous-non alkaline) / Foothills - 3000 to 6000 ft / Steep - 0.04 to 0.10	Headwater - link 1-30	Sedimentary - sandstone (porous-non alkaline)	Foothills - 3000 to 6000 ft	Steep - 0.04 to 0.10
22	1224	Headwater - link 1-30 / Sedimentary - sandstone (porous-non alkaline) / Foothills - 3000 to 6000 ft / Very Steep - above 0.10	Headwater - link 1-30	Sedimentary - sandstone (porous-non alkaline)	Foothills - 3000 to 6000 ft	Very Steep - above 0.10

APPENDIX 10: SOUTHERN ROCKY MOUNTAINS AQUATIC MACROHABITATS

NUMBER	CODE	AQUATIC MACROHABITAT DESCRIPTION	STREAM SIZE	DOMINANT GEOLOGY	ELEVATION	GRADIENT
23	1230	Headwater - link 1-30 / Sedimentary - sandstone (porous-non alkaline) / Montane - 6000 to 9000 ft /	Headwater - link 1-30	Sedimentary - sandstone (porous-non alkaline)	Montane - 6000 to 9000 ft	
24	1231	Headwater - link 1-30 / Sedimentary - sandstone (porous-non alkaline) / Montane - 6000 to 9000 ft / Low - less than 0.02	Headwater - link 1-30	Sedimentary - sandstone (porous-non alkaline)	Montane - 6000 to 9000 ft	Low - less than 0.02
25	1232	Headwater - link 1-30 / Sedimentary - sandstone (porous-non alkaline) / Montane - 6000 to 9000 ft / Moderate - 0.02 to 0.04	Headwater - link 1-30	Sedimentary - sandstone (porous-non alkaline)	Montane - 6000 to 9000 ft	Moderate - 0.02 to 0.04
26	1233	Headwater - link 1-30 / Sedimentary - sandstone (porous-non alkaline) / Montane - 6000 to 9000 ft / Steep - 0.04 to 0.10	Headwater - link 1-30	Sedimentary - sandstone (porous-non alkaline)	Montane - 6000 to 9000 ft	Steep - 0.04 to 0.10
27	1234	Headwater - link 1-30 / Sedimentary - sandstone (porous-non alkaline) / Montane - 6000 to 9000 ft / Very Steep - above 0.10	Headwater - link 1-30	Sedimentary - sandstone (porous-non alkaline)	Montane - 6000 to 9000 ft	Very Steep - above 0.10
28	1240	Headwater - link 1-30 / Sedimentary - sandstone (porous-non alkaline) / Alpine - above 9000 ft /	Headwater - link 1-30	Sedimentary - sandstone (porous-non alkaline)	Alpine - above 9000 ft	
29	1241	Headwater - link 1-30 / Sedimentary - sandstone (porous-non alkaline) / Alpine - above 9000 ft / Low - less than 0.02	Headwater - link 1-30	Sedimentary - sandstone (porous-non alkaline)	Alpine - above 9000 ft	Low - less than 0.02
30	1242	Headwater - link 1-30 / Sedimentary - sandstone (porous-non alkaline) / Alpine - above 9000 ft / Moderate - 0.02 to 0.04	Headwater - link 1-30	Sedimentary - sandstone (porous-non alkaline)	Alpine - above 9000 ft	Moderate - 0.02 to 0.04
31	1243	Headwater - link 1-30 / Sedimentary - sandstone (porous-non alkaline) / Alpine - above 9000 ft / Steep - 0.04 to 0.10	Headwater - link 1-30	Sedimentary - sandstone (porous-non alkaline)	Alpine - above 9000 ft	Steep - 0.04 to 0.10
32	1244	Headwater - link 1-30 / Sedimentary - sandstone (porous-non alkaline) / Alpine - above 9000 ft / Very Steep - above 0.10	Headwater - link 1-30	Sedimentary - sandstone (porous-non alkaline)	Alpine - above 9000 ft	Very Steep - above 0.10
33	1321	Headwater - link 1-30 / Sedimentary - carbonate (porous) / Foothills - 3000 to 6000 ft / Low - less than 0.02	Headwater - link 1-30	Sedimentary - carbonate (porous)	Foothills - 3000 to 6000 ft	Low - less than 0.02
34	1331	Headwater - link 1-30 / Sedimentary - carbonate (porous) / Montane - 6000 to 9000 ft / Low - less than 0.02	Headwater - link 1-30	Sedimentary - carbonate (porous)	Montane - 6000 to 9000 ft	Low - less than 0.02
35	1332	Headwater - link 1-30 / Sedimentary - carbonate (porous) / Montane - 6000 to 9000 ft / Moderate - 0.02 to 0.04	Headwater - link 1-30	Sedimentary - carbonate (porous)	Montane - 6000 to 9000 ft	Moderate - 0.02 to 0.04
36	1333	Headwater - link 1-30 / Sedimentary - carbonate (porous) / Montane - 6000 to 9000 ft / Steep - 0.04 to 0.10	Headwater - link 1-30	Sedimentary - carbonate (porous)	Montane - 6000 to 9000 ft	Steep - 0.04 to 0.10
37	1334	Headwater - link 1-30 / Sedimentary - carbonate (porous) / Montane - 6000 to 9000 ft / Very Steep - above 0.10	Headwater - link 1-30	Sedimentary - carbonate (porous)	Montane - 6000 to 9000 ft	Very Steep - above 0.10
38	1341	Headwater - link 1-30 / Sedimentary - carbonate (porous) / Alpine - above 9000 ft / Low - less than 0.02	Headwater - link 1-30	Sedimentary - carbonate (porous)	Alpine - above 9000 ft	Low - less than 0.02
39	1342	Headwater - link 1-30 / Sedimentary - carbonate (porous) / Alpine - above 9000 ft / Moderate - 0.02 to 0.04	Headwater - link 1-30	Sedimentary - carbonate (porous)	Alpine - above 9000 ft	Moderate - 0.02 to 0.04
40	1343	Headwater - link 1-30 / Sedimentary - carbonate (porous) / Alpine - above 9000 ft / Steep - 0.04 to 0.10	Headwater - link 1-30	Sedimentary - carbonate (porous)	Alpine - above 9000 ft	Steep - 0.04 to 0.10
41	1344	Headwater - link 1-30 / Sedimentary - carbonate (porous) / Alpine - above 9000 ft / Very Steep - above 0.10	Headwater - link 1-30	Sedimentary - carbonate (porous)	Alpine - above 9000 ft	Very Steep - above 0.10
42	1400	Headwater - link 1-30 / Coarse (alluvium, glacial deposits, colluvium) / /	Headwater - link 1-30	Coarse (alluvium, glacial deposits, colluvium)		
43	1420	Headwater - link 1-30 / Coarse (alluvium, glacial deposits, colluvium) / Foothills - 3000 to 6000 ft /	Headwater - link 1-30	Coarse (alluvium, glacial deposits, colluvium)	Foothills - 3000 to 6000 ft	
44	1421	Headwater - link 1-30 / Coarse (alluvium, glacial deposits, colluvium) / Foothills - 3000 to 6000 ft / Low - less than 0.02	Headwater - link 1-30	Coarse (alluvium, glacial deposits, colluvium)	Foothills - 3000 to 6000 ft	Low - less than 0.02

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NUMBER	CODE	AQUATIC MACROHABITAT DESCRIPTION	STREAM SIZE	DOMINANT GEOLOGY	ELEVATION	GRADIENT
45	1422	Headwater - link 1-30 / Coarse (alluvium, glacial deposits, colluvium) / Foothills - 3000 to 6000 ft / Moderate - 0.02 to 0.04	Headwater - link 1-30	Coarse (alluvium, glacial deposits, colluvium)	Foothills - 3000 to 6000 ft	Moderate - 0.02 to 0.04
46	1423	Headwater - link 1-30 / Coarse (alluvium, glacial deposits, colluvium) / Foothills - 3000 to 6000 ft / Steep - 0.04 to 0.10	Headwater - link 1-30	Coarse (alluvium, glacial deposits, colluvium)	Foothills - 3000 to 6000 ft	Steep - 0.04 to 0.10
47	1424	Headwater - link 1-30 / Coarse (alluvium, glacial deposits, colluvium) / Foothills - 3000 to 6000 ft / Very Steep - above 0.10	Headwater - link 1-30	Coarse (alluvium, glacial deposits, colluvium)	Foothills - 3000 to 6000 ft	Very Steep - above 0.10
48	1430	Headwater - link 1-30 / Coarse (alluvium, glacial deposits, colluvium) / Montane - 6000 to 9000 ft /	Headwater - link 1-30	Coarse (alluvium, glacial deposits, colluvium)	Montane - 6000 to 9000 ft	
49	1431	Headwater - link 1-30 / Coarse (alluvium, glacial deposits, colluvium) / Montane - 6000 to 9000 ft / Low - less than 0.02	Headwater - link 1-30	Coarse (alluvium, glacial deposits, colluvium)	Montane - 6000 to 9000 ft	Low - less than 0.02
50	1432	Headwater - link 1-30 / Coarse (alluvium, glacial deposits, colluvium) / Montane - 6000 to 9000 ft / Moderate - 0.02 to 0.04	Headwater - link 1-30	Coarse (alluvium, glacial deposits, colluvium)	Montane - 6000 to 9000 ft	Moderate - 0.02 to 0.04
51	1433	Headwater - link 1-30 / Coarse (alluvium, glacial deposits, colluvium) / Montane - 6000 to 9000 ft / Steep - 0.04 to 0.10	Headwater - link 1-30	Coarse (alluvium, glacial deposits, colluvium)	Montane - 6000 to 9000 ft	Steep - 0.04 to 0.10
52	1434	Headwater - link 1-30 / Coarse (alluvium, glacial deposits, colluvium) / Montane - 6000 to 9000 ft / Very Steep - above 0.10	Headwater - link 1-30	Coarse (alluvium, glacial deposits, colluvium)	Montane - 6000 to 9000 ft	Very Steep - above 0.10
53	1440	Headwater - link 1-30 / Coarse (alluvium, glacial deposits, colluvium) / Alpine - above 9000 ft /	Headwater - link 1-30	Coarse (alluvium, glacial deposits, colluvium)	Alpine - above 9000 ft	
54	1441	Headwater - link 1-30 / Coarse (alluvium, glacial deposits, colluvium) / Alpine - above 9000 ft / Low - less than 0.02	Headwater - link 1-30	Coarse (alluvium, glacial deposits, colluvium)	Alpine - above 9000 ft	Low - less than 0.02
55	1442	Headwater - link 1-30 / Coarse (alluvium, glacial deposits, colluvium) / Alpine - above 9000 ft / Moderate - 0.02 to 0.04	Headwater - link 1-30	Coarse (alluvium, glacial deposits, colluvium)	Alpine - above 9000 ft	Moderate - 0.02 to 0.04
56	1443	Headwater - link 1-30 / Coarse (alluvium, glacial deposits, colluvium) / Alpine - above 9000 ft / Steep - 0.04 to 0.10	Headwater - link 1-30	Coarse (alluvium, glacial deposits, colluvium)	Alpine - above 9000 ft	Steep - 0.04 to 0.10
57	1444	Headwater - link 1-30 / Coarse (alluvium, glacial deposits, colluvium) / Alpine - above 9000 ft / Very Steep - above 0.10	Headwater - link 1-30	Coarse (alluvium, glacial deposits, colluvium)	Alpine - above 9000 ft	Very Steep - above 0.10
58	2121	Creek - link 30-50 / Granitic, basaltic, share (non-porous) / Foothills - 3000 to 6000 ft / Low - less than 0.02	Creek - link 30-50	Granitic, basaltic, share (non-porous)	Foothills - 3000 to 6000 ft	Low - less than 0.02
59	2122	Creek - link 30-50 / Granitic, basaltic, share (non-porous) / Foothills - 3000 to 6000 ft / Moderate - 0.02 to 0.04	Creek - link 30-50	Granitic, basaltic, share (non-porous)	Foothills - 3000 to 6000 ft	Moderate - 0.02 to 0.04
60	2131	Creek - link 30-50 / Granitic, basaltic, share (non-porous) / Montane - 6000 to 9000 ft / Low - less than 0.02	Creek - link 30-50	Granitic, basaltic, share (non-porous)	Montane - 6000 to 9000 ft	Low - less than 0.02
61	2132	Creek - link 30-50 / Granitic, basaltic, share (non-porous) / Montane - 6000 to 9000 ft / Moderate - 0.02 to 0.04	Creek - link 30-50	Granitic, basaltic, share (non-porous)	Montane - 6000 to 9000 ft	Moderate - 0.02 to 0.04
62	2140	Creek - link 30-50 / Granitic, basaltic, share (non-porous) / Alpine - above 9000 ft /	Creek - link 30-50	Granitic, basaltic, share (non-porous)	Alpine - above 9000 ft	
63	2141	Creek - link 30-50 / Granitic, basaltic, share (non-porous) / Alpine - above 9000 ft / Low - less than 0.02	Creek - link 30-50	Granitic, basaltic, share (non-porous)	Alpine - above 9000 ft	Low - less than 0.02
64	2220	Creek - link 30-50 / Sedimentary - sandstone (porous-non alkaline) / Foothills - 3000 to 6000 ft /	Creek - link 30-50	Sedimentary - sandstone (porous-non alkaline)	Foothills - 3000 to 6000 ft	
65	2221	Creek - link 30-50 / Sedimentary - sandstone (porous-non alkaline) / Foothills - 3000 to 6000 ft / Low - less than 0.02	Creek - link 30-50	Sedimentary - sandstone (porous-non alkaline)	Foothills - 3000 to 6000 ft	Low - less than 0.02
66	2222	Creek - link 30-50 / Sedimentary - sandstone (porous-non alkaline) / Foothills - 3000 to 6000 ft / Moderate - 0.02 to 0.04	Creek - link 30-50	Sedimentary - sandstone (porous-non alkaline)	Foothills - 3000 to 6000 ft	Moderate - 0.02 to 0.04

APPENDIX 10: SOUTHERN ROCKY MOUNTAINS AQUATIC MACROHABITATS

NUMBER	CODE	AQUATIC MACROHABITAT DESCRIPTION	STREAM SIZE	DOMINANT GEOLOGY	ELEVATION	GRADIENT
67	2223	Creek - link 30-50 / Sedimentary - sandstone (porous-non alkaline) / Foothills - 3000 to 6000 ft / Steep - 0.04 to 0.10	Creek - link 30-50	Sedimentary - sandstone (porous-non alkaline)	Foothills - 3000 to 6000 ft	Steep - 0.04 to 0.10
68	2230	Creek - link 30-50 / Sedimentary - sandstone (porous-non alkaline) / Montane - 6000 to 9000 ft /	Creek - link 30-50	Sedimentary - sandstone (porous-non alkaline)	Montane - 6000 to 9000 ft	
69	2231	Creek - link 30-50 / Sedimentary - sandstone (porous-non alkaline) / Montane - 6000 to 9000 ft / Low - less than 0.02	Creek - link 30-50	Sedimentary - sandstone (porous-non alkaline)	Montane - 6000 to 9000 ft	Low - less than 0.02
70	2232	Creek - link 30-50 / Sedimentary - sandstone (porous-non alkaline) / Montane - 6000 to 9000 ft / Moderate - 0.02 to 0.04	Creek - link 30-50	Sedimentary - sandstone (porous-non alkaline)	Montane - 6000 to 9000 ft	Moderate - 0.02 to 0.04
71	2233	Creek - link 30-50 / Sedimentary - sandstone (porous-non alkaline) / Montane - 6000 to 9000 ft / Steep - 0.04 to 0.10	Creek - link 30-50	Sedimentary - sandstone (porous-non alkaline)	Montane - 6000 to 9000 ft	Steep - 0.04 to 0.10
72	2331	Creek - link 30-50 / Sedimentary - carbonate (porous) / Montane - 6000 to 9000 ft / Low - less than 0.02	Creek - link 30-50	Sedimentary - carbonate (porous)	Montane - 6000 to 9000 ft	Low - less than 0.02
73	2400	Creek - link 30-50 / Coarse (alluvium, glacial deposits, colluvium) / /	Creek - link 30-50	Coarse (alluvium, glacial deposits, colluvium)		
74	2420	Creek - link 30-50 / Coarse (alluvium, glacial deposits, colluvium) / Foothills - 3000 to 6000 ft /	Creek - link 30-50	Coarse (alluvium, glacial deposits, colluvium)	Foothills - 3000 to 6000 ft	
75	2421	Creek - link 30-50 / Coarse (alluvium, glacial deposits, colluvium) / Foothills - 3000 to 6000 ft / Low - less than 0.02	Creek - link 30-50	Coarse (alluvium, glacial deposits, colluvium)	Foothills - 3000 to 6000 ft	Low - less than 0.02
76	2422	Creek - link 30-50 / Coarse (alluvium, glacial deposits, colluvium) / Foothills - 3000 to 6000 ft / Moderate - 0.02 to 0.04	Creek - link 30-50	Coarse (alluvium, glacial deposits, colluvium)	Foothills - 3000 to 6000 ft	Moderate - 0.02 to 0.04
77	2423	Creek - link 30-50 / Coarse (alluvium, glacial deposits, colluvium) / Foothills - 3000 to 6000 ft / Steep - 0.04 to 0.10	Creek - link 30-50	Coarse (alluvium, glacial deposits, colluvium)	Foothills - 3000 to 6000 ft	Steep - 0.04 to 0.10
78	2430	Creek - link 30-50 / Coarse (alluvium, glacial deposits, colluvium) / Montane - 6000 to 9000 ft /	Creek - link 30-50	Coarse (alluvium, glacial deposits, colluvium)	Montane - 6000 to 9000 ft	
79	2431	Creek - link 30-50 / Coarse (alluvium, glacial deposits, colluvium) / Montane - 6000 to 9000 ft / Low - less than 0.02	Creek - link 30-50	Coarse (alluvium, glacial deposits, colluvium)	Montane - 6000 to 9000 ft	Low - less than 0.02
80	2432	Creek - link 30-50 / Coarse (alluvium, glacial deposits, colluvium) / Montane - 6000 to 9000 ft / Moderate - 0.02 to 0.04	Creek - link 30-50	Coarse (alluvium, glacial deposits, colluvium)	Montane - 6000 to 9000 ft	Moderate - 0.02 to 0.04
81	2433	Creek - link 30-50 / Coarse (alluvium, glacial deposits, colluvium) / Montane - 6000 to 9000 ft / Steep - 0.04 to 0.10	Creek - link 30-50	Coarse (alluvium, glacial deposits, colluvium)	Montane - 6000 to 9000 ft	Steep - 0.04 to 0.10
82	2434	Creek - link 30-50 / Coarse (alluvium, glacial deposits, colluvium) / Montane - 6000 to 9000 ft / Very Steep - above 0.10	Creek - link 30-50	Coarse (alluvium, glacial deposits, colluvium)	Montane - 6000 to 9000 ft	Very Steep - above 0.10
83	2440	Creek - link 30-50 / Coarse (alluvium, glacial deposits, colluvium) / Alpine - above 9000 ft /	Creek - link 30-50	Coarse (alluvium, glacial deposits, colluvium)	Alpine - above 9000 ft	
84	2441	Creek - link 30-50 / Coarse (alluvium, glacial deposits, colluvium) / Alpine - above 9000 ft / Low - less than 0.02	Creek - link 30-50	Coarse (alluvium, glacial deposits, colluvium)	Alpine - above 9000 ft	Low - less than 0.02
85	2442	Creek - link 30-50 / Coarse (alluvium, glacial deposits, colluvium) / Alpine - above 9000 ft / Moderate - 0.02 to 0.04	Creek - link 30-50	Coarse (alluvium, glacial deposits, colluvium)	Alpine - above 9000 ft	Moderate - 0.02 to 0.04
86	2443	Creek - link 30-50 / Coarse (alluvium, glacial deposits, colluvium) / Alpine - above 9000 ft / Steep - 0.04 to 0.10	Creek - link 30-50	Coarse (alluvium, glacial deposits, colluvium)	Alpine - above 9000 ft	Steep - 0.04 to 0.10
87	3120	Small River - link 50-450 / Granitic, basaltic, share (non-porous) / Foothills - 3000 to 6000 ft /	Small River - link 50-450	Granitic, basaltic, share (non-porous)	Foothills - 3000 to 6000 ft	
88	3121	Small River - link 50-450 / Granitic, basaltic, share (non-porous) / Foothills - 3000 to 6000 ft / Low - less than 0.02	Small River - link 50-450	Granitic, basaltic, share (non-porous)	Foothills - 3000 to 6000 ft	Low - less than 0.02

APPENDIX 10: SOUTHERN ROCKY MOUNTAINS AQUATIC MACROHABITATS

NUMBER	CODE	AQUATIC MACROHABITAT DESCRIPTION	STREAM SIZE	DOMINANT GEOLOGY	ELEVATION	GRADIENT
89	3130	Small River - link 50-450 / Granitic, basaltic, share (non-porous) / Montane - 6000 to 9000 ft /	Small River - link 50-450	Granitic, basaltic, share (non-porous)	Montane - 6000 to 9000 ft	
90	3131	Small River - link 50-450 / Granitic, basaltic, share (non-porous) / Montane - 6000 to 9000 ft / Low - less than 0.02	Small River - link 50-450	Granitic, basaltic, share (non-porous)	Montane - 6000 to 9000 ft	Low - less than 0.02
91	3220	Small River - link 50-450 / Sedimentary - sandstone (porous-non alkaline) / Foothills - 3000 to 6000 ft /	Small River - link 50-450	Sedimentary - sandstone (porous-non alkaline)	Foothills - 3000 to 6000 ft	
92	3221	Small River - link 50-450 / Sedimentary - sandstone (porous-non alkaline) / Foothills - 3000 to 6000 ft / Low - less than 0.02	Small River - link 50-450	Sedimentary - sandstone (porous-non alkaline)	Foothills - 3000 to 6000 ft	Low - less than 0.02
93	3222	Small River - link 50-450 / Sedimentary - sandstone (porous-non alkaline) / Foothills - 3000 to 6000 ft / Moderate - 0.02 to 0.04	Small River - link 50-450	Sedimentary - sandstone (porous-non alkaline)	Foothills - 3000 to 6000 ft	Moderate - 0.02 to 0.04
94	3223	Small River - link 50-450 / Sedimentary - sandstone (porous-non alkaline) / Foothills - 3000 to 6000 ft / Steep - 0.04 to 0.10	Small River - link 50-450	Sedimentary - sandstone (porous-non alkaline)	Foothills - 3000 to 6000 ft	Steep - 0.04 to 0.10
95	3224	Small River - link 50-450 / Sedimentary - sandstone (porous-non alkaline) / Foothills - 3000 to 6000 ft / Very Steep - above 0.10	Small River - link 50-450	Sedimentary - sandstone (porous-non alkaline)	Foothills - 3000 to 6000 ft	Very Steep - above 0.10
96	3230	Small River - link 50-450 / Sedimentary - sandstone (porous-non alkaline) / Montane - 6000 to 9000 ft /	Small River - link 50-450	Sedimentary - sandstone (porous-non alkaline)	Montane - 6000 to 9000 ft	
97	3231	Small River - link 50-450 / Sedimentary - sandstone (porous-non alkaline) / Montane - 6000 to 9000 ft / Low - less than 0.02	Small River - link 50-450	Sedimentary - sandstone (porous-non alkaline)	Montane - 6000 to 9000 ft	Low - less than 0.02
98	3232	Small River - link 50-450 / Sedimentary - sandstone (porous-non alkaline) / Montane - 6000 to 9000 ft / Moderate - 0.02 to 0.04	Small River - link 50-450	Sedimentary - sandstone (porous-non alkaline)	Montane - 6000 to 9000 ft	Moderate - 0.02 to 0.04
99	3233	Small River - link 50-450 / Sedimentary - sandstone (porous-non alkaline) / Montane - 6000 to 9000 ft / Steep - 0.04 to 0.10	Small River - link 50-450	Sedimentary - sandstone (porous-non alkaline)	Montane - 6000 to 9000 ft	Steep - 0.04 to 0.10
100	3300	Small River - link 50-450 / Sedimentary - carbonate (porous) / /	Small River - link 50-450	Sedimentary - carbonate (porous)		
101	3321	Small River - link 50-450 / Sedimentary - carbonate (porous) / Foothills - 3000 to 6000 ft / Low - less than 0.02	Small River - link 50-450	Sedimentary - carbonate (porous)	Foothills - 3000 to 6000 ft	Low - less than 0.02
102	3330	Small River - link 50-450 / Sedimentary - carbonate (porous) / Montane - 6000 to 9000 ft /	Small River - link 50-450	Sedimentary - carbonate (porous)	Montane - 6000 to 9000 ft	
103	3331	Small River - link 50-450 / Sedimentary - carbonate (porous) / Montane - 6000 to 9000 ft / Low - less than 0.02	Small River - link 50-450	Sedimentary - carbonate (porous)	Montane - 6000 to 9000 ft	Low - less than 0.02
104	3400	Small River - link 50-450 / Coarse (alluvium, glacial deposits, colluvium) / /	Small River - link 50-450	Coarse (alluvium, glacial deposits, colluvium)		
105	3420	Small River - link 50-450 / Coarse (alluvium, glacial deposits, colluvium) / Foothills - 3000 to 6000 ft /	Small River - link 50-450	Coarse (alluvium, glacial deposits, colluvium)	Foothills - 3000 to 6000 ft	
106	3421	Small River - link 50-450 / Coarse (alluvium, glacial deposits, colluvium) / Foothills - 3000 to 6000 ft / Low - less than 0.02	Small River - link 50-450	Coarse (alluvium, glacial deposits, colluvium)	Foothills - 3000 to 6000 ft	Low - less than 0.02
107	3422	Small River - link 50-450 / Coarse (alluvium, glacial deposits, colluvium) / Foothills - 3000 to 6000 ft / Moderate - 0.02 to 0.04	Small River - link 50-450	Coarse (alluvium, glacial deposits, colluvium)	Foothills - 3000 to 6000 ft	Moderate - 0.02 to 0.04
108	3423	Small River - link 50-450 / Coarse (alluvium, glacial deposits, colluvium) / Foothills - 3000 to 6000 ft / Steep - 0.04 to 0.10	Small River - link 50-450	Coarse (alluvium, glacial deposits, colluvium)	Foothills - 3000 to 6000 ft	Steep - 0.04 to 0.10
109	3430	Small River - link 50-450 / Coarse (alluvium, glacial deposits, colluvium) / Montane - 6000 to 9000 ft /	Small River - link 50-450	Coarse (alluvium, glacial deposits, colluvium)	Montane - 6000 to 9000 ft	
110	3431	Small River - link 50-450 / Coarse (alluvium, glacial deposits, colluvium) / Montane - 6000 to 9000 ft / Low - less than 0.02	Small River - link 50-450	Coarse (alluvium, glacial deposits, colluvium)	Montane - 6000 to 9000 ft	Low - less than 0.02

APPENDIX 10: SOUTHERN ROCKY MOUNTAINS AQUATIC MACROHABITATS

NUMBER	CODE	AQUATIC MACROHABITAT DESCRIPTION	STREAM SIZE	DOMINANT GEOLOGY	ELEVATION	GRADIENT
111	3432	Small River - link 50-450 / Coarse (alluvium, glacial deposits, colluvium) / Montane - 6000 to 9000 ft / Moderate - 0.02 to 0.04	Small River - link 50-450	Coarse (alluvium, glacial deposits, colluvium)	Montane - 6000 to 9000 ft	Moderate - 0.02 to 0.04
112	3433	Small River - link 50-450 / Coarse (alluvium, glacial deposits, colluvium) / Montane - 6000 to 9000 ft / Steep - 0.04 to 0.10	Small River - link 50-450	Coarse (alluvium, glacial deposits, colluvium)	Montane - 6000 to 9000 ft	Steep - 0.04 to 0.10
113	3434	Small River - link 50-450 / Coarse (alluvium, glacial deposits, colluvium) / Montane - 6000 to 9000 ft / Very Steep - above 0.10	Small River - link 50-450	Coarse (alluvium, glacial deposits, colluvium)	Montane - 6000 to 9000 ft	Very Steep - above 0.10
114	3440	Small River - link 50-450 / Coarse (alluvium, glacial deposits, colluvium) / Alpine - above 9000 ft /	Small River - link 50-450	Coarse (alluvium, glacial deposits, colluvium)	Alpine - above 9000 ft	
115	3441	Small River - link 50-450 / Coarse (alluvium, glacial deposits, colluvium) / Alpine - above 9000 ft / Low - less than 0.02	Small River - link 50-450	Coarse (alluvium, glacial deposits, colluvium)	Alpine - above 9000 ft	Low - less than 0.02
116	3442	Small River - link 50-450 / Coarse (alluvium, glacial deposits, colluvium) / Alpine - above 9000 ft / Moderate - 0.02 to 0.04	Small River - link 50-450	Coarse (alluvium, glacial deposits, colluvium)	Alpine - above 9000 ft	Moderate - 0.02 to 0.04
117	4220	Large River - link > 450 / Sedimentary - sandstone (porous-non alkaline) / Foothills - 3000 to 6000 ft /	Large River - link > 450	Sedimentary - sandstone (porous-non alkaline)	Foothills - 3000 to 6000 ft	
118	4221	Large River - link > 450 / Sedimentary - sandstone (porous-non alkaline) / Foothills - 3000 to 6000 ft / Low - less than 0.02	Large River - link > 450	Sedimentary - sandstone (porous-non alkaline)	Foothills - 3000 to 6000 ft	Low - less than 0.02
119	4222	Large River - link > 450 / Sedimentary - sandstone (porous-non alkaline) / Foothills - 3000 to 6000 ft / Moderate - 0.02 to 0.04	Large River - link > 450	Sedimentary - sandstone (porous-non alkaline)	Foothills - 3000 to 6000 ft	Moderate - 0.02 to 0.04
120	4223	Large River - link > 450 / Sedimentary - sandstone (porous-non alkaline) / Foothills - 3000 to 6000 ft / Steep - 0.04 to 0.10	Large River - link > 450	Sedimentary - sandstone (porous-non alkaline)	Foothills - 3000 to 6000 ft	Steep - 0.04 to 0.10
121	4230	Large River - link > 450 / Sedimentary - sandstone (porous-non alkaline) / Montane - 6000 to 9000 ft /	Large River - link > 450	Sedimentary - sandstone (porous-non alkaline)	Montane - 6000 to 9000 ft	
122	4231	Large River - link > 450 / Sedimentary - sandstone (porous-non alkaline) / Montane - 6000 to 9000 ft / Low - less than 0.02	Large River - link > 450	Sedimentary - sandstone (porous-non alkaline)	Montane - 6000 to 9000 ft	Low - less than 0.02
123	4232	Large River - link > 450 / Sedimentary - sandstone (porous-non alkaline) / Montane - 6000 to 9000 ft / Moderate - 0.02 to 0.04	Large River - link > 450	Sedimentary - sandstone (porous-non alkaline)	Montane - 6000 to 9000 ft	Moderate - 0.02 to 0.04
124	4233	Large River - link > 450 / Sedimentary - sandstone (porous-non alkaline) / Montane - 6000 to 9000 ft / Steep - 0.04 to 0.10	Large River - link > 450	Sedimentary - sandstone (porous-non alkaline)	Montane - 6000 to 9000 ft	Steep - 0.04 to 0.10
125	4400	Large River - link > 450 / Coarse (alluvium, glacial deposits, colluvium) / /	Large River - link > 450	Coarse (alluvium, glacial deposits, colluvium)		
126	4420	Large River - link > 450 / Coarse (alluvium, glacial deposits, colluvium) / Foothills - 3000 to 6000 ft /	Large River - link > 450	Coarse (alluvium, glacial deposits, colluvium)	Foothills - 3000 to 6000 ft	
127	4421	Large River - link > 450 / Coarse (alluvium, glacial deposits, colluvium) / Foothills - 3000 to 6000 ft / Low - less than 0.02	Large River - link > 450	Coarse (alluvium, glacial deposits, colluvium)	Foothills - 3000 to 6000 ft	Low - less than 0.02
128	4422	Large River - link > 450 / Coarse (alluvium, glacial deposits, colluvium) / Foothills - 3000 to 6000 ft / Moderate - 0.02 to 0.04	Large River - link > 450	Coarse (alluvium, glacial deposits, colluvium)	Foothills - 3000 to 6000 ft	Moderate - 0.02 to 0.04
129	4423	Large River - link > 450 / Coarse (alluvium, glacial deposits, colluvium) / Foothills - 3000 to 6000 ft / Steep - 0.04 to 0.10	Large River - link > 450	Coarse (alluvium, glacial deposits, colluvium)	Foothills - 3000 to 6000 ft	Steep - 0.04 to 0.10
130	4430	Large River - link > 450 / Coarse (alluvium, glacial deposits, colluvium) / Montane - 6000 to 9000 ft /	Large River - link > 450	Coarse (alluvium, glacial deposits, colluvium)	Montane - 6000 to 9000 ft	
131	4431	Large River - link > 450 / Coarse (alluvium, glacial deposits, colluvium) / Montane - 6000 to 9000 ft / Low - less than 0.02	Large River - link > 450	Coarse (alluvium, glacial deposits, colluvium)	Montane - 6000 to 9000 ft	Low - less than 0.02
132	4432	Large River - link > 450 / Coarse (alluvium, glacial deposits, colluvium) / Montane - 6000 to 9000 ft / Moderate - 0.02 to 0.04	Large River - link > 450	Coarse (alluvium, glacial deposits, colluvium)	Montane - 6000 to 9000 ft	Moderate - 0.02 to 0.04

APPENDIX 10: SOUTHERN ROCKY MOUNTAINS AQUATIC MACROHABITATS

NUMBER	CODE	AQUATIC MACROHABITAT DESCRIPTION	STREAM SIZE	DOMINANT GEOLOGY	ELEVATION	GRADIENT
133	4433	Large River - link > 450 / Coarse (alluvium, glacial deposits, colluvium) / Montane - 6000 to 9000 ft / Steep - 0.04 to 0.10	Large River - link > 450	Coarse (alluvium, glacial deposits, colluvium)	Montane - 6000 to 9000 ft	Steep - 0.04 to 0.10
134	4434	Large River - link > 450 / Coarse (alluvium, glacial deposits, colluvium) / Montane - 6000 to 9000 ft / Very Steep - above 0.10	Large River - link > 450	Coarse (alluvium, glacial deposits, colluvium)	Montane - 6000 to 9000 ft	Very Steep - above 0.10

APPENDIX 11

BIOPHYSICAL MODELING

Biophysical Modeling -Terrestrial Ecological Land Units

A variety of factors, such as temperature, soil moisture, and plant-available nutrients, can be considered driving abiotic variables influencing vegetation pattern across the earth's surface. Indirect measures of these variables may be combined with a vegetation map to characterize and assess biophysical variation represented within potential conservation areas. Ideally, indirect measures to use in the Southern Rocky Mountains could include climatic zone, elevation, landform, slope, aspect, hydrologic regime, soil depth, soil texture, soil pH and salinity, exposed bedrock, and others. Given available spatial data, we mapped ecological land units (ELUs) for the Southern Rocky Mountains ecoregion. Figure 1 provides a schematic of our process for developing ELUs.

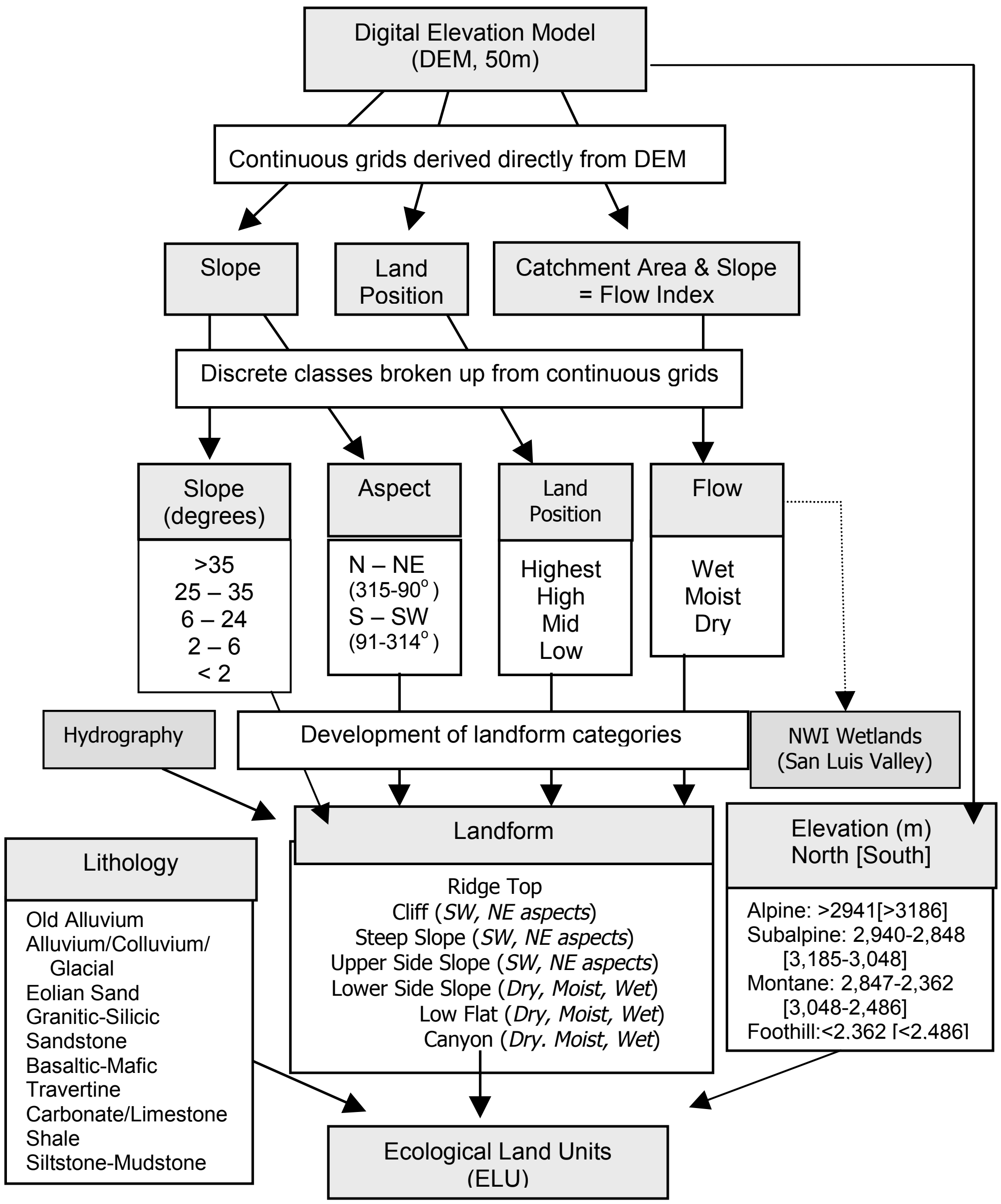

Figure 1. Schematic for development of ecological land units in the Southern Rocky Mountains ecoregion.

Spatial data sets included a $50m^2$ digital elevation model (DEM) developed from 1:100,000 scale topography, and surficial geology from Colorado, Wyoming, and New Mexico. Variables and variable classes used to develop ELUs were derived from documented knowledge of driving ecological factors within the ecoregion (e.g., Weaver 1970, DeVelice et al. 1986, Kaufman et al. 1992, Dick-Peddie 1993, Reid et al. 1999, Peet 2000)

First, we used the DEM to develop a classification of seven major landforms known to influence vegetation pattern. Landform character is primarily a function of slope angle—from flat topography to steep cliff faces, and landscape position—from lowest to highest, relative to adjacent areas. The continuous elevation grid was broken into discrete classes for slope angle (5 classes) and landscape position (5 classes). Five classes of slope angle were developed to help characterize a variety of landforms, from flat topography at low angles to steep cliff faces at higher angles. Landscape position was a relative measure assigned to each grid cell using the relative elevation of surrounding grid cells. For example, if surrounding cells were all above a given cell, that cell received a positive value, while negative values were applied to cells surrounded by others of lower elevation. Cells along side slopes (with surrounding cells both higher and lower) and cells along flat topography (elevations similar to original grid cell) received neutral values. All grid cells were then categorized into four major slope positions (highest, high, mid-slope, and low). The various combinations of slope angle and landscape position then were combined to highlight characteristic landforms for the ecoregion (Figure 2).

<table>
<tr><th colspan="6">Landscape Position</th></tr>
<tr><th>Slope Angle °</th><th>Highest</th><th>High</th><th>Mid</th><th>Low</th><th>Lowest</th></tr>
<tr><td>> 35</td><td rowspan="5">Ridge Top</td><td colspan="3">Cliff</td><td rowspan="5">Canyon</td></tr>
<tr><td>24 - 35</td><td rowspan="2">Upper Side Slope</td><td></td><td></td></tr>
<tr><td>6 - 24</td><td colspan="2">Lower Side Slope</td></tr>
<tr><td>2 - 6</td><td colspan="3">Rolling Plain</td></tr>
<tr><td>0 - 2</td><td colspan="3">Flat</td></tr>
</table>

Figure 2. Characteristic landforms of the Southern Rocky Mountains as defined by slope angle and landscape position.

A surface flow index was used that combines the catchment area of each grid cell, that is, the number of $50m^2$ cells above and likely flowing into the grid cell, and the slope angle of the grid cell, which indicates drainage conditions of that cell. The flow index, with a continuous scale partitioned into *dry, moist, and wet* categories*,* was used to modify flat to gently sloping landforms (*e.g.*, flats, rolling plains, and lower side slopes) as an initial indicator for montane wetland and riparian environments. National Wetland Inventory (NWI) data were used to calibrate the flow index (specifically, the *wet-moist* threshold). NWI data were used directly to indicate the occurrence of "*wet* " environments for portions of the San Luis Valley. Slope aspect (south-southwest vs. north-northeast) was used to modify more steeply sloping landforms. Hydrography was used primarily to define the terrestrial/aquatic boundary of the landforms, but it also served as an additional ancillary data set to calibrate the flow index. Figure 2 indicates the distribution of the seven major landforms.

Each landform was further modified by one of ten classes for surficial geology, developed from lithology groups modified from Raines et al. (1996) for the western United States. Surficial features included alluvium, colluvium, glacial moraines, and sand dunes. Seven classes of bedrock exposed at the surface were defined by major physical and chemical properties likely to effect vegetation. Figure 3 indicates the distribution of the ten surficial geology classes.

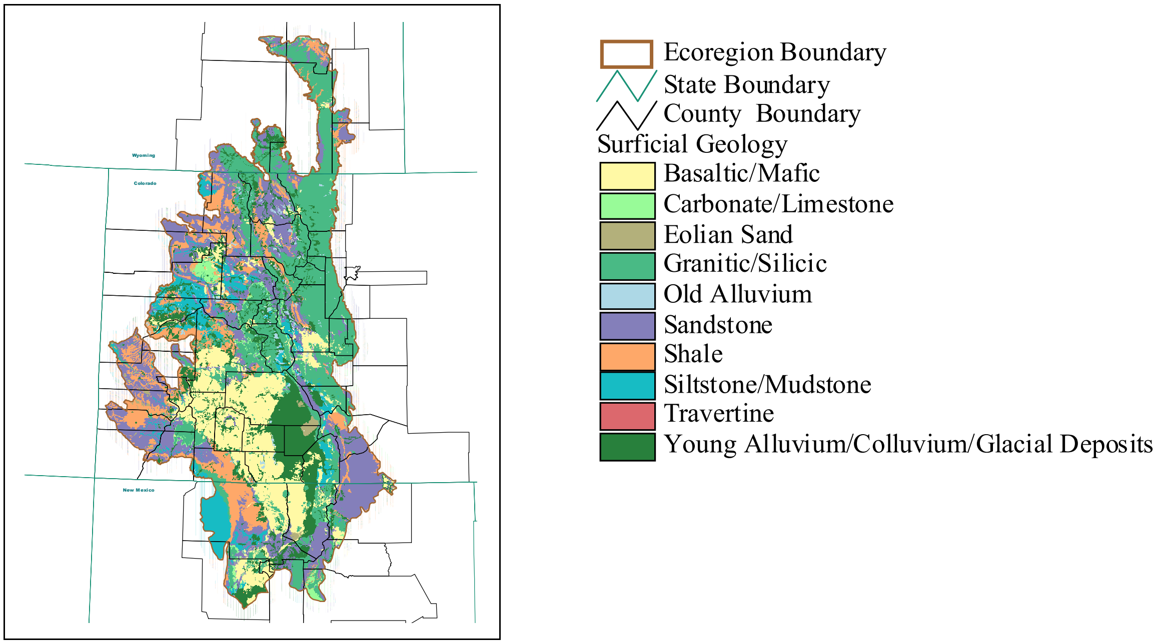

Figure 3. Surficial Geology Classes

Finally, all landforms were nested within four major elevation zones (Foothill, Montane, Subalpine, Alpine) that are reflected in major vegetation distributions. Given the north-south extent and high elevation gain of the SRM, zonal transitions vary somewhat from north to south. We reviewed existing literature, then sampled the elevations where major vegetation shifts occur at northern and southern ends of the ecoregion. For example, to estimate the elevation where the alpine zone transitions to subalpine, elevations were sampled on southwest slopes along the tundra/forest margin on the vegetation map in northern New Mexico and southern Wyoming. The mean values from each sample set (n = 50) established the southern and northern extremes. Elevation breaks across the entire ecoregion represent an interpolation between the north-south extremes. Figure 4 indicates the distribution of the four elevation classes in the Southern Rocky Mountains.

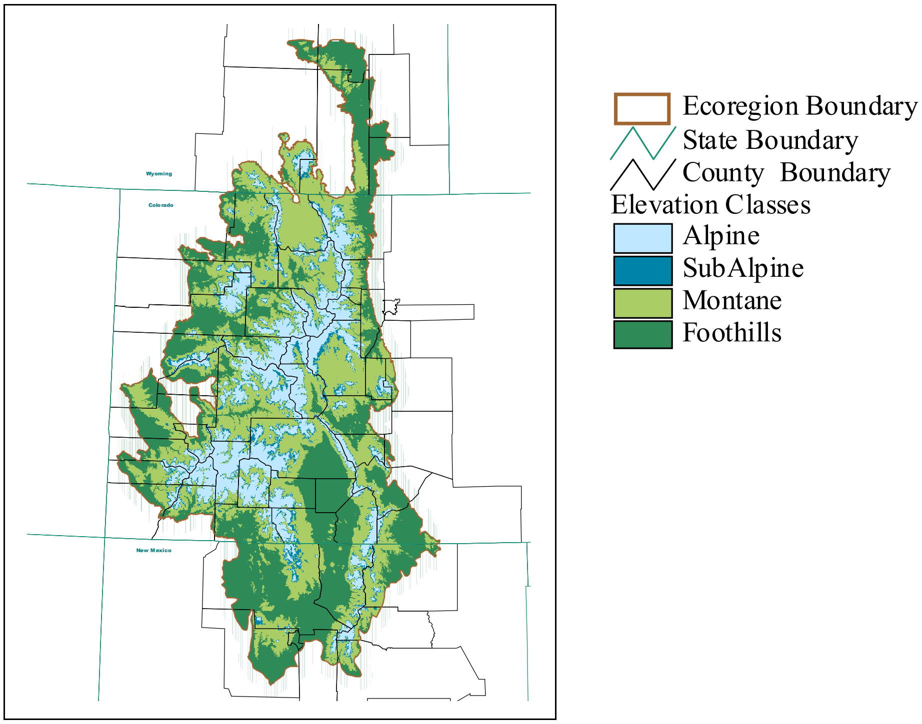

Figure 4. Elevation Classes

The unique combinations of landform, surficial geology, and elevation classes produced ELUs, mapped across the ecoregion. This data set was smoothed using a focal majority filter (168 m radius focal window), and when polygons classified as water were eliminated, this yielded 830 ELUs for the ecoregion. Figure 5 is a map of ELU distribution in the Southern Rocky Mountains. No legend is provided as the number of unique ELU's is very high. This map is merely illustrative of the ELU variability in the ecoregion.

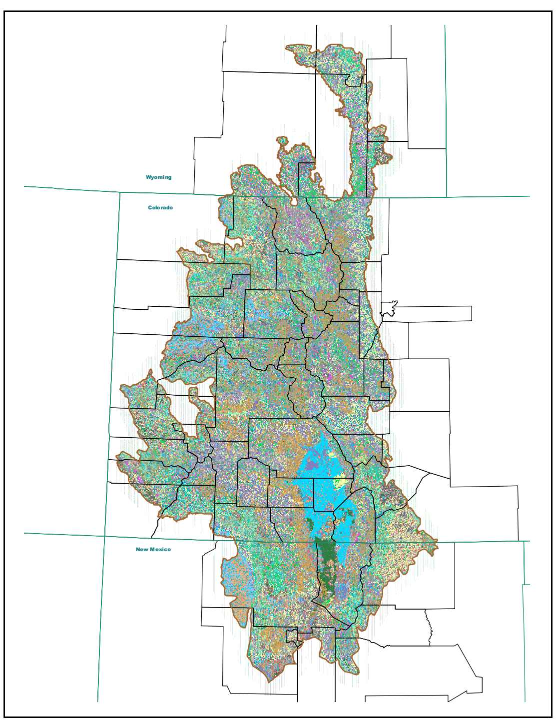

Figure 5. ELU Distribution

The vegetation map was then overlaid on the ELUs across the entire ecoregion. Since several ecological systems naturally occur as small patches, they could not be accurately depicted on the vegetation map, so these systems were represented as Heritage/expert-derived points, and thus, excluded from further GIS-analysis. With additional smoothing that eliminated minor combinations (<1 % of total the system's vegetative extent), a total of 410 vegetation/ELU combinations remained as our tool to represent variability within our dominant terrestrial ecosystem targets, and capture the major physical gradients for the ecoregion. Table 1 is an example that includes a small portion of the vegetation/ELU combinations that were used to represent Southern Rocky Mountains biophysical gradients within the ecological system. A compilation of ELU/vegetation combinations in the Southern Rocky Mountains is provided in Appendix 26.

In order to represent the four major riparian ecological systems, riparian features were modeled using hydrography and elevation zones, as depicted in the ELUs. The models were validated using point locations from riparian vegetation classification efforts in Colorado and New Mexico.

This entire process resulted in a comprehensive distribution map for 30 large patch, matrix forming, and linear ecological systems to use as coarse-filter targets for automated portions of portfolio design.

Table 1. Sample output indicating areal statistics for a subset of the 25 ELUs characterizing Ponderosa Pine Woodlands in the Southern Rocky Mountains ecoregion (Appendix 26 contains a full listing).

Southern Rocky Mountains: Ponderosa Pine Woodland		
ELU Description (elevation zone, substrate type, landform type, flow/aspect)	**Total Area** ELU/Cover Type Combination (ha)	**% Total Area of Type Within SRM**
Foothills - Granitic/Silicic - Lower side slope dry	166,836	7.96%
Montane - Granitic/Silicic - Lower side slope dry	136,481	6.51%
Foothills - Sandstone - Lower side slope dry	133,996	6.39%
Foothills - Granitic/Silicic - NE facing upper side slope	71,227	3.40%
Montane - Sandstone - Lower side slope dry	69,219	3.30%
Montane - Granitic/Silicic - SW facing upper side slope	67,980	3.24%
Montane - Granitic/Silicic - NE facing upper side slope	67,495	3.22%
Foothills - Shale - Lower side slope dry	62,643	2.99%
Foothills - Granitic/Silicic - SW facing upper side slope	56,471	2.69%
Montane - Basaltic/Mafic - Lower side slope dry	54,352	2.59%

Freshwater Aquatic Macrohabitats

Aquatic ecological units

In the Southern Rocky Mountain ecoregion, a comprehensive map of aquatic ecological units was developed and applied at two levels of detail, in the same manner as vegetation/ELU combinations were used for terrestrial ecological systems.

Macrohabitats are the finest-scale biophysical classification unit used in the conservation assessment. We used the macrohabitats to capture fine-scale variability within the aquatic systems by setting goals for representing the macrohabitats in the SITES runs. Macrohabitats were not in themselves conservation targets. Examples of macrohabitats include specific types of lakes and stream/river segments that are delineated, mapped, and classified according to the local environmental factors that determine the types and distributions of aquatic assemblages. These units will be used in site-level conservation planning.

The variables describing stream macrohabitats in the SRM include elevation, gradient, size, geology of contributing area, and connection to alpine lakes, and were derived from spatial data layers including hydrography at 1:100,000, geology, and digital elevation using automated classification techniques in a GIS. We discuss each variable in detail below:

Hydrography: We defined four stream size classes based on link number, which is a count of the number of first order streams upstream of a point. The classes are: headwater (link 1 -30); creek (link 31-50); small river (link 51-450); large river (link >450). The distribution by size classes is described in Table 2.

Table 2. Hydrography Size Classes.

Size class	Percent of streams by length
Headwater	88.0
Creek	3.8
Small river	3.8
Large river	4.1

Geology: We calculated the dominant geology in the drainage of each stream reach to distinguish the potential for groundwater contribution. The geology of the Southern Rocky Mountains is highly variable. The percentage of each class is summarized in Table 3. Generally, the highest potential ground water inputs occur in coarse glacial, alluvial or colluvial deposits in areas of relief.

Table 3. Hydrologic interpretation of dominant geology of the Southern Rocky Mountains.

Hydro-geologic class	Lithology	Percent of total stream length
Highest groundwater potential	Alluvium, colluvium, glacial deposits	9.2

Moderate groundwater potential	Sedimentary – carbonate, sandstone, shale, siltstone/mudstone	33.0
Low groundwater potential	Mixed lithology – some coarse, sedimentary and granitic/basaltic	0.3
All surface flow	Granitic, basaltic	57.6

Topography: In the Southern Rockies we measured two topographic factors, elevation and gradient, the change in elevation of a stream reach over its length. Elevation influences aquatic habitats in several ways. First, elevation influences climate, specifically temperature and precipitation. Second, vegetation responds to climate zones and this response influences stream energy inputs and stream morphology. We classified elevation into three zones: foothills (3000-6000 ft.), montane (6000-9000 ft.) and alpine (>9000 ft.). The frequency of streams in each elevation zone is summarized in Table 4.

Gradient is a useful measure of channel morphology because it is correlated to sinuosity, pool-riffle pattern, confinement, substrate size, and water velocity. We calculated the gradient for each stream reach automatically from a digital elevation model (DEM) in the GIS. We classified macrohabitat gradients into four classes: low (<0.02), moderate (0.02 – 0.04), steep (0.04 – 0.10), and very steep (>0.10) (see Rosgen 1997). The distribution of the macrohabitats by gradient class is given in Table 5.

Table 4. Elevation

Elevation class	Percent of streams by length
Low	0
Foothills	31.4
Montane	55.7
Alpine	12.9

Table 5. Gradient

Gradient class	Percent of streams by length
Low	47
Moderate	20
Steep	23
Very steep	9.4

Macrohabitat types were defined for the SRM as unique combinations of the four classification variables described above. In the SRM 106 unique macrohabitat types occurred out of a possible 256 combinations (four size x four hydrologic x four elevation X four gradient). (As with ELUs, many of these types do not exist.) The most common macrohabitats types were headwaters, surface-flow dominated streams, at montane elevations and ranging from low to steep gradients. See Appendix 10 for a list of the macrohabitat types.

APPENDIX 12

PORTFOLIO DESIGN METHODS

Background

The SITES (V1.0) program was developed by the National Center for Ecological Analysis and Synthesis, University of California at Santa Barbara (Andelman et al. 1999). SITES allows inputs of target occurrences represented as points, polygons, or lines in a GIS environment and allows for conservation goals to be stated in a variety of ways, such as percent area, numbers of point occurrences, linear distances, etc. The program also allows for the integration of many available spatial data sets on land use pattern and conservation status, and enables a rapid evaluation of alternative portfolio configurations. The SITES program should allow the team to update the portfolio in the future as new data become available.

The SITES V1.0 program is a MS-DOS based application which has an Arcview 3.2 GIS graphic user interface (ESRI, Redlands, CA). It evaluates portfolio design by comparing millions of possible portfolio designs against chosen conservation values to determine the most efficient or "optimal" portfolio. The SRM team used the "simulated annealing" model so that several alternative portfolios could be compared to one another to yield an optimal solution.

Analysis Unit

The team selected 2,965 acre (1,200 ha) hexagons (derived from a uniform grid) as the unit of analysis for running SITES. All conservation targets, threats, and goals were analyzed from the perspective of hexagons. The team found that a 2,965 acre hexagon, roughly the size of a small landscape-scale area, was sufficient for efficiently representing local-scale targets in small functional sites while allowing for aggregation of ecological systems into extensive landscape-scale conservation areas. The effectiveness of a contiguous set of hexagon units for defining natural variability, especially among spatially heterogeneous data sets, is well documented (White et al. 1992). Use of hexagons resulted in ca. 17,000 analysis units for the entire ecoregion. Each hexagon was populated by overlaying GIS data layers with points or polygon information for targeted species, communities and ecological systems.

Parameters

The principle mechanism used by SITES is optimization described by the following objective function:

$$Total\ Cost = \sum_i Cost\ Site\,i \quad + \quad \sum_j Penalty\ Cost\,j \quad + \quad w_b \sum Boundary\ Length$$

SITES attempts to minimize *Cost*, as reflected in the combined scores from the suitability index, while meeting as many goals for conservation targets (thus minimizing *Penalty Cost* per *target*), and minimizing the total *Boundary Length* (i.e., overall perimeter) of the entire portfolio. The boundary length modifier controls the spatial layout of the portfolio, and can be varied depending on the relative importance of compactness of size.

Each conservation target was assigned a quantitative *goal* (number of occurrences, area, or linear distance, in the case of aquatic or riparian systems), expressed as a numerical value for the ecoregion as a whole and for each stratification unit (USFS section or ecological drainage unit). A *Penalty* value was set at 1,000 points per target. This value approximated the maximum values assigned to hexagons in the suitability index, which gave a strong incentive for the program to meet conservation goals. For each of the intermediate- and coarse-scale targets, a *minimum size* was established (e.g., at least 12,000 contiguous hectares of a given woodland ecosystem to approximate Minimum Dynamic Area for target viability/integrity). SITES was required to find contiguous hexagons that contain sufficient area (or length) of each system or species habitat to count toward a target's conservation goals. Finally, a *boundary length modifier* was used to force the model to limit fragmentation in the portfolio. The modifier is a factor multiplied by the total perimeter of the portfolio. The model attempts to minimize this overall perimeter measure, so a higher boundary length modifier results in a more "clumped" portfolio. Selection of the boundary length modifier was done through trial and error. A modifier that is too high will force the model to bring in hexagons that may lack conservation targets, simply to increase "clumping." After some experimentation, a boundary length modifier of 0.01 was selected.

The SITES program randomly selects a "seed" portfolio of a randomly chosen set of hexagons. It then selects another randomly selected set of hexagons, and compares the two to determine which one is better at meeting conservation goals for the least cost. The better portfolio is kept and the process is repeated one million times (the "simulated annealing") per run for a total of 10 runs. If one portfolio meets the goal for one less target than an alternative portfolio, it is assigned a cost value of 1,000 points higher than the alternative portfolio, thus incurring the penalty. The final value of a portfolio is the total cost of all included SITES analysis units plus any penalty factors incurred for missing targets or targets whose goals were not met. This process allows SITES to configure a portfolio that is most efficient in meeting conservation goals while incurring the lowest possible conservation cost as defined by the suitability index and boundary length modifier.

Suitability Index

SITES selects areas to meet goals for conservation targets while balancing objectives of efficiency—that is, the greatest number of target goals met for the lowest cost or least amount of suitable land. The "suitability index" integrates land use factors for a given geographic area, and represents the likely "cost" associated with conserving an area. The index can also be considered to be an indirect measure of target viability. The suitability index is a mechanism for integrating economic, socio-political, and biological factors in the design process. It was used to help select among analysis units (hexagons) that contain conservation targets. The index was based upon 15 factors, including minimum land area, current road density (four-wheel drive, interstate, highway, other), number of dams, number of mines, land use/land cover, projected future urban development, pollution (Superfund) sites, water quality indicators, fire fuel conditions, estimates of recreation impact, and land conservation status (see Table 13). The team developed the index for the ecoregion using available spatial data sets, and this value was applied as a "cost" factor to each 1,200-hectare hexagon. The suitability index for each hexagon had two components: a suitability value for the hexagon itself and a suitability value for the area upstream of the hexagon (contributing area). Upstream suitability was calculated to take into account environmental conditions in the watershed draining into the hexagon. The local and upstream suitability values were weighted equally in the final suitability index.

Each factor was given a different weight in the index depending on its likely impact on conservation targets. The weighting of factors was identical in the local and upstream suitability values, the only difference being that the upstream factors were calculated using the entire area that drains into the hexagon, rather than just the hexagon itself. All analysis units were assigned a uniform value of 240 points to ensure that some base "cost" of land was taken into account in portfolio design. The index, as applied to each SITES analysis unit, fell between 240 and 1902.

Table 1. Parameters used in the suitability index with data sources, cost (in classes), and comments.

Class	Data Source	Cost (points)	Comments
Dams		40 X # of dams	
Fire Fuel Conditions	USFS national assessment of fuel/fire regime departure from natural range of variation	10 = presence of condition class 2 20 = presence of condition class 3	Areas with higher ranks have missed multiple return intervals
Land Use/Land Cover	National Land Cover Data (NLCD), and housing density c. 1990 (Theobald, personal communication)*	0 = natural/semi-natural vegetation & land cover 5 = Agriculture 10 = Ex-urban 50 = Suburban 100 = Urban	Cost value scaled proportional to area of hexagon??
Mines		40 X # of mines	Includes both active and abandoned mines
Minimum Land Area	SITES hexagon grid	240	Applied to all hexagons
Projected Urban Growth	(Theobald 1990 and 2050 census block-group housing density)	50 = presence	Area not urbanized in 1990, but projected urban for 2050
Protected Land Status	SRM Protected Areas Assessment	10 = presence of GAP rank 3 20 = presence of GAP rank 3 and/or 4	
Recent Disturbance	National Land Cover Data, Gap land cover	10 = presence	NLCD transitional category and SRM ecological system recent clear-cut category (since 1990)
Recreational Impact	ESRI 1990 census blocks DLG trails	20 = presence of trails within 10 km of urban block.	Hexagon with 1 or more trails within 10 km of urban block gets 20 points
FWD Road Density	1998 TIGER files	0=0km 10 =>0 –2.5km 30 = 2.5 – 5 62 = 5 – 10 125 = 10-20	

Class	Data Source	Cost (points)	Comments
		250 = >20 km	
Interstate Road Density	1998 TIGER files	0=0km 60 =>0 –2.5km 180 = 2.5 – 5 375 = 5 – 10 750 = 10-20 1,500 = >20km	
Highway Road Density	1998 TIGER files	0=0km 40 =>0 –2.5km 120 = 2.5 – 5 250 = 5 – 10 500 = 10-20 1,000 = >20 km	
Other Road Density	1998 TIGER files	0=0km 20 =>0 –2.5km 60 = 2.5 – 5 125 = 5 – 10 250 = 10-20 500 = >20 km	
Superfund Sites	CERCLA, EPA-National Priority List	40 = CERCLA values of P or F	
Water Quality Indicators	EPA 303d streams, EPA RF3 river reach files	0 = ratio of 303d to total stream length <10% 10 = ratio 10-50% = ratio >50%	

Land Use/Land Cover categories:

Natural= NLCD Natural = 0 (NLCD classes emergent herbaceous wetland, woody wetland, grassland herbaceous, mixed forest, evergreen forest, deciduous forest, open water, ice & snow, bare rock/sand/clay)

Agriculture = 5 (NLCD classes orchard/vineyard, pasture/hay, row crops, small grains, fallow)

Exurban = 10 (NLCD classes low res, high res, commercial/industrial/transportation, urban recreational grasses combined with Theobald housing density field "c1990". Exurban is represented by grid cells with one of these NLCD classes AND c1990 = 5)

Suburban = 50 (NLCD classes low res, high res, commercial/industrial/transportation, urban recreational grasses combined with Theobald housing density field "c1990". Exurban is represented by grid cells with one of these NLCD classes AND c1990 = 4).

Urban = 100 *(NLCD classes low res, high res, commercial/industrial/transportation, urban recreational grasses combined with Theobald housing density field "c1990". Exurban is represented by grid cells with one of these NLCD classes AND c1990 = 1, 2 or 3)*

Target Occurrence Information

Each hexagon was populated by overlaying GIS layers with occurrences of local- to intermediate-scale species and communities, linear riparian and aquatic riverine systems, and intermediate- to coarse-scale ecological systems and species habitats. The team included only occurrences from 1985 to present to ensure that the portfolio would be based on reliable and up-to-date target information. There was a wealth of occurrences for local-scale species and rare-community targets, many with up-to-date information on occurrence viability/integrity (see Viability/Integrity section). The team took advantage of this fact by representing differential values for each *point* occurrence, based on its viability score. For example, A-ranked occurrences received 100% of their initial value of 1 (number occurrences X 1). B-ranked occurrences received 75% (number of occurrences X 0.75) and C-ranked occurrences received 50% (number of occurrences X 0.5). This provided a mechanism for SITES to favor selection of higher-quality occurrences over those that were considered of lower quality. The size of the ecoregion and number of targets made for a very complex SITES model, particularly when compared with smaller and less data-rich ecoregions.

Terrestrial ecological systems were represented with a modeled vegetation distribution map (Map 5) that combined best-available spatial data (see biophysical modeling section). Biophysical gradients within each of these were represented by combining the modeled systems map with those Ecological Land Units (ELUs) that made up at least 1% of the system's total area. Integrating the ELUs into the site selection program allowed the team to represent the variability of each terrestrial ecological system. For example, the input included both the area of each ecological system (e.g., pinyon-juniper woodland) and the system combined with its component ELUs (e.g., pinyon-juniper woodland in foothill elevations, SW facing steep slopes, on old alluvium) as inputs to SITES. A minimum size criterion was set for the ecological system (Minimum Dynamic Area). Individual system/ELU combinations were included in the model with no minimum size criteria, but with an areal requirement defined (10% of extent). This process results in multiple areas >12,000 ha of pinyon-juniper woodland that also include the representative variability of that system throughout the ecoregion.

A parallel process was followed for all aquatic ecological systems and their component aquatic macrohabitat units. Aquatic macrohabitats with more than 1% of the total length of each ecological system were used in the analysis. A minimum length was established for aquatic system units, and a 10% of total length goal was applied to aquatic ecological system/macrohabitat combinations.

Refining the Initial Portfolio

The team ran the SITES program with several different boundary length modifiers (.01 and 0.1) to learn more about the overall portfolio and the component settings of SITES. The primary run started with those units and Category 1 and 2 protected areas (GAP Analysis Program) as an initial "seed." The team set the program to work through 10 runs of one million iterations each and selected the most efficient results. The output of SITES was then used in a series of interactive workshops with team members and others from The Nature Conservancy, Natural Heritage Programs, University of Colorado, and Colorado State University, who evaluated, discussed, and modified the conservation areas. In these workshops, the team assessed additional data sets including Natural Heritage Program "potential conservation area" boundaries, expert-derived sites, and potential habitat overlays for wide-ranging species (to evaluate overall representation and identify important linkages). Working interactively with information projected on-screen, the team traded SITES analysis units in and out of the proposed portfolio, then identified specific sets of hexagons as individual portfolio areas. The team made rough adjustments to site boundaries, as fine adjustments will be done during site conservation planning.

The result of the workshops was used in one final run of SITES. By "locking in" all areas selected in the workshops, SITES was set to re-evaluate and summarize which, if any, conservation goals remained to be met with existing data (see Portfolio Assembly Results). One final review was made to evaluate the final SITES output and finalize the portfolio.

APPENDIX 13: CONSERVATION AREA SUMMARIES

TAXON GROUP	SCIENTIFIC NAME	COMMON NAME	GRANK
AGUA CALIENTE, NM- Area # 1 TOTAL CONSERVATION TARGETS: 9 ACRES: 17,792 % OF AREA ALREADY PROTECTED: 7% OWNERSHIP- 57.6% FEDERAL; 40.7% PRIVATE; 1.7% STATE			
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS LARGE RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	MONTANE MODERATE AND LOW GRADIENTS LARGE RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	
BIRDS	EMPIDONAX TRAILLII EXTIMUS	SOUTHWESTERN WILLOW FLYCATCHER	G5
BIRDS	FALCO PEREGRINUS ANATUM	AMERICAN PEREGRINE FALCON	G3
FISH	CATOSTOMUS PLEBEIUS	RIO GRANDE SUCKER	G3
FISH	GILA PANDORA	RIO GRANDE CHUB	G3
PLANT COMMUNITIES	POPULUS ANGUSTIFOLIA/JUNIPERUS SCOPULORUM	NARROWLEAF COTTONWOOD/ROCKY MOUNTAIN JUNIPER WOODLAND	G2
PLANTS	ASTRAGALUS RIPLEYI	RIPLEY MILKVETCH	G3
TERRESTRIAL SYSTEM	JUNIPER SAVANNA	JUNIPER SAVANNA	
TERRESTRIAL SYSTEM	SAGEBRUSH STEPPE	SAGEBRUSH STEPPE	
ANIMAS RIVER, CO- Area # 2 TOTAL CONSERVATION TARGETS: 22 ACRES: 201,636 % OF AREA ALREADY PROTECTED: 7.4% OWNERSHIP - 89.5% FEDERAL; 40.7% PRIVATE; 1.7% STATE			
AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 4	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 4	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 4	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 4	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER GRANITE / VOLCANIC - EDU 4	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER GRANITE / VOLCANIC - EDU 4	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 4	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 4	
BIRDS	FALCO PEREGRINUS ANATUM	AMERICAN PEREGRINE FALCON	G3
BIRDS	HALIAEETUS LEUCOCEPHALUS	BALD EAGLE	G4
FISH	ONCORHYNCHUS CLARKI PLEURITICUS	COLORADO RIVER CUTTHROAT TROUT	G3
INVERTEBRATES	SPEYERIA NOKOMIS NOKOMIS	GREAT BASIN FRITILLARY	G2
PLANT COMMUNITIES	ABIES CONCOLOR-PICEA PUNGENS-POPULUS ANGU	WHITE FIR-BLUE SPRUCE-NARROWLEAF COTTONWOOD/ROCKY MOUNTAIN MAPLE	G2
PLANTS	BOTRYCHIUM ECHO	REFLECTED MOONWORT	G2
PLANTS	BOTRYCHIUM HESPERIUM	WESTERN MOONWORT	G3
PLANTS	BOTRYCHIUM PINNATUM	NORTHERN MOONWORT	G4
PLANTS	ERIOPHORUM ALTAICUM VAR NEOGAEUM	ALTAI COTTONGRASS	G3
REPTILES	CHRYSEMYS PICTA	PAINTED TURTLE	G5
REPTILES	EUMECES MULTIVIRGATUS EPIPLEUROTUS	VARIABLE SKINK	G5
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	ALPINE SUBSTRATE - ICE FIELD	ALPINE SUBSTRATE - ICE FIELD	
TERRESTRIAL SYSTEM	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	
TERRESTRIAL SYSTEM	ASPEN FOREST	ASPEN FOREST	
TERRESTRIAL SYSTEM	GAMBEL'S OAK SHRUBLAND	GAMBEL'S OAK SHRUBLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	
ARCHULETA CREEK, CO- Area # 3 TOTAL CONSERVATION TARGETS: 4 ACRES: 14,826 % OF AREA ALREADY PROTECTED: 0% OWNERSHIP- 37.4% FEDERAL; 62.6% PRIVATE; 0.0% STATE			
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 4	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 4	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 4	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 4	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
BALDY CHATO, CO- Area # 4 TOTAL CONSERVATION TARGETS: 4 ACRES: 2,965 % OF AREA ALREADY PROTECTED:83.8% OWERSHIP- 100% FEDERAL; 0.0% PRIVATE; 0.0% STATE			
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
INVERTEBRATES	BOLORIA IMPROBA ACROCNEMA	UNCOMPAHGRE FRITILLARY	G2
INVERTEBRATES	OENEIS BORE EDWARDSII	WHITE-VEINED ARCTIC	G5
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	

* Targets in bold provided by reviewers and not yet added in SRM database

APPENDIX 13: CONSERVATION AREA SUMMARIES

TAXON GROUP	SCIENTIFIC NAME	COMMON NAME	GRANK
BALDY CINCO, CO-Area #5 TOTAL CONSERVATION TARGETS: 3 ACRES: 2,965 % OF AREA ALREADY PROTECTED:100% OWNERSHIP- 100% FEDERAL; 0.0% PRIVATE; 0.0% STATE			
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
INVERTEBRATES	BOLORIA IMPROBA ACROCNEMA	UNCOMPAHGRE FRITILLARY	G2
TERRESTRIAL SYSTEM	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	
BEATON CREEK EAST, CO- Area # 6 TOTAL CONSERVATION TARGETS: 3 ACRES: 2,965 % OF AREA ALREADY PROTECTED: 0% OWNERSHIP- 83.3% FEDERAL; 16.7% PRIVATE; 0.0% STATE			
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 3	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 3	
PLANTS	ASTRAGALUS WETHERILLII	WETHERILL MILKVETCH	G3
TERRESTRIAL SYSTEM	WINTERFAT SHRUB STEPPE	WINTERFAT SHRUB STEPPE	
BEAVER CREEK-LONE CONE, CO- Area #7 TOTAL CONSERVATION TARGETS: 7 ACRES: 14,826 % OF AREA ALREADY PROTECTED: 0% OWNERSHIP- 79% FEDERAL; 21.0% PRIVATE 0.0% STATE			
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	
AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE/FOOTHILLS, FOOTHILLS STEEP & VERY STEEP RADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	
PLANTS	STELLARIA IRRIGUA	ALTAI CHICKWEED	G4
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	ALPINE SUBSTRATE - ICE FIELD	ALPINE SUBSTRATE - ICE FIELD	
TERRESTRIAL SYSTEM	GAMBEL'S OAK SHRUBLAND	GAMBEL'S OAK SHRUBLAND	
TERRESTRIAL SYSTEM	MONTANE - FOOTHILL CLIFF & CANYON	MONTANE - FOOTHILL CLIFF & CANYON	
BENNETT CREEK SOUTH, CO- Area #8 TOTAL CONSERVATION TARGETS: 6 ACRES: 5,931 % OF AREA ALREADY PROTECTED:0% OWNERSHIP- 97.5% FEDERAL; 2.5% PRIVATE; 0.0% STATE			
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	
PLANT COMMUNITIES	DANTHONIA PARRYI	PARRY'S OATGRASS	G2
FISH	ONCORHYNCHUS CLARKI VIRGINALIS	RIO GRANDE CUTTHROAT TROUT	G3
PLANTS	MACHAERANTHERA COLORADOENSIS	COLORADO TANSY-ASTER	G2
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	MONTANE GRASSLAND	MONTANE GRASSLAND	
BERTHOUD PASS, CO- Area #9 TOTAL CONSERVATION TARGETS: 18 ACRES: 83,027 % OF AREA ALREADY PROTECTED: 8.7% OWNERSHIP- 89.7% FEDERAL; 9.6% PRIVATE; 0.8% STATE			
AMPHIBIANS	BUFO BOREAS POP 1	BOREAL TOAD (SOUTHERN ROCKY MOUNTAIN POPULATION)	G1
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER GRANITE / VOLCANIC LAKE - EDU 1	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER GRANITE / VOLCANIC LAKE - EDU 1	
FISH	ONCORHYNCHUS CLARKI PLEURITICUS	COLORADO RIVER CUTTHROAT TROUT	G3
INVERTEBRATES	GLOSSOSOMA ALASCENSE	A CADDISFLY	G3
INVERTEBRATES	PHANETA INSIGNATA	TORTRICID MOTH	G3
INVERTEBRATES	PHANETA UNDESCRIBED SPECIES	PHANETA UNDESCRIBED SPECIES	G3
INVERTEBRATES	PROSERPINUS FLAVOFASCIATA	YELLOW-BANDED DAY SPHINX	G4
PLANT COMMUNITIES	PINUS ARISTATA/TRIFOLIUM DASYPHYLLUM	BRISTLE-CONE PINE/UINTAH CLOVER	G2
PLANTS	AQUILEGIA SAXIMONTANA	ROCKY MOUNTAIN COLUMBINE	G3
PLANTS	DRABA GRAYANA	GRAY'S PEAK WHITLOW-GRASS	G3
PLANTS	DRABA STREPTOBRACHIA	COLORADO DIVIDE WHITLOW-GRASS	G3
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	ALPINE SUBSTRATE - ICE FIELD	ALPINE SUBSTRATE - ICE FIELD	
TERRESTRIAL SYSTEM	LODGEPOLE PINE FOREST	LODGEPOLE PINE FOREST	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	
BIG DOMINGUEZ RIVER, CO- Area #10 TOTAL CONSERVATION TARGETS: 8 ACRES: 47,287 % OF AREA ALREADY PROTECTED: 0% OWNERSHIP- 99.4% FEDERAL; 0.6% PRIVATE; 0.0% STATE			
AQUATIC SYSTEM	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
BIRDS	FALCO PEREGRINUS ANATUM	AMERICAN PEREGRINE FALCON	G3

* Targets in bold provided by reviewers and not yet added in SRM database

TAXON GROUP	SCIENTIFIC NAME	COMMON NAME	GRANK
PLANTS	ASTRAGALUS LINIFOLIUS	GRAND JUNCTION MILKVETCH	G3
PLANTS	DRABA RECTIFRUCTA	MOUNTAIN WHITLOW-GRASS	G3
TERRESTRIAL SYSTEM	JUNIPER SAVANNA	JUNIPER SAVANNA	
TERRESTRIAL SYSTEM	PINYON - JUNIPER WOODLAND	PINYON - JUNIPER WOODLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
TERRESTRIAL SYSTEM	WINTERFAT SHRUB STEPPE	WINTERFAT SHRUB STEPPE	
BILLY CREEK UPLANDS, CO- Area #11 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 2 OWNERSHIP- 59.5% FEDERAL; 14.8% PRIVATE; 25.7% STATE		ACRES: 5930
PLANTS	ASTRAGALUS WETHERILLII	WETHERILL MILKVETCH	G3
PLANTS	CIRSIUM PERPLEXANS	ROCKY MOUNTAIN THISTLE	G2
BLACK MOUNTAIN, CO- Area #12 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 5 OWNERSHIP- 14.1% FEDERAL; 37.7% STATE; 48.2%		ACRES: 11,861
AQUATIC SYSTEM	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 2	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 2	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 2	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 2	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 2	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 2	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
TERRESTRIAL SYSTEM	SOUTH PARK MONTANE GRASSLANDS	SOUTH PARK MONTANE GRASSLANDS	
BOX ELDER CREEK, WY- Area # 13 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 7 OWNERSHIP- 8.1% FEDERAL; 77.5% PRIVATE; 14.4 % STATE		ACRES: 162,998
AMPHIBIANS	RANA PIPIENS	NORTHERN LEOPARD FROG	G5
AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	
BIRDS	HALIAEETUS LEUCOCEPHALUS	BALD EAGLE	G4
TERRESTRIAL SYSTEM	INTERMONTANE - FOOTHILL GRASSLAND	INTERMONTANE - FOOTHILL GRASSLAND	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	MONTANE - FOOTHILL CLIFF & CANYON	MONTANE - FOOTHILL CLIFF & CANYON	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
BRUSH CREEK AT CANNIBAL POINT, CO- Area #14 % OF AREA ALREADY PROTECTED: 1.1%	TOTAL CONSERVATION TARGETS: 5 OWNERSHIP- 98.2% FEDERAL; 1.8% PRIVATE; 0.0% STATE		ACRES: 8,895
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
PLANTS	SALIX CANDIDA	HOARY OR SILVER WILLOW	G5
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
BURNING MOUNTAIN, CO- Area #15 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 2 OWNERSHIP- 61.3% FEDERAL; 38.7% PRIVATE; 0.0% STATE		ACRES: 2,965
AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS LARGE RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 3	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS LARGE RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 3	
PLANTS	ASTRAGALUS WETHERILLII	WETHERILL MILKVETCH	G3
BUTLER CREEK, CO- Area # 16 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 3 OWNERSHIP- 87.5% FEDERAL; 6.5% PRIVATE; 5.9% STATE		ACRES: 6,221
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 3	
FISH	ONCORHYNCHUS CLARKI PLEURITICUS	COLORADO RIVER CUTTHROAT TROUT	G3
PLANTS	ASTRAGALUS WETHERILLII	WETHERILL MILKVETCH	G3
BUTTERFLY HAVEN, CO- Area #17 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 5 OWNERSHIP- 52.3% FEDERAL; 47.7% PRIVATE; 0.0% STATE		ACRES: 2,965
INVERTEBRATES	CALLOPHRYS MOSSII SCHRYVERI	MOSS' ELFIN	G3
INVERTEBRATES	CELASTRINA HUMULUS	HOPS AZURE	G2
INVERTEBRATES	EUPHYES BIMACULA	TWO-SPOTTED SKIPPER	G4
INVERTEBRATES	POLITES ORIGENES RHENA	RHENA SKIPPER	G3
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
CANYON LARGO, NM- Area # 18 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 0 OWNERSHIP- 0% FEDERAL; 100% PRIVATE; 0% STATE		ACRES: 1,477
CARNERO CREEK, CO- Area #19 % OF AREA ALREADY PROTECTED: 5.7%	TOTAL CONSERVATION TARGETS: 32 OWNERSHIP- 70.1% FEDERAL; 26.6% PRIVATE; 3.3% STATE		ACRES: 212,557
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW	ALPINE/MONTANE MODERATE AND LOW GRADIENTS	

* Targets in bold provided by reviewers and not yet added in SRM database

TAXON GROUP	SCIENTIFIC NAME	COMMON NAME	GRANK
	GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	
BIRDS	FALCO PEREGRINUS ANATUM	AMERICAN PEREGRINE FALCON	G3
FISH	CATOSTOMUS PLEBEIUS	RIO GRANDE SUCKER	G3
FISH	GILA PANDORA	RIO GRANDE CHUB	G3
FISH	ONCORHYNCHUS CLARKI VIRGINALIS	RIO GRANDE CUTTHROAT TROUT	G3
INVERTEBRATES	CLISTORONIA MACULATA	A CADDISFLY	G3
MAMMALS	CYNOMYS GUNNISONI	GUNNISON'S PRAIRIE DOG	G5
MAMMALS	MARTES AMERICANA	PINE MARTEN	G5
MAMMALS	PEROGNATHUS FLAVUS SANLUISI	SILKY POCKET MOUSE SUBSP.	G3
PLANT COMMUNITIES	FESTUCA ARIZONICA-MUHLENBERGIA MONTANA	ARIZONA FESCUE/MOUNTAIN MUHLY	G3
PLANT COMMUNITIES	PINUS EDULIS/STIPA COMATA	XERIC WESTERN SLOPE PINYON-JUNIPER WOODLANDS	G2
PLANT COMMUNITIES	PINUS EDULIS/STIPA SCRIBNERI	TWO-NEEDLE PINYON/SCRIBNER'S NEEDLE GRASS	G3
PLANT COMMUNITIES	POPULUS ANGUSTIFOLIA/JUNIPERUS SCOPULORUM	NARROWLEAF COTTONWOOD/ROCKY MOUNTAIN JUNIPER WOODLAND	G2
PLANT COMMUNITIES	STIPA NEOMEXICANA	NEW MEXICO NEEDLE GRASS	G2
PLANTS	CLEOME MULTICAULIS	SLENDER SPIDERFLOWER	G2
PLANTS	ERIOGONUM LACHNOGYNUM	LONGROOT WILD BUCKWHEAT	G4
PLANTS	**NEOPARRYA LITHOPHILIA = ALETES LITHOPHILUS**	**ROCK-LOVING ALTETES**	**G3**
TERRESTRIAL SYSTEM	ALPINE SUBSTRATE - ICE FIELD	ALPINE SUBSTRATE - ICE FIELD	
TERRESTRIAL SYSTEM	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	
TERRESTRIAL SYSTEM	DOUGLAS FIR - PONDEROSA PINE FOREST	DOUGLAS FIR - PONDEROSA PINE FOREST	
TERRESTRIAL SYSTEM	FRESHWATER MARSH & WET MEADOW	FRESHWATER MARSH & WET MEADOW	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	MONTANE - FOOTHILL CLIFF & CANYON	MONTANE - FOOTHILL CLIFF & CANYON	
TERRESTRIAL SYSTEM	MONTANE GRASSLAND	MONTANE GRASSLAND	
TERRESTRIAL SYSTEM	MONTANE RIPARIAN SHRUBLAND	MONTANE RIPARIAN SHRUBLAND	
TERRESTRIAL SYSTEM	MOUNTAIN SAGEBRUSH SHRUBLAND	MOUNTAIN SAGEBRUSH SHRUBLAND	
TERRESTRIAL SYSTEM	PINYON - JUNIPER WOODLAND	PINYON - JUNIPER WOODLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
TERRESTRIAL SYSTEM	SAN LUIS VALLEY WINTERFAT SHRUB STEPPE	SAN LUIS VALLEY WINTERFAT SHRUB STEPPE	
TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	
CASTLE PEAK, CO- Area #20 % OF AREA ALREADY PROTECTED: 2.1%	TOTAL CONSERVATION TARGETS: 26 OWNERSHIP- 58.3% FEDERAL; 37.7% PRIVATE; 4.0% STATE		ACRES: 252,046
AQUATIC SYSTEM	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC LAKE - EDU 3	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC LAKE - EDU 3	
AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
AQUATIC SYSTEM	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 3	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 3	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 3	
AQUATIC SYSTEM	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	
AQUATIC SYSTEM	MONTANE STEEP & VERY STEEP GRADIENTS O LARGE RIVER SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE STEEP & VERY STEEP GRADIENTS O LARGE RIVER SHALES / SANDSTONES / LIMESTONES - EDU 3	
BIRDS	BUCEPHALA ISLANDICA	BARROW'S GOLDENEYE	G5
BIRDS	**CENTROCERCUS MINIMUS**	**GUNNISON SAGE GROUSE**	**G1**
FISH	ONCORHYNCHUS CLARKI PLEURITICUS	COLORADO RIVER CUTTHROAT TROUT	G3
MAMMALS	CORYNORHINUS TOWNSENDII PALLESCENS	PALE LUMP-NOSED BAT	G4
MAMMALS	MARTES AMERICANA	PINE MARTEN	G5
PLANT COMMUNITIES	ARTEMISIA TRIDENTATA SSP. TRIDENTATA/LEYM	BIG SAGEBRUSH/GREAT BASIN LYME GRASS	G2
PLANT COMMUNITIES	JUNIPERUS SCOPULORUM/CERCOCARPUS MONTANUS	FOOTHILLS PINYON-JUNIPER WOODLANDS/SCARP WOODLANDS	G2

* Targets in bold provided by reviewers and not yet added in SRM database

TAXON GROUP	SCIENTIFIC NAME	COMMON NAME	GRANK
PLANT COMMUNITIES	POPULUS ANGUSTIFOLIA/JUNIPERUS SCOPULORUM	NARROWLEAF COTTONWOOD/ROCKY MOUNTAIN JUNIPER WOODLAND	G2
PLANT COMMUNITIES	POPULUS ANGUSTIFOLIA/SALIX LIGULIFOLIA - SHEPHERDIA ARGENTEA WOODLAND	NARROWLEAF COTTONWOOD/STRAP-LEAF WILLOW-SILVER BUFFALOBERRY	G1
PLANTS	PENSTEMON HARRINGTONII	HARRINGTON BEARDTONGUE	G3
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	ASPEN FOREST	ASPEN FOREST	
TERRESTRIAL SYSTEM	GAMBEL'S OAK SHRUBLAND	GAMBEL'S OAK SHRUBLAND	
TERRESTRIAL SYSTEM	INTERMONTANE - FOOTHILL GRASSLAND	INTERMONTANE - FOOTHILL GRASSLAND	
TERRESTRIAL SYSTEM	LODGEPOLE PINE FOREST	LODGEPOLE PINE FOREST	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	MONTANE GRASSLAND	MONTANE GRASSLAND	
TERRESTRIAL SYSTEM	MOUNTAIN SAGEBRUSH SHRUBLAND	MOUNTAIN SAGEBRUSH SHRUBLAND	
TERRESTRIAL SYSTEM	PINYON - JUNIPER WOODLAND	PINYON - JUNIPER WOODLAND	
CATTLE CREEK, CO- Area #21 TOTAL CONSERVATION TARGETS: 2 ACRES: 2,965 % OF AREA ALREADY PROTECTED: 21.1% OWNERSHIP- 79.0% FEDERAL; 19.2% PRIVATE; 1.8% STATE			
AQUATIC SYSTEM	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	
FISH	ONCORHYNCHUS CLARKI PLEURITICUS	COLORADO RIVER CUTTHROAT TROUT	G3
CHACON CANYON, NM- Area # 22 TOTAL CONSERVATION TARGETS: 3 ACRES: 21,701 % OF AREA ALREADY PROTECTED: 0% OWNERSHIP- 87.4% FEDERAL; 12.6% PRIVATE; 0% STATE			
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 4	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 4	
TERRESTRIAL SYSTEM	INTERMONTANE - FOOTHILL GRASSLAND	INTERMONTANE - FOOTHILL GRASSLAND	
TERRESTRIAL SYSTEM	JUNIPER SAVANNA	JUNIPER SAVANNA	
CHEESMAN, CO- Area #23 TOTAL CONSERVATION TARGETS: 24 ACRES: 319,954 % OF AREA ALREADY PROTECTED: 21.1% OWNERSHIP- 79.0% FEDERAL; 19.2% PRIVATE; 1.8% STATE			
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER GRANITE / VOLCANIC LAKE - EDU 1	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER GRANITE / VOLCANIC LAKE - EDU 1	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER GRANITE / VOLCANIC - EDU 1	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER GRANITE / VOLCANIC - EDU 1	
AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS LARGE RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 1	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS LARGE RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 1	
BIRDS	FALCO PEREGRINUS ANATUM	AMERICAN PEREGRINE FALCON	G3
BIRDS	PASSERINA AMOENA	LAZULI BUNTING	G5
BIRDS	STRIX OCCIDENTALIS LUCIDA	MEXICAN SPOTTED OWL	G3
BIRDS	VERMIVORA VIRGINIAE	VIRGINIA'S WARBLER	G5
INVERTEBRATES	CALLOPHRYS MOSSII SCHRYVERI	MOSS' ELFIN	G3
INVERTEBRATES	CELASTRINA HUMULUS	HOPS AZURE	G2
INVERTEBRATES	HESPERIA LEONARDUS MONTANA	PAWNEE MONTANE SKIPPER	G1
MAMMALS	**ZAPUS HUDSONIUS PREBLEI**	**MEADOW JUMPING MOUSE**	**G2**
PLANT COMMUNITIES	DANTHONIA PARRYI	PARRY'S OATGRASS	G2
PLANTS	ERIOPHORUM GRACILE	SLENDER COTTONGRASS	G5
PLANTS	MIMULUS GEMMIPARUS	WEBER MONKEY-FLOWER	G2
PLANTS	POTENTILLA RUPINCOLA	ROCKY MOUNTAIN CINQUEFOIL	G2
PLANTS	PTILAGROSTIS PORTERI	PORTER FEATHERGRASS	G2
PLANTS	TELESONIX JAMESII	JAMES' TELESONIX	G4
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	DOUGLAS FIR - PONDEROSA PINE FOREST	DOUGLAS FIR - PONDEROSA PINE FOREST	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	
CIMMARRON RIVER, CO- Area #24 TOTAL CONSERVATION TARGETS: 3 ACRES: 8,896 % OF AREA ALREADY PROTECTED: 0% OWNERSHIP- 3.7% FEDERAL; 58.2% PRIVATE; 38.2% STATE			
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
PLANTS	CIRSIUM PERPLEXANS	ROCKY MOUNTAIN THISTLE	G2

* Targets in bold provided by reviewers and not yet added in SRM database

APPENDIX 13: CONSERVATION AREA SUMMARIES

TAXON GROUP	SCIENTIFIC NAME	COMMON NAME	GRANK
TERRESTRIAL SYSTEM	GAMBEL'S OAK SHRUBLAND	GAMBEL'S OAK SHRUBLAND	
COLONA MOUNTAIN, CO- Area #25	TOTAL CONSERVATION TARGETS: 2	ACRES: 2,966	
% OF AREA ALREADY PROTECTED: 0%	OWNERSHIP- 7.9% FEDERAL; 92.1% PRIVATE; 0.0% STATE		
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 3	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 3	
PLANTS	ASTRAGALUS WETHERILLII	WETHERILL MILKVETCH	G3
CONEJOS RIVER, CO , NM- Area # 26	TOTAL CONSERVATION TARGETS: 15	ACRES: 65,236	
% OF AREA ALREADY PROTECTED: 25.2%	OWNERSHIP- 90.9% FEDERAL; 7.6% PRIVATE; 1.5% STATE		
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	
BIRDS	FALCO PEREGRINUS ANATUM	AMERICAN PEREGRINE FALCON	G3
BIRDS	**HALIAEETUS LEUCOCEPHALUS**	**BALD EAGLE**	**G4**
FISH	ONCORHYNCHUS CLARKI VIRGINALIS	RIO GRANDE CUTTHROAT TROUT	G3
INVERTEBRATES	SUWALLIA WARDI	A STONEFLY	G3
PLANTS	ASTRAGALUS RIPLEYI	RIPLEY MILKVETCH	G3
PLANTS	CYSTOPTERIS MONTANA	MOUNTAIN BLADDER FERN	G5
PLANTS	TRIFOLIUM BRANDEGEEI	BRANDEGEE CLOVER	G5
PLANTS	ASTRAGALUS RIPLEYI	RIPLEY MILKVETCH	G3
TERRESTRIAL SYSTEM	UPPER MONTANE RIPARIAN FOREST & WOODLAND	UPPER MONTANE RIPARIAN FOREST & WOODLAND	
TERRESTRIAL SYSTEM	INTERMONTANE - FOOTHILL GRASSLAND	INTERMONTANE - FOOTHILL GRASSLAND	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
CONUNDRUM, CO- Area #27	TOTAL CONSERVATION TARGETS: 10	ACRES: 50,409	
% OF AREA ALREADY PROTECTED: 75.3%	OWNERSHIP- 87.8% FEDERAL; 12.2% PRIVATE; 0.0% STATE		
AQUATIC SYSTEM	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
AQUATIC SYSTEM	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	
BIRDS	LEUCOSTICTE AUSTRALIS	BROWN-CAPPED ROSY FINCH	G4
PLANTS	DRABA SPECTABILIS VAR OXYLOBA	DRABA SPECTABILIS VAR OXYLOBA	G3
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	ALPINE SUBSTRATE - ICE FIELD	ALPINE SUBSTRATE - ICE FIELD	
TERRESTRIAL SYSTEM	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	
TERRESTRIAL SYSTEM	ASPEN FOREST	ASPEN FOREST	
TERRESTRIAL SYSTEM	GAMBEL'S OAK SHRUBLAND	GAMBEL'S OAK SHRUBLAND	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
CORRAL CREEK, WY- Area # 28	TOTAL CONSERVATION TARGETS: 8	ACRES: 25,487	
% OF AREA ALREADY PROTECTED: 26.5%	OWNERSHIP- 28.2% FEDERAL; 56.5% PRIVATE; 15.3% STATE		
AQUATIC SYSTEM	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	
BIRDS	HALIAEETUS LEUCOCEPHALUS	BALD EAGLE	G4
TERRESTRIAL SYSTEM	INTERMONTANE - FOOTHILL GRASSLAND	INTERMONTANE - FOOTHILL GRASSLAND	
TERRESTRIAL SYSTEM	JUNIPER SAVANNA	JUNIPER SAVANNA	
TERRESTRIAL SYSTEM	MONTANE RIPARIAN SHRUBLAND	MONTANE RIPARIAN SHRUBLAND	
TERRESTRIAL SYSTEM	MOUNTAIN SAGEBRUSH SHRUBLAND	MOUNTAIN SAGEBRUSH SHRUBLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
TERRESTRIAL SYSTEM	UPPER MONTANE RIPARIAN FOREST & WOODLAND	UPPER MONTANE RIPARIAN FOREST & WOODLAND	
COTTONWOOK CRKS SAN JUANS, CO- Area # 29	TOTAL CONSERVATION TARGETS: 12	ACRES: 115,645	
% OF AREA ALREADY PROTECTED:0.2%	OWNERSHIP- 82% FEDERAL; 15.7% PRIVATE; 17% STATE		
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 3	
AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE/FOOTHILLS, FOOTHILLS STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	

* Targets in bold provided by reviewers and not yet added in SRM database

APPENDIX 13: CONSERVATION AREA SUMMARIES

TAXON GROUP	SCIENTIFIC NAME	COMMON NAME	GRANK
FISH	ONCORHYNCHUS CLARKI PLEURITICUS	COLORADO RIVER CUTTHROAT TROUT	G3
PLANT COMMUNITIES	POPULUS ANGUSTIFOLIA/CRATAEGUS RIVULARIS	NARROWLEAF COTTONWOOD/RIVER HAWTHORN WOODLAND	G2
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	
TERRESTRIAL SYSTEM	ASPEN FOREST	ASPEN FOREST	
TERRESTRIAL SYSTEM	GAMBEL'S OAK SHRUBLAND	GAMBEL'S OAK SHRUBLAND	
TERRESTRIAL SYSTEM	MONTANE GRASSLAND	MONTANE GRASSLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	
COTTONWOOD PASS, CO- Area # 30 % OF AREA ALREADY PROTECTED: 28.9%	TOTAL CONSERVATION TARGETS: 44 OWNERSHIP- 89.5% FEDERAL; 9.2% PRIVATE; 1.3% STATE	ACRES: 474,441	
AMPHIBIANS	BUFO BOREAS POP 1	BOREAL TOAD (SOUTHERN ROCKY MOUNTAIN POPULATION)	G1
AQUATIC SYSTEM	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 2	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 2	
AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
AQUATIC SYSTEM	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 2	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 2	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER GRANITE / VOLCANIC - EDU 3	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER GRANITE / VOLCANIC - EDU 3	
BIRDS	FALCO PEREGRINUS ANATUM	AMERICAN PEREGRINE FALCON	G3
FISH	ONCORHYNCHUS CLARKI PLEURITICUS	COLORADO RIVER CUTTHROAT TROUT	G3
INVERTEBRATES	OCHROTRICHIA SUSANAE	A CADDISFLY	G3
INVERTEBRATES	OENEIS BORE EDWARDSII	WHITE-VEINED ARCTIC	G5
MAMMALS	MARTES AMERICANA	PINE MARTEN	G5
PLANT COMMUNITIES	PINUS ARISTATA/TRIFOLIUM DASYPHYLLUM	BRISTLE-CONE PINE/UINTAH CLOVER	G2
PLANT COMMUNITIES	POPULUS ANGUSTIFOLIA/BETULA OCCIDENTALIS	NARROWLEAF COTTONWOOD/WATER BIRCH	G1
PLANT COMMUNITIES	POPULUS ANGUSTIFOLIA/JUNIPERUS SCOPULORUM	NARROWLEAF COTTONWOOD/ROCKY MOUNTAIN JUNIPER WOODLAND	G2
PLANTS	ASTRAGALUS MOLYBDENUS	LEADVILLE MILKVETCH	G3
PLANTS	BRAYA GLABELLA VAR GLABELLA	ARCTIC BRAYA	G5
PLANTS	BRAYA HUMILIS	ALPINE BRAYA	G4
PLANTS	DRABA GLOBOSA	ROCKCRESS DRABA	G3
PLANTS	DRABA PORSILDII	PORSILD'S WHITLOW-GRASS	G3
PLANTS	DRABA RECTIFRUCTA	MOUNTAIN WHITLOW-GRASS	G3
PLANTS	DRABA SPECTABILIS VAR OXYLOBA	DRABA SPECTABILIS VAR OXYLOBA	G3
PLANTS	DRABA STREPTOBRACHIA	COLORADO DIVIDE WHITLOW-GRASS	G3
PLANTS	DRABA VENTOSA	WIND RIVER WHITLOW-GRASS	G3
PLANTS	ERIGERON LANATUS	WOOLLY FLEABANE	G3
PLANTS	ERIOPHORUM ALTAICUM VAR NEOGAEUM	ALTAI COTTONGRASS	G3
PLANTS	GILIA PENSTEMONOIDES	BLACK CANYON GILIA	G3
PLANTS	MACHAERANTHERA COLORADOENSIS	COLORADO TANSY-ASTER	G2
PLANTS	SALIX CANDIDA	HOARY OR SILVER WILLOW	G5
PLANTS	SISYRINCHIUM PALLIDUM	PALE BLUE-EYED GRASS	G2
PLANTS	STELLARIA IRRIGUA	ALTAI CHICKWEED	G4
PLANTS	SULLIVANTIA HAPEMANII VAR PURPUSII	HANGING GARDEN SULLIVANTIA	G3
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	ALPINE SUBSTRATE - ICE FIELD	ALPINE SUBSTRATE - ICE FIELD	
TERRESTRIAL SYSTEM	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	
TERRESTRIAL SYSTEM	ASPEN FOREST	ASPEN FOREST	
TERRESTRIAL SYSTEM	LODGEPOLE PINE FOREST	LODGEPOLE PINE FOREST	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	MONTANE - FOOTHILL CLIFF & CANYON	MONTANE - FOOTHILL CLIFF & CANYON	
TERRESTRIAL SYSTEM	MONTANE GRASSLAND	MONTANE GRASSLAND	
TERRESTRIAL SYSTEM	MOUNTAIN SAGEBRUSH SHRUBLAND	MOUNTAIN SAGEBRUSH SHRUBLAND	
TERRESTRIAL SYSTEM	PINYON - JUNIPER WOODLAND	PINYON - JUNIPER WOODLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	

* Targets in bold provided by reviewers and not yet added in SRM database

APPENDIX 13: CONSERVATION AREA SUMMARIES

TAXON GROUP	SCIENTIFIC NAME	COMMON NAME	GRANK
TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	
COYOTE CREEK, NM- Area # 31 TOTAL CONSERVATION TARGETS: 11 ACRES: 120,272 % OF AREA ALREADY PROTECTED: 0.3% OWNERSHIP- 13.1% FEDERAL; 74% PRIVATE; 12.9% STATE			
AQUATIC SYSTEM	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 2	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 2	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 2	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 2	
BIRDS	EMPIDONAX TRAILLII EXTIMUS	SOUTHWESTERN WILLOW FLYCATCHER	G5
BIRDS	HALIAEETUS LEUCOCEPHALUS	BALD EAGLE	G4
MAMMALS	CYNOMYS GUNNISONI	GUNNISON'S PRAIRIE DOG	G5
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	INTERMONTANE - FOOTHILL GRASSLAND	INTERMONTANE - FOOTHILL GRASSLAND	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	MONTANE MIXED CONIFER FOREST (DRY-MESIC & MOIST-MESIC)	MONTANE MIXED CONIFER FOREST (DRY-MESIC & MOIST-MESIC)	
TERRESTRIAL SYSTEM	PINYON - JUNIPER WOODLAND	PINYON - JUNIPER WOODLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
CRESTED BUTTE, CO- Area #32 TOTAL CONSERVATION TARGETS: 33 ACRES: 396,313 % OF AREA ALREADY PROTECTED: 29.5% OWNERSHIP- 84.9%; 14.6% PRIVATE; 0.4% STATE			
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 3	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 3	
AQUATIC SYSTEM	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS LARGE RIVER GRANITE / VOLCANIC - EDU 3	MONTANE MODERATE AND LOW GRADIENTS LARGE RIVER GRANITE / VOLCANIC - EDU 3	
BIRDS	**PROGNE SUBIS**	**PURPLE MARTIN**	**G5**
FISH	ONCORHYNCHUS CLARKI PLEURITICUS	COLORADO RIVER CUTTHROAT TROUT	G3
INVERTEBRATES	HYPTIOTES SP	TRIANGLE WEBSPIDER	G3
MAMMALS	MARTES AMERICANA	PINE MARTEN	G5
MAMMALS	SOREX HOYI MONTANUS	PYGMY SHREW	G2
PLANT COMMUNITIES	POPULUS TREMULOIDES/CEANOTHUS VELUTINUS	QUAKING ASPEN/TOBACCO-BRUSH	G2
PLANTS	CIRSIUM PERPLEXANS	ROCKY MOUNTAIN THISTLE	G2
PLANTS	DROSERA ROTUNDIFOLIA	ROUNDLEAF SUNDEW	G5
PLANTS	GILIA PENSTEMONOIDES	BLACK CANYON GILIA	G3
PLANTS	PENSTEMON MENSARUM	GRAND MESA PENSTEMON	G3
PLANTS	SPIRANTHES DILUVIALIS	UTE LADIES' TRESSES	G2
PLANTS	SULLIVANTIA HAPEMANII VAR PURPUSII	HANGING GARDEN SULLIVANTIA	G3
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	ALPINE SUBSTRATE - ICE FIELD	ALPINE SUBSTRATE - ICE FIELD	
TERRESTRIAL SYSTEM	ASPEN FOREST	ASPEN FOREST	
TERRESTRIAL SYSTEM	GAMBEL'S OAK SHRUBLAND	GAMBEL'S OAK SHRUBLAND	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	MOUNTAIN SAGEBRUSH SHRUBLAND	MOUNTAIN SAGEBRUSH SHRUBLAND	
TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	
CROSS AND FALL CREEKS, CO- Area #33 TOTAL CONSERVATION TARGETS: 13 ACRES: 50,409 % OF AREA ALREADY PROTECTED: 82.6% OWNERSHIP- 95.9% FEDERAL; 4.1% PRIVATE; 0.0% STATE			
AMPHIBIANS	BUFO BOREAS POP 1	BOREAL TOAD (SOUTHERN ROCKY MOUNTAIN POPULATION)	G1
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 3	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 3	
BIRDS	FALCO PEREGRINUS ANATUM	AMERICAN PEREGRINE FALCON	G3
FISH	ONCORHYNCHUS CLARKI PLEURITICUS	COLORADO RIVER CUTTHROAT TROUT	G3
PLANT COMMUNITIES	DANTHONIA INTERMEDIA	TIMBER OATGRASS	G2
PLANTS	ERIOPHORUM ALTAICUM VAR NEOGAEUM	ALTAI COTTONGRASS	G3
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	

* Targets in bold provided by reviewers and not yet added in SRM database

TAXON GROUP	SCIENTIFIC NAME	COMMON NAME	GRANK
	MEADOW		
TERRESTRIAL SYSTEM	ALPINE SUBSTRATE - ICE FIELD	ALPINE SUBSTRATE - ICE FIELD	
TERRESTRIAL SYSTEM	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	
CROWN, CO- Area #34 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 8 OWNERSHIP- 42.8%; 51.6% PRIVATE; 5.6% STATE		ACRES: 71,165
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
AQUATIC SYSTEM	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	
AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS LARGE RIVER SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS LARGE RIVER SHALES / SANDSTONES / LIMESTONES - EDU 3	
PLANT COMMUNITIES	PINUS EDULIS/STIPA COMATA	XERIC WESTERN SLOPE PINYON-JUNIPER WOODLANDS	G2
PLANTS	PENSTEMON HARRINGTONII	HARRINGTON BEARDTONGUE	G3
TERRESTRIAL SYSTEM	GAMBEL'S OAK SHRUBLAND	GAMBEL'S OAK SHRUBLAND	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	MOUNTAIN SAGEBRUSH SHRUBLAND	MOUNTAIN SAGEBRUSH SHRUBLAND	
CRYSTAL LAKE CREEK, CO- Area #35 % OF AREA ALREADY PROTECTED: 50.6%	TOTAL CONSERVATION TARGETS: 3 OWNERSHIP- 100% FEDERAL; 0.0% PRIVATE; 0.0% STATE		ACRES: 2,965
AQUATIC SYSTEM	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 2	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 2	
BIRDS	LEUCOSTICTE AUSTRALIS	BROWN-CAPPED ROSY FINCH	G4
TERRESTRIAL SYSTEM	ALPINE SUBSTRATE - ICE FIELD	ALPINE SUBSTRATE - ICE FIELD	
CULEBRA RANGE, CO , NM- Area # 36 % OF AREA ALREADY PROTECTED: 2.6%	TOTAL CONSERVATION TARGETS: 42 OWNERSHIP- 18.1% FEDERAL; 81.8% PRIVATE; 0.1% STATE		ACRES: 462,50
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 2	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 2	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 2	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 2	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 5	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 5	
BIRDS	LEUCOSTICTE AUSTRALIS	BROWN-CAPPED ROSY FINCH	G4
FISH	CATOSTOMUS PLEBEIUS	RIO GRANDE SUCKER	G3
FISH	ONCORHYNCHUS CLARKI STOMIAS	GREENBACK CUTTHROAT TROUT	G2
FISH	ONCORHYNCHUS CLARKI VIRGINALIS	RIO GRANDE CUTTHROAT TROUT	G3
MAMMALS	MARTES AMERICANA	PINE MARTEN	G5
PLANT COMMUNITIES	DANTHONIA PARRYI	PARRY'S OATGRASS	G2
PLANTS	DRABA STREPTOBRACHIA	COLORADO DIVIDE WHITLOW-GRASS	G3
PLANTS	PAPAVER RADICATUM SSP KLUANENSE	ALPINE POPPY	G3
PLANTS	ASTRAGALUS RIPLEYI	RIPLEY MILKVETCH	G3
PLANTS	SALIX ARIZONICA	ARIZONA WILLOW	G2
REPTILES	EUMECES MULTIVIRGATUS EPIPLEUROTUS	VARIABLE SKINK	G5
TERRESTRIAL SYSTEM	DOUGLAS FIR - PONDEROSA PINE FOREST	DOUGLAS FIR - PONDEROSA PINE FOREST	
TERRESTRIAL SYSTEM	MONTANE GRASSLAND	MONTANE GRASSLAND	
TERRESTRIAL SYSTEM	MOUNTAIN SAGEBRUSH SHRUBLAND	MOUNTAIN SAGEBRUSH SHRUBLAND	
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	ASPEN FOREST	ASPEN FOREST	
TERRESTRIAL SYSTEM	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	
TERRESTRIAL SYSTEM	INTERMONTANE - FOOTHILL GRASSLAND	INTERMONTANE - FOOTHILL GRASSLAND	
TERRESTRIAL SYSTEM	JUNIPER SAVANNA	JUNIPER SAVANNA	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	MONTANE MIXED CONIFER FOREST (DRY-MESIC & MOIST-MESIC)	MONTANE MIXED CONIFER FOREST (DRY-MESIC & MOIST-MESIC)	
TERRESTRIAL SYSTEM	PINYON - JUNIPER WOODLAND	PINYON - JUNIPER WOODLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	

* Targets in bold provided by reviewers and not yet added in SRM database

TAXON GROUP	SCIENTIFIC NAME	COMMON NAME	GRANK
TERRESTRIAL SYSTEM	SAGEBRUSH STEPPE	SAGEBRUSH STEPPE	
TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	
CUMBRES PASS LINK, CO- Area #37 TOTAL CONSERVATION TARGETS: 7 ACRES: 14,827 % OF AREA ALREADY PROTECTED:0% OWNERSHIP- 41.6% FEDERAL; 58.4% PRIVATE; 0.0% STATE			
AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 5	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 5	
FISH	ONCORHYNCHUS CLARKI PLEURITICUS	COLORADO RIVER CUTTHROAT TROUT	G3
MAMMALS	**LYNX CANADENSIS**	**LYNX**	**G5**
TERRESTRIAL SYSTEM	ALPINE SUBSTRATE - ICE FIELD	ALPINE SUBSTRATE - ICE FIELD	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
DARK CANYON, CO- Area #38 TOTAL CONSERVATION TARGETS: 11 ACRES: 50,410 % OF AREA ALREADY PROTECTED: 1.4% OWNERSHIP- 65.6% FEDERAL; 27.8% PRIVATE; 6.6% STATE			
AMPHIBIANS	BUFO BOREAS POP 1	BOREAL TOAD (SOUTHERN ROCKY MOUNTAIN POPULATION)	G1
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 2	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 2	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 2	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 2	
PLANT COMMUNITIES	POPULUS ANGUSTIFOLIA/JUNIPERUS SCOPULORUM	NARROWLEAF COTTONWOOD/ROCKY MOUNTAIN JUNIPER WOODLAND	G2
PLANTS	DRABA GRAYANA	GRAY'S PEAK WHITLOW-GRASS	G3
PLANTS	ERIOGONUM BRANDEGEEI	BRANDEGEE WILD BUCKWHEAT	G1
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	
TERRESTRIAL SYSTEM	LODGEPOLE PINE FOREST	LODGEPOLE PINE FOREST	
TERRESTRIAL SYSTEM	PINYON - JUNIPER WOODLAND	PINYON - JUNIPER WOODLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
DAWSON DRAW CANYON EAST, CO- Area #39 TOTAL CONSERVATION TARGETS: 3 ACRES: 2,965 % OF AREA ALREADY PROTECTED:0% OWNERSHIP- 100.0% FEDERAL; 0.0% PRIVATE; 0.0% STATE			
AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE/FOOTHILLS, FOOTHILLS STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	
PLANT COMMUNITIES	POPULUS ANGUSTIFOLIA/CRATAEGUS RIVULARIS	NARROWLEAF COTTONWOOD/RIVER HAWTHORN WOODLAND	G2
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
DEATH VALLEY CREEK, CO- Area #40 TOTAL CONSERVATION TARGETS: 2 ACRES: 2,965 % OF AREA ALREADY PROTECTED: 0% OWNERSHIP- 100.0% FEDERAL; 0.0% PRIVATE; 0.0% STATE			
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 4	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 4	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
DEBEQUE CANYON, CO- Area #41 TOTAL CONSERVATION TARGETS: 5 ACRES: 11,177 % OF AREA ALREADY PROTECTED: 0% OWNERSHIP- 59.1% FEDERAL; 40.9% PRIVATE; 0.0% STATE			
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 3	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 3	
AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS LARGE RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 3	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS LARGE RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 3	
INVERTEBRATES	PHYCIODES BATESI ANASAZI	CANYON CRESCENT	G2
TERRESTRIAL SYSTEM	GAMBEL'S OAK SHRUBLAND	GAMBEL'S OAK SHRUBLAND	
TERRESTRIAL SYSTEM	MONTANE - FOOTHILL CLIFF & CANYON	MONTANE - FOOTHILL CLIFF & CANYON	
DEBEQUE SOUTH, CO- Area #42 TOTAL CONSERVATION TARGETS: 15 ACRES: 158,236 % OF AREA ALREADY PROTECTED:0.1% OWNERSHIP- 53.5% FEDERAL; 45.8% PRIVATE; 0.7% STATE			
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 3	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 3	
AQUATIC SYSTEM	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	
AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW	

* Targets in bold provided by reviewers and not yet added in SRM database

APPENDIX 13: CONSERVATION AREA SUMMARIES

TAXON GROUP	SCIENTIFIC NAME	COMMON NAME	GRANK
	LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	
AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 3	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 3	
FISH	ONCORHYNCHUS CLARKI PLEURITICUS	COLORADO RIVER CUTTHROAT TROUT	G3
PLANTS	ASTRAGALUS DEBEQUAEUS	DEBEQUE MILKVETCH	G2
PLANTS	ASTRAGALUS WETHERILLII	WETHERILL MILKVETCH	G3
PLANTS	CIRSIUM PERPLEXANS	ROCKY MOUNTAIN THISTLE	G2
PLANTS	PENSTEMON MENSARUM	GRAND MESA PENSTEMON	G3
TERRESTRIAL SYSTEM	ASPEN FOREST	ASPEN FOREST	
TERRESTRIAL SYSTEM	GAMBEL'S OAK SHRUBLAND	GAMBEL'S OAK SHRUBLAND	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	MONTANE - FOOTHILL CLIFF & CANYON	MONTANE - FOOTHILL CLIFF & CANYON	
TERRESTRIAL SYSTEM	PINYON - JUNIPER WOODLAND	PINYON - JUNIPER WOODLAND	
TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	
DRY LARAMIE RIVER, WY- Area # 43	TOTAL CONSERVATION TARGETS: 4		ACRES: 7,863
% OF AREA ALREADY PROTECTED:0%	OWNERSHIP- 14.7% FEDERAL; 72.9% PRIVATE; 12.4% STATE		
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	
AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS LARGE RIVER GRANITE / VOLCANIC - EDU 1	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS LARGE RIVER GRANITE / VOLCANIC - EDU 1	
TERRESTRIAL SYSTEM	INTERMONTANE - FOOTHILL GRASSLAND	INTERMONTANE - FOOTHILL GRASSLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
EAGLE RIVER AT GYPSUM, CO- Area # 44	TOTAL CONSERVATION TARGETS: 13		ACRES: 92,869
% OF AREA ALREADY PROTECTED: 0%	OWNERSHIP- 73.3% FEDERAL; 23.9% PRIVATE; 2.8% STATE		
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 3	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 3	
AQUATIC SYSTEM	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	
BIRDS	AMPHISPIZA BELLI	SAGE SPARROW	G5
BIRDS	HALIAEETUS LEUCOCEPHALUS	BALD EAGLE	G4
FISH	ONCORHYNCHUS CLARKI PLEURITICUS	COLORADO RIVER CUTTHROAT TROUT	G3
INVERTEBRATES	NEOMINOIS RIDINGSII	RIDING'S SATYR	G5
INVERTEBRATES	PHYCIODES BATESI ANASAZI	CANYON CRESCENT	G2
MAMMALS	CORYNORHINUS TOWNSENDII PALLESCENS	PALE LUMP-NOSED BAT	G4
PLANTS	PENSTEMON HARRINGTONII	HARRINGTON BEARDTONGUE	G3
TERRESTRIAL SYSTEM	ALPINE SUBSTRATE - ICE FIELD	ALPINE SUBSTRATE - ICE FIELD	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	PINYON - JUNIPER WOODLAND	PINYON - JUNIPER WOODLAND	
EAST DIVIDE CREEK, CO- Area # 45	TOTAL CONSERVATION TARGETS: 2		ACRES: 2,965
% OF AREA ALREADY PROTECTED: 0%	OWNERSHIP- 56.2% FEDERAL; 43.8% PRIVATE; 0.0% STATE		
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	
PLANTS	ASTRAGALUS WETHERILLII	WETHERILL MILKVETCH	G3
EAST MANCOS RIVER, CO- Area #46	TOTAL CONSERVATION TARGETS: 1		ACRES: 2,965
% OF AREA ALREADY PROTECTED: 0%	OWNERSHIP- 53.4% FEDERAL; 46.6% PRIVATE; 0.0% STATE		
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
EAST RIFLE CREEK, CO- Area #47	TOTAL CONSERVATION TARGETS: 3		ACRES: 2,965
% OF AREA ALREADY PROTECTED: 0%	OWNERSHIP- 9.1% FEDERAL; 90.9% PRIVATE; 0.0% STATE		
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 3	
PLANTS	SULLIVANTIA HAPEMANII VAR PURPUSII	HANGING GARDEN SULLIVANTIA	G3
TERRESTRIAL SYSTEM	GAMBEL'S OAK SHRUBLAND	GAMBEL'S OAK SHRUBLAND	
ELK RIDGE, CO- Area #48	TOTAL CONSERVATION TARGETS: 6		ACRES: 23,722
% OF AREA ALREADY PROTECTED: 0%	OWNERSHIP- 88.2% FEDERAL; 11.8% PRIVATE; 0.0% STATE		
AQUATIC SYSTEM	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 2	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 2	fair
AQUATIC SYSTEM	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 3	

* Targets in bold provided by reviewers and not yet added in SRM database

TAXON GROUP	SCIENTIFIC NAME	COMMON NAME	GRANK
	CHANNELS AND BASINS) - EDU 3		
AQUATIC SYSTEM	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 2	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 2	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
TERRESTRIAL SYSTEM	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
ENDLICH MESA BASIN, CO- Area #49 % OF AREA ALREADY PROTECTED: 100%	TOTAL CONSERVATION TARGETS: 3 OWNERSHIP- 100% FEDERAL; 0.0% PRIVATE; 0.0% STATE	ACRES: 2,965	
AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 4	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 4	
PLANTS	ERIOPHORUM ALTAICUM VAR NEOGAEUM	ALTAI COTTONGRASS	G3
TERRESTRIAL SYSTEM	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	
ESCALANTE RIVER, CO- Area # 50 % OF AREA ALREADY PROTECTED:3%	TOTAL CONSERVATION TARGETS: 15 OWNERSHIP- 92.7% FEDERAL; 5.9% PRIVATE; 1.4% STATE	ACRES: 110,304	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	
AQUATIC SYSTEM	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	
PLANT COMMUNITIES	JUNIPERUS OSTEOSPERMA/STIPA COMATA	ONE-SEED JUNIPER/NEEDLE-AND-THREAD	G2
PLANT COMMUNITIES	POPULUS ANGUSTIFOLIA/SALIX LIGULIFOLIA - SHEPHERDIA ARGENTEA WOODLAND	NARROWLEAF COTTONWOOD/STRAP-LEAF WILLOW-SILVER BUFFALOBERRY	G1
PLANTS	ASTRAGALUS LINIFOLIUS	GRAND JUNCTION MILKVETCH	G3
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	ASPEN FOREST	ASPEN FOREST	
TERRESTRIAL SYSTEM	GAMBEL'S OAK SHRUBLAND	GAMBEL'S OAK SHRUBLAND	
TERRESTRIAL SYSTEM	JUNIPER SAVANNA	JUNIPER SAVANNA	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	MONTANE - FOOTHILL CLIFF & CANYON	MONTANE - FOOTHILL CLIFF & CANYON	
TERRESTRIAL SYSTEM	PINYON - JUNIPER WOODLAND	PINYON - JUNIPER WOODLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
TERRESTRIAL SYSTEM	WINTERFAT SHRUB STEPPE	WINTERFAT SHRUB STEPPE	
ESTES PARK, CO- Area #51 % OF AREA ALREADY PROTECTED:67.6%	TOTAL CONSERVATION TARGETS: 39 OWNERSHIP- 88.9% FEDERAL; 10.5% PRIVATE; 0.6% STATE	ACRES: 318,171	
AMPHIBIANS	BUFO BOREAS POP 1	BOREAL TOAD (SOUTHERN ROCKY MOUNTAIN POPULATION)	G1
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER GRANITE / VOLCANIC LAKE - EDU 1	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER GRANITE / VOLCANIC LAKE - EDU 1	
BIRDS	CINCLUS MEXICANUS	AMERICAN DIPPER	G5
BIRDS	CYPSELOIDES NIGER	BLACK SWIFT	G4
FISH	ONCORHYNCHUS CLARKI PLEURITICUS	COLORADO RIVER CUTTHROAT TROUT	G3
FISH	ONCORHYNCHUS CLARKI STOMIAS	GREENBACK CUTTHROAT TROUT	G2
INVERTEBRATES	NEOMINOIS WYOMINGO	SWALE SATYR	G3
INVERTEBRATES	PARALEUCTRA PROJECTA	PARALEUCTRA PROJECTA	G3
INVERTEBRATES	PHANETA UNDESCRIBED SPECIES	PHANETA UNDESCRIBED SPECIES	G3
MAMMALS	MARTES AMERICANA	PINE MARTEN	G5
MAMMALS	ZAPUS HUDSONIUS PREBLEI	MEADOW JUMPING MOUSE	G2
MOLLUSKS	ACROLOXUS COLORADENSIS	ROCKY MOUNTAIN CAPSHELL	G1
PLANT COMMUNITIES	DANTHONIA PARRYI	PARRY'S OATGRASS	G2
PLANT COMMUNITIES	MUHLENBERGIA MONTANA-STIPA COMATA	MOUNTAIN MUHLY/NEEDLE-AND-THREAD	G2
PLANT COMMUNITIES	PURSHIA TRIDENTATA/MUHLENBERGIA MONTANA	BITTERBRUSH/MOUNTAIN MAHOGANY	G2
PLANT COMMUNITIES	RIBES CEREUM/LEYMUS AMBIGUUS	WHITE SQUAW CURRANT/ROCKY MOUNTAIN LYME GRASS	G2
PLANTS	AQUILEGIA SAXIMONTANA	ROCKY MOUNTAIN COLUMBINE	G3
PLANTS	BOTRYCHIUM ECHO	REFLECTED MOONWORT	G2
PLANTS	BOTRYCHIUM HESPERIUM	WESTERN MOONWORT	G3

* Targets in bold provided by reviewers and not yet added in SRM database

TAXON GROUP	SCIENTIFIC NAME	COMMON NAME	GRANK
PLANTS	DRABA GRAYANA	GRAY'S PEAK WHITLOW-GRASS	G3
PLANTS	DRYOPTERIS EXPANSA	SPREADING WOOD FERN	G5
PLANTS	JUNCUS TWEEDYI	TWEEDY RUSH	G3
PLANTS	MIMULUS GEMMIPARUS	WEBER MONKEY-FLOWER	G2
PLANTS	POTENTILLA RUPINCOLA	ROCKY MOUNTAIN CINQUEFOIL	G2
PLANTS	SALIX SERISSIMA	AUTUMN WILLOW	G4
PLANTS	SISYRINCHIUM PALLIDUM	PALE BLUE-EYED GRASS	G2
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	ALPINE SUBSTRATE - ICE FIELD	ALPINE SUBSTRATE - ICE FIELD	
TERRESTRIAL SYSTEM	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	
TERRESTRIAL SYSTEM	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	
TERRESTRIAL SYSTEM	FRESHWATER MARSH & WET MEADOW	FRESHWATER MARSH & WET MEADOW	
TERRESTRIAL SYSTEM	LODGEPOLE PINE FOREST	LODGEPOLE PINE FOREST	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	MONTANE GRASSLAND	MONTANE GRASSLAND	
TERRESTRIAL SYSTEM	MONTANE RIPARIAN SHRUBLAND	MONTANE RIPARIAN SHRUBLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	
FALL CREEK, CO- Area # 52 % OF AREA ALREADY PROTECTED: 100%	TOTAL CONSERVATION TARGETS: 2 OWNERSHIP- 100.0% FEDERAL; 0.0% PRIVATE; 0.0% STATE		ACRES: 2,965
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
FLAT TOPS, CO- Area #53 % OF AREA ALREADY PROTECTED: 44%	TOTAL CONSERVATION TARGETS: 28 OWNERSHIP- 88.5% FEDERAL; 10.0% PRIVATE; 1.5% STATE		ACRES: 462,580
AQUATIC SYSTEM	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC LAKE - EDU 3	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC LAKE - EDU 3	
AQUATIC SYSTEM	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC LAKE - EDU 7	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC LAKE - EDU 7	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 7	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 7	
AQUATIC SYSTEM	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
AQUATIC SYSTEM	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 7	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 7	
AQUATIC SYSTEM	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	
AQUATIC SYSTEM	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 7	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 7	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 7	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 7	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 7	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 7	
AQUATIC SYSTEM	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 7	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 7	
BIRDS	BUCEPHALA ISLANDICA	BARROW'S GOLDENEYE	G5
BIRDS	CYPSELOIDES NIGER	BLACK SWIFT	G4
BIRDS	LEUCOSTICTE AUSTRALIS	BROWN-CAPPED ROSY FINCH	G4
BIRDS	SPIZELLA BREWERI	BREWER'S SPARROW	G5
FISH	ONCORHYNCHUS CLARKI PLEURITICUS	COLORADO RIVER CUTTHROAT TROUT	G3
INVERTEBRATES	EREBIA THEANO	THEANO ALPINE	G4
MAMMALS	MARTES AMERICANA	PINE MARTEN	G5
PLANTS	SULLIVANTIA HAPEMANII VAR PURPUSII	HANGING GARDEN SULLIVANTIA	G3
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	

* Targets in bold provided by reviewers and not yet added in SRM database

TAXON GROUP	SCIENTIFIC NAME	COMMON NAME	GRANK
	MEADOW		
TERRESTRIAL SYSTEM	ALPINE SUBSTRATE - ICE FIELD	ALPINE SUBSTRATE - ICE FIELD	
TERRESTRIAL SYSTEM	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	
TERRESTRIAL SYSTEM	ASPEN FOREST	ASPEN FOREST	
TERRESTRIAL SYSTEM	GAMBEL'S OAK SHRUBLAND	GAMBEL'S OAK SHRUBLAND	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	MONTANE GRASSLAND	MONTANE GRASSLAND	
TERRESTRIAL SYSTEM	MOUNTAIN SAGEBRUSH SHRUBLAND	MOUNTAIN SAGEBRUSH SHRUBLAND	
TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	
FLORIDA CREEK, CO- Area #54 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 3 OWNERSHIP- 20.5% FEDERAL; 71.2% PRIVATE; 8.3% STATE		ACRES: 8,553
AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 4	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 4	
REPTILES	EUMECES MULTIVIRGATUS EPIPLEUROTUS	VARIABLE SKINK	G5
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
FORBES/SHEEP MOUNTAIN, WY- Area # 55 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 4 OWNERSHIP- 65.1% FEDERAL; 28.1% PRIVATE; 6.7% STATE		ACRES: 26,521
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 1	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 1	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	
TERRESTRIAL SYSTEM	INTERMONTANE - FOOTHILL GRASSLAND	INTERMONTANE - FOOTHILL GRASSLAND	
TERRESTRIAL SYSTEM	LODGEPOLE PINE FOREST	LODGEPOLE PINE FOREST	
FOSSIL RIDGE, CO- Area #56 % OF AREA ALREADY PROTECTED	TOTAL CONSERVATION TARGETS: 9 OWNERSHIP- 91.4% FEDERAL; 8.6% PRIVATE; 0.0% STATE		ACRES: 17,7912
AQUATIC SYSTEM	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 2	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 2	
AQUATIC SYSTEM	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
MAMMALS	MARTES AMERICANA	PINE MARTEN	G5
PLANTS	ASTRAGALUS MOLYBDENUS	LEADVILLE MILKVETCH	G3
PLANTS	BRAYA GLABELLA VAR GLABELLA	ARCTIC BRAYA	G5
PLANTS	BRAYA HUMILIS	ALPINE BRAYA	G4
PLANTS	DRABA GLOBOSA	ROCKCRESS DRABA	G3
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	
FRYINGPAN RIVER, CO- Area #57 % OF AREA ALREADY PROTECTED: 99.3	TOTAL CONSERVATION TARGETS: 3 OWNERSHIP- 100.0% FEDERAL; 0.0% PRIVATE; 0.0% STATE		ACRES: 5,931
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
FISH	ONCORHYNCHUS CLARKI PLEURITICUS	COLORADO RIVER CUTTHROAT TROUT	G3
TERRESTRIAL SYSTEM	ALPINE SUBSTRATE - ICE FIELD	ALPINE SUBSTRATE - ICE FIELD	
GARDEN PARK, CO- Area # 58 % OF AREA ALREADY PROTECTED: 10.3%	TOTAL CONSERVATION TARGETS: 15 OWNERSHIP- 54.2% FEDERAL; 39.6% PRIVATE; 6.3% STATE		ACRES: 119,852
AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 2	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 2	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 2	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 2	
AQUATIC SYSTEM	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 2	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 2	
BIRDS	FALCO PEREGRINUS ANATUM	AMERICAN PEREGRINE FALCON	G3
BIRDS	STRIX OCCIDENTALIS LUCIDA	MEXICAN SPOTTED OWL	G3
MAMMALS	MARTES AMERICANA	PINE MARTEN	G5
PLANT COMMUNITIES	POPULUS ANGUSTIFOLIA/JUNIPERUS SCOPULORUM	NARROWLEAF COTTONWOOD/ROCKY MOUNTAIN JUNIPER WOODLAND	G2
PLANT COMMUNITIES	POPULUS ANGUSTIFOLIA/SALIX IRRORATA	NARROWLEAF COTTONWOOD/BLUESTEM WILLOW	G2
PLANTS	**ERIOGONUM BRANDEGEEI**	**BRANDEGEE WILD BUCKWHEAT**	**G1**
TERRESTRIAL SYSTEM	DOUGLAS FIR - PONDEROSA PINE FOREST	DOUGLAS FIR - PONDEROSA PINE FOREST	
TERRESTRIAL SYSTEM	GAMBEL'S OAK SHRUBLAND	GAMBEL'S OAK SHRUBLAND	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	

* Targets in bold provided by reviewers and not yet added in SRM database

APPENDIX 13: CONSERVATION AREA SUMMARIES

TAXON GROUP	SCIENTIFIC NAME	COMMON NAME	GRANK
TERRESTRIAL SYSTEM	MONTANE GRASSLAND	MONTANE GRASSLAND	
TERRESTRIAL SYSTEM	PINYON - JUNIPER WOODLAND	PINYON - JUNIPER WOODLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
GLENWOOD CANYON, CO- Area #59 % OF AREA ALREADY PROTECTED: 1.7%	TOTAL CONSERVATION TARGETS: 24 OWNERSHIP- 84.9% FEDERAL; 15.1% PRIVATE; 0.0% STATE		ACRES: 160,123
AQUATIC SYSTEM	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC LAKE - EDU 3	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC LAKE - EDU 3	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	
AQUATIC SYSTEM	MONTANE STEEP & VERY STEEP GRADIENTS O LARGE RIVER SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE STEEP & VERY STEEP GRADIENTS O LARGE RIVER SHALES / SANDSTONES / LIMESTONES - EDU 3	
AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS LARGE RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 3	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS LARGE RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 3	
AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS LARGE RIVER SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS LARGE RIVER SHALES / SANDSTONES / LIMESTONES - EDU 3	
BIRDS	CYPSELOIDES NIGER	BLACK SWIFT	G4
BIRDS	FALCO PEREGRINUS ANATUM	AMERICAN PEREGRINE FALCON	G3
FISH	ONCORHYNCHUS CLARKI PLEURITICUS	COLORADO RIVER CUTTHROAT TROUT	G3
INVERTEBRATES	CAPNIA UNDESCRIBED SP	CAPNIA UNDESCRIBED SP	G3
INVERTEBRATES	NEOMINOIS RIDINGSII	RIDING'S SATYR	G5
INVERTEBRATES	PARALEUCTRA PROJECTA	PARALEUCTRA PROJECTA	G3
MAMMALS	CORYNORHINUS TOWNSENDII PALLESCENS	PALE LUMP-NOSED BAT	G4
PLANT COMMUNITIES	POPULUS TREMULOIDES/CEANOTHUS VELUTINUS	QUAKING ASPEN/TOBACCO-BRUSH	G2
PLANTS	PENSTEMON HARRINGTONII	HARRINGTON BEARDTONGUE	G3
PLANTS	SULLIVANTIA HAPEMANII VAR PURPUSII	HANGING GARDEN SULLIVANTIA	G3
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	ASPEN FOREST	ASPEN FOREST	
TERRESTRIAL SYSTEM	GAMBEL'S OAK SHRUBLAND	GAMBEL'S OAK SHRUBLAND	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	MONTANE - FOOTHILL CLIFF & CANYON	MONTANE - FOOTHILL CLIFF & CANYON	
TERRESTRIAL SYSTEM	MONTANE GRASSLAND	MONTANE GRASSLAND	
TERRESTRIAL SYSTEM	MOUNTAIN SAGEBRUSH SHRUBLAND	MOUNTAIN SAGEBRUSH SHRUBLAND	
TERRESTRIAL SYSTEM	PINYON - JUNIPER WOODLAND	PINYON - JUNIPER WOODLAND	
TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	
GOLDEN GATE CANYON, CO- Area #60 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 20 OWNERSHIP- 2.9% FEDERAL; 84.5% PRIVATE; 12.5% STATE		ACRES: 52,591
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER GRANITE / VOLCANIC LAKE - EDU 1	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER GRANITE / VOLCANIC LAKE - EDU 1	
BIRDS	**FALCO PEREGRINUS ANATUM**	**AMERICAN PEREGRINE FALCON**	**G3**
INVERTEBRATES	APHELIA SPP	APHELIA SPP	G3
INVERTEBRATES	CALLOPHRYS MOSSII SCHRYVERI	MOSS' ELFIN	G3
INVERTEBRATES	CELASTRINA HUMULUS	HOPS AZURE	G2
INVERTEBRATES	GRAMMIS UNDESCRIBED SP #1	A MOTH	G3
INVERTEBRATES	TRACHYSMIA GRANDIS	TRACHYSMIA GRANDIS	G3
MAMMALS	**CORYNORHINUS TOWNSENDII PALLESCENS**	**WESTERN BIG EARED BAT**	**G4**
PLANT COMMUNITIES	DANTHONIA PARRYI	PARRY'S OATGRASS	G2
PLANT COMMUNITIES	PINUS PONDEROSA/CERCOCARPUS MONTANUS/ANDR	PONDEROSA PINE/MOUNTAIN MAHOGANY/BIG BLUESTEM	G2
PLANT COMMUNITIES	PINUS PONDEROSA/FESTUCA KINGII	PONDEROSA PINE/SPIKE FESCUE	G2
PLANT COMMUNITIES	STIPA COMATA - COLORADO FRONT RANGE	NEEDLE-AND-THREAD/BLUE GRAMA FRONT RANGE VARIANT	G1
PLANTS	BOTRYPUS VIRGINIANUS SSP EUROPAEUS	RATTLESNAKE FERN	G5
PLANTS	**MIMULUS GEMMIPARUS**	**WEBERS MONKEY FLOWER**	**G2**
PLANTS	SPIRANTHES DILUVIALIS	UTE LADIES' TRESSES	G2
TERRESTRIAL SYSTEM	DOUGLAS FIR - PONDEROSA PINE FOREST	DOUGLAS FIR - PONDEROSA PINE FOREST	
TERRESTRIAL SYSTEM	INTERMONTANE - FOOTHILL GRASSLAND	INTERMONTANE - FOOTHILL GRASSLAND	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	MONTANE GRASSLAND	MONTANE GRASSLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
GORE RANGE, CO- Area # 61 % OF AREA ALREADY PROTECTED: 35.9%	TOTAL CONSERVATION TARGETS: 23 OWNERSHIP- 73.0% FEDERAL; 26.2% PRIVATE; 0.8% STATE		ACRES: 192,742
AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	

* Targets in bold provided by reviewers and not yet added in SRM database

TAXON GROUP	SCIENTIFIC NAME	COMMON NAME	GRANK
	3		
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 3	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 3	
AQUATIC SYSTEM	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	
FISH	ONCORHYNCHUS CLARKI PLEURITICUS	COLORADO RIVER CUTTHROAT TROUT	G3
INVERTEBRATES	CAPNIA UINTAHI GAUFIN	CAPNIA UINTAHI GAUFIN	G4
PLANTS	CAREX CONCINNA	LOW NORTHERN SEDGE	G4
PLANTS	DRABA SPECTABILIS VAR OXYLOBA	DRABA SPECTABILIS VAR OXYLOBA	G3
PLANTS	PENSTEMON HARRINGTONII	HARRINGTON BEARDTONGUE	G3
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	ALPINE SUBSTRATE - ICE FIELD	ALPINE SUBSTRATE - ICE FIELD	
TERRESTRIAL SYSTEM	ASPEN FOREST	ASPEN FOREST	
TERRESTRIAL SYSTEM	LODGEPOLE PINE FOREST	LODGEPOLE PINE FOREST	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	MONTANE - FOOTHILL CLIFF & CANYON	MONTANE - FOOTHILL CLIFF & CANYON	
TERRESTRIAL SYSTEM	MOUNTAIN SAGEBRUSH SHRUBLAND	MOUNTAIN SAGEBRUSH SHRUBLAND	
TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	
GRAY MOUNTAIN, CO- Area #62 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 9 OWNERSHIP- 90.8% FEDERAL; 9.2% PRIVATE; 0.0% STATE		ACRES: 14,826
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	
PLANTS	BOTRYCHIUM ECHO	REFLECTED MOONWORT	G2
PLANTS	BOTRYCHIUM HESPERIUM	WESTERN MOONWORT	G3
PLANTS	BOTRYCHIUM PALLIDUM	PALE MOONWORT	G2
PLANTS	MACHAERANTHERA COLORADOENSIS	COLORADO TANSY-ASTER	G2
PLANTS	TRIFOLIUM BRANDEGEEI	BRANDEGEE CLOVER	G5
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	ALPINE SUBSTRATE - ICE FIELD	ALPINE SUBSTRATE - ICE FIELD	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
GRAYS/TORREY, CO- Area #63 % OF AREA ALREADY PROTECTED: 7.2%	TOTAL CONSERVATION TARGETS: 30 OWNERSHIP- 85.1% FEDERAL; 14.9% PRIVATE; 0.0% STATE		ACRES: 180,881
AMPHIBIANS	BUFO BOREAS POP 1	BOREAL TOAD (SOUTHERN ROCKY MOUNTAIN POPULATION)	G1
AQUATIC SYSTEM	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 3	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 3	
AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	
AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER GRANITE / VOLCANIC LAKE - EDU 1	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER GRANITE / VOLCANIC LAKE - EDU 1	
BIRDS	FALCO PEREGRINUS ANATUM	AMERICAN PEREGRINE FALCON	G3
BIRDS	LEUCOSTICTE AUSTRALIS	BROWN-CAPPED ROSY FINCH	G4
FISH	ONCORHYNCHUS CLARKI PLEURITICUS	COLORADO RIVER CUTTHROAT TROUT	G3
INVERTEBRATES	PHANETA INSIGNATA	TORTRICID MOTH	G3
INVERTEBRATES	PHANETA UNDESCRIBED SPECIES	PHANETA UNDESCRIBED SPECIES	G3
MAMMALS	MARTES AMERICANA	PINE MARTEN	G5
PLANT COMMUNITIES	ARTEMISIA CANA/FESTUCA THURBERI	SILVER SAGEBRUSH/THURBER'S FESCUE	G2
PLANTS	AQUILEGIA SAXIMONTANA	ROCKY MOUNTAIN COLUMBINE	G3
PLANTS	ARMERIA SCABRA SSP SIBIRICA	SEA PINK	G5
PLANTS	CAREX OREOCHARIS	A SEDGE	G3
PLANTS	DRABA GLOBOSA	ROCKCRESS DRABA	G3
PLANTS	DRABA GRAYANA	GRAY'S PEAK WHITLOW-GRASS	G3
PLANTS	DRABA RECTIFRUCTA	MOUNTAIN WHITLOW-GRASS	G3
PLANTS	DRABA STREPTOBRACHIA	COLORADO DIVIDE WHITLOW-GRASS	G3

* Targets in bold provided by reviewers and not yet added in SRM database

APPENDIX 13: CONSERVATION AREA SUMMARIES

TAXON GROUP	SCIENTIFIC NAME	COMMON NAME	GRANK
PLANTS	RUBUS ARCTICUS SPP ACAULIS	NAGOON BERRY	G5
PLANTS	SALIX CANDIDA	HOARY OR SILVER WILLOW	G5
PLANTS	SAUSSUREA WEBERI	WEBER SAUSSUREA	G3
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	ALPINE SUBSTRATE - ICE FIELD	ALPINE SUBSTRATE - ICE FIELD	
TERRESTRIAL SYSTEM	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	
TERRESTRIAL SYSTEM	FRESHWATER MARSH & WET MEADOW	FRESHWATER MARSH & WET MEADOW	
TERRESTRIAL SYSTEM	LODGEPOLE PINE FOREST	LODGEPOLE PINE FOREST	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	
GREAT SAND DUNES/SAN LUIS LAKES, CO- Area #64 % OF AREA ALREADY PROTECTED: 75.3%	TOTAL CONSERVATION TARGETS: 39 OWNERSHIP- 47.7% FEDERAL; 49.9% PRIVATE; 2.4% STATE	ACRES: 240,182	
AMPHIBIANS	BUFO BOREAS POP 1	BOREAL TOAD (SOUTHERN ROCKY MOUNTAIN POPULATION)	G1
AMPHIBIANS	RANA PIPIENS	NORTHERN LEOPARD FROG	G5
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	
BIRDS	**AMPHISPIZA BELLI**	**SAGE SPARROW**	**G5**
BIRDS	ASIO FLAMMEUS	SHORT-EARED OWL	G5
BIRDS	BUTEO REGALIS	FERRUGINOUS HAWK	G4
BIRDS	**GRUS CANADENSIS TABIDA**	**GREATER SANDHILL CRANE**	**G4**
FISH	CATOSTOMUS PLEBEIUS	RIO GRANDE SUCKER	G3
FISH	ONCORHYNCHUS CLARKI VIRGINALIS	RIO GRANDE CUTTHROAT TROUT	G3
INVERTEBRATES	AMBLYDERUS TRIPLEHORNI	GREAT SAND DUNES ANTHICID BEETLE	G1
INVERTEBRATES	**AMBLYDERUS WERNERI**	**GREAT SAND DUNES ANTHICID BEETLE 2**	**G1**
INVERTEBRATES	CICINDELA THEATINA	SAN LUIS DUNES TIGER BEETLE	G1
INVERTEBRATES	COPABLEPHARON UNDESCRIBED SP	COPABLEPHARON UNDESCRIBED SP	G3
INVERTEBRATES	DAIHINIBAENETES GIGANTEUS	GIANT SAND TREADER CRICKET	G3
INVERTEBRATES	EUPHILOTES RITA COLORADENSIS	COLORADO BLUE	G2
INVERTEBRATES	EUPROSERPINUS WIESTI	WIEST'S SPHINX MOTH	G3
INVERTEBRATES	**HYPOCACCUS**	**UNDESCRIBED SPECIES**	
INVERTEBRATES	**PROCTOACANTHUS**	**UNDESCRIBED SPECIES**	
INVERTEBRATES	SCHINIA AVEMENSIS	GOLD-EDGED GEM	G3
MAMMALS	CORYNORHINUS TOWNSENDII PALLESCENS	PALE LUMP-NOSED BAT	G4
MAMMALS	DIPODOMYS ORDII MONTANUS	SAN LUIS KANGAROO RAT	G3
MAMMALS	MARTES AMERICANA	PINE MARTEN	G5
MAMMALS	PEROGNATHUS FLAVESCENS RELICTUS	PLAINS POCKET MOUSE SUBSP.	G2
MAMMALS	PEROGNATHUS FLAVUS SANLUISI	SILKY POCKET MOUSE SUBSP.	G3
MAMMALS	SPERMOPHILUS TRIDECEMLINEATUS BLANCA	THIRTEEN-LINED GROUND SQUIRREL SUBSP.	G3
MAMMALS	TAMIAS MINIMUS CARYI	SAN LUIS LEAST CHIPMUNK	G3
MAMMALS	**THOMOMYS BOTTAE PERVAGUS**	**BOTTA'S POCKET GOPHER SUBSP.PERVAGUS**	**G3**
PLANT COMMUNITIES	ABIES CONCOLOR-PICEA PUNGENS-POPULUS ANGU	WHITE FIR-BLUE SPRUCE-NARROWLEAF COTTONWOOD/ROCKY MOUNTAIN MAPLE	G2
PLANT COMMUNITIES	POPULUS ANGUSTIFOLIA/JUNIPERUS SCOPULORUM	NARROWLEAF COTTONWOOD/ROCKY MOUNTAIN JUNIPER WOODLAND	G2
PLANT COMMUNITIES	POPULUS ANGUSTIFOLIA/SAND DUNE FOREST	NARROWLEAF COTTONWOOD/SAND DUNE FOREST	G1
PLANT COMMUNITIES	SALICORNIA RUBRA	RED SALTWORT	G2
PLANT COMMUNITIES	STIPA COMATA-ORYZOPSIS HYMENOIDES	NEEDLE-AND-THREAD/INDIAN MOUNTAIN RICE-GRASS	G2
PLANTS	CLEOME MULTICAULIS	SLENDER SPIDERFLOWER	G2
TERRESTRIAL SYSTEM	ACTIVE SAND DUNE & SWALE COMPLEX	ACTIVE SAND DUNE & SWALE COMPLEX	
TERRESTRIAL SYSTEM	GREASEWOOD FLAT & EPHEMERAL MEADOW COMPLEX	GREASEWOOD FLAT & EPHEMERAL MEADOW COMPLEX	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	MONTANE GRASSLAND	MONTANE GRASSLAND	
TERRESTRIAL SYSTEM	SAN LUIS VALLEY WINTERFAT SHRUB STEPPE	SAN LUIS VALLEY WINTERFAT SHRUB STEPPE	
TERRESTRIAL SYSTEM	STABILIZED SAND DUNE	STABILIZED SAND DUNE	
GREEN MOUNTAIN, CO- Area # 65 % OF AREA ALREADY PROTECTED: 25.4%	TOTAL CONSERVATION TARGETS: 4 OWNERSHIP- 84.3% FEDERAL; 15.7% PRIVATE; 0.0% STATE	ACRES: 17,792	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
FISH	ONCORHYNCHUS CLARKI PLEURITICUS	COLORADO RIVER CUTTHROAT TROUT	G3
PLANTS	ILIAMNA GRANDIFLORA	LARGE-FLOWER GLOBE-MALLOW	G3
TERRESTRIAL SYSTEM	GAMBEL'S OAK SHRUBLAND	GAMBEL'S OAK SHRUBLAND	
GREENHORN MOUNTAIN, CO- Area #66 % OF AREA ALREADY PROTECTED:8.5%	TOTAL CONSERVATION TARGETS: 26 OWNERSHIP- 61.9% FEDERAL; 35.7% PRIVATE; 2.4% STATE	ACRES: 288,106	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES /	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES /	

* Targets in bold provided by reviewers and not yet added in SRM database

TAXON GROUP	SCIENTIFIC NAME	COMMON NAME	GRANK
	SANDSTONES / LIMESTONES - EDU 2	LIMESTONES - EDU 2	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 2	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 2	
AQUATIC SYSTEM	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 2	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 2	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 2	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 2	
AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 2	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 2	
BIRDS	FALCO PEREGRINUS ANATUM	AMERICAN PEREGRINE FALCON	G3
BIRDS	**PASSERINA AMOENA**	**LAZULI BUNTING**	**G5**
BIRDS	STRIX OCCIDENTALIS LUCIDA	MEXICAN SPOTTED OWL	G3
BIRDS	VERMIVORA VIRGINIAE	VIRGINIA'S WARBLER	G5
FISH	ONCORHYNCHUS CLARKI STOMIAS	GREENBACK CUTTHROAT TROUT	G2
MAMMALS	MARTES AMERICANA	PINE MARTEN	G5
PLANT COMMUNITIES	POPULUS ANGUSTIFOLIA/JUNIPERUS SCOPULORUM	NARROWLEAF COTTONWOOD/ROCKY MOUNTAIN JUNIPER WOODLAND	G2
PLANTS	MENTZELIA DENSA	ROYAL GORGE STICKLEAF	G2
PLANTS	PENSTEMON DEGENERI	DEGENER BEARDTONGUE	G2
REPTILES	EUMECES MULTIVIRGATUS EPIPLEUROTUS	VARIABLE SKINK	G5
TERRESTRIAL SYSTEM	ALPINE SUBSTRATE - ICE FIELD	ALPINE SUBSTRATE - ICE FIELD	
TERRESTRIAL SYSTEM	ASPEN FOREST	ASPEN FOREST	
TERRESTRIAL SYSTEM	DOUGLAS FIR - PONDEROSA PINE FOREST	DOUGLAS FIR - PONDEROSA PINE FOREST	
TERRESTRIAL SYSTEM	GAMBEL'S OAK SHRUBLAND	GAMBEL'S OAK SHRUBLAND	
TERRESTRIAL SYSTEM	INTERMONTANE - FOOTHILL GRASSLAND	INTERMONTANE - FOOTHILL GRASSLAND	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	MONTANE GRASSLAND	MONTANE GRASSLAND	
TERRESTRIAL SYSTEM	MONTANE MIXED CONIFER FOREST (DRY-MESIC & MOIST-MESIC)	MONTANE MIXED CONIFER FOREST (DRY-MESIC & MOIST-MESIC)	
TERRESTRIAL SYSTEM	PINYON - JUNIPER WOODLAND	PINYON - JUNIPER WOODLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	
GREENIE MOUNTAIN, CO- Area #67 % OF AREA ALREADY PROTECTED: 8.9%	TOTAL CONSERVATION TARGETS: 13 OWNERSHIP- 32.6% FEDERAL; 65% PRIVATE; 2.4% STATE		ACRES: 139,367
	SPECIES AGGREGATION	WATERBIRD STAGING AREA	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	
BIRDS	ASIO FLAMMEUS	SHORT-EARED OWL	G5
BIRDS	GRUS CANADENSIS TABIDA	GREATER SANDHILL CRANE	G4
BIRDS	HALIAEETUS LEUCOCEPHALUS	BALD EAGLE	G4
MAMMALS	CYNOMYS GUNNISONI	GUNNISON'S PRAIRIE DOG	G5
MAMMALS	PEROGNATHUS FLAVUS SANLUISI	SILKY POCKET MOUSE SUBSP.	G3
MAMMALS	SPERMOPHILUS TRIDECEMLINEATUS BLANCA	THIRTEEN-LINED GROUND SQUIRREL SUBSP.	G3
PLANT COMMUNITIES	STIPA NEOMEXICANA	NEW MEXICO NEEDLE GRASS	G2
PLANTS	CLEOME MULTICAULIS	SLENDER SPIDERFLOWER	G2
TERRESTRIAL SYSTEM	GREASEWOOD FLAT & EPHEMERAL MEADOW COMPLEX	GREASEWOOD FLAT & EPHEMERAL MEADOW COMPLEX	
TERRESTRIAL SYSTEM	MONTANE - FOOTHILL CLIFF & CANYON	MONTANE - FOOTHILL CLIFF & CANYON	
TERRESTRIAL SYSTEM	SAN LUIS VALLEY WINTERFAT SHRUB STEPPE	SAN LUIS VALLEY WINTERFAT SHRUB STEPPE	
GRIZZLY PEAK, CO- Area #68 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 3 OWNERSHIP- 99.9% FEDERAL; 0.1% PRIVATE; 0.0% STATE		ACRES: 2,965
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	
PLANTS	DRABA SPECTABILIS VAR OXYLOBA	DRABA SPECTABILIS VAR OXYLOBA	G3
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
GUANELLA, CO- Area #69 % OF AREA ALREADY PROTECTED: 37.7%	TOTAL CONSERVATION TARGETS: 20 OWNERSHIP- 84.3% FEDERAL; 12.3% PRIVATE; 3.4% STATE		ACRES: 68,050
AMPHIBIANS	BUFO BOREAS POP 1	BOREAL TOAD (SOUTHERN ROCKY MOUNTAIN POPULATION)	G1
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER GRANITE / VOLCANIC	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER GRANITE / VOLCANIC LAKE - EDU 1	

* Targets in bold provided by reviewers and not yet added in SRM database

APPENDIX 13: CONSERVATION AREA SUMMARIES

TAXON GROUP	SCIENTIFIC NAME	COMMON NAME	GRANK
	LAKE - EDU 1		
BIRDS	CYPSELOIDES NIGER	BLACK SWIFT	G4
INVERTEBRATES	EUCOSMA FOFANA	TORTRICID MOTH	G3
INVERTEBRATES	PHANETA INSIGNATA	TORTRICID MOTH	G3
INVERTEBRATES	PHANETA UNDESCRIBED SPECIES	PHANETA UNDESCRIBED SPECIES	G3
PLANT COMMUNITIES	PINUS ARISTATA/JUNIPERUS COMMUNIS	BRISTLECONE PINE/COMMON JUNIPER	G3
PLANT COMMUNITIES	PINUS ARISTATA/TRIFOLIUM DASYPHYLLUM	BRISTLE-CONE PINE/UINTAH CLOVER	G2
PLANTS	AQUILEGIA SAXIMONTANA	ROCKY MOUNTAIN COLUMBINE	G3
PLANTS	BOTRYCHIUM CAMPESTRE	PRAIRIE MOONWORT	G3
PLANTS	BOTRYCHIUM HESPERIUM	WESTERN MOONWORT	G3
PLANTS	CAREX CONCINNA	LOW NORTHERN SEDGE	G4
PLANTS	MIMULUS GEMMIPARUS	WEBER MONKEY-FLOWER	G2
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	ALPINE SUBSTRATE - ICE FIELD	ALPINE SUBSTRATE - ICE FIELD	
TERRESTRIAL SYSTEM	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	
TERRESTRIAL SYSTEM	LODGEPOLE PINE FOREST	LODGEPOLE PINE FOREST	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	
GUNNISON BASIN, CO- Area #70 % OF AREA ALREADY PROTECTED: 8.1%	TOTAL CONSERVATION TARGETS: 20 OWNERSHIP- 76.5% FEDERAL; 21.2% PRIVATE; 2.3% STATE	ACRES: 561,045	
AQUATIC SYSTEM	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS LARGE RIVER GRANITE / VOLCANIC - EDU 3	MONTANE MODERATE AND LOW GRADIENTS LARGE RIVER GRANITE / VOLCANIC - EDU 3	
BIRDS	**CENTROCERCUS MINIMUS**	**GUNNISON SAGE GROUSE**	**G1**
BIRDS	HALIAEETUS LEUCOCEPHALUS	BALD EAGLE	G4
FISH	ONCORHYNCHUS CLARKI PLEURITICUS	COLORADO RIVER CUTTHROAT TROUT	G3
INVERTEBRATES	BAETIS VIRILE	A MAYFLY	G3
MAMMALS	MARTES AMERICANA	PINE MARTEN	G5
PLANT COMMUNITIES	DANTHONIA PARRYI	PARRY'S OATGRASS	G2
PLANTS	ASTRAGALUS ANISUS	GUNNISON MILKVETCH	G2
PLANTS	ASTRAGALUS MICROCYMBUS	SKIFF MILKVETCH	G1
PLANTS	GILIA PENSTEMONOIDES	BLACK CANYON GILIA	G3
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	
TERRESTRIAL SYSTEM	ASPEN FOREST	ASPEN FOREST	
TERRESTRIAL SYSTEM	DOUGLAS FIR - PONDEROSA PINE FOREST	DOUGLAS FIR - PONDEROSA PINE FOREST	
TERRESTRIAL SYSTEM	GAMBEL'S OAK SHRUBLAND	GAMBEL'S OAK SHRUBLAND	
TERRESTRIAL SYSTEM	LODGEPOLE PINE FOREST	LODGEPOLE PINE FOREST	
TERRESTRIAL SYSTEM	MOUNTAIN SAGEBRUSH SHRUBLAND	MOUNTAIN SAGEBRUSH SHRUBLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	
HARDEN CREEK, WY- Area # 71 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 4 OWNERSHIP- 59.3% FEDERAL; 21.5% PRIVATE; 19.2% STATE	ACRES: 2,966	
AMPHIBIANS	BUFO BOREAS POP 1	BOREAL TOAD (SOUTHERN ROCKY MOUNTAIN POPULATION)	G1
AMPHIBIANS	RANA SYLVATICA	WOOD FROG	G5
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 1	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 1	
AQUATIC SYSTEM	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	
HARDSCRABBLE, CO- Area #72 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 3 OWNERSHIP- 100% FEDERAL; 0.0% PRIVATE; 0.0% STATE	ACRES: 2,965	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	
FISH	ONCORHYNCHUS CLARKI PLEURITICUS	COLORADO RIVER CUTTHROAT TROUT	G3
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
HERMIT PARK, CO- Area #73 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 3 OWNERSHIP- 36.9% FEDERAL; 63.1% PRIVATE; 0.0% STATE	ACRES: 2,965	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER GRANITE / VOLCANIC LAKE - EDU 1	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER GRANITE / VOLCANIC LAKE - EDU 1	
PLANTS	POTENTILLA RUPINCOLA	ROCKY MOUNTAIN CINQUEFOIL	G2

* Targets in bold provided by reviewers and not yet added in SRM database

APPENDIX 13: CONSERVATION AREA SUMMARIES

TAXON GROUP	SCIENTIFIC NAME	COMMON NAME	GRANK
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
HIGHWAY SPRING, CO- Area #74	TOTAL CONSERVATION TARGETS: 2		ACRES: 2,965
% OF AREA ALREADY PROTECTED: 0%	OWNERSHIP- 86.9% FEDERAL; 13.1% PRIVATE; 0.0% STATE		
TERRESTRIAL SYSTEM	MONTANE GRASSLAND	MONTANE GRASSLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
HONDO CREEK, RITO, CO- Area #75	TOTAL CONSERVATION TARGETS: 3		ACRES: 2,965
% OF AREA ALREADY PROTECTED: 0%	OWNERSHIP- 95.1% FEDERAL; 4.9% PRIVATE; 0.0% STATE		
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	
PLANTS	MACHAERANTHERA COLORADOENSIS	COLORADO TANSY-ASTER	G2
TERRESTRIAL SYSTEM	MONTANE GRASSLAND	MONTANE GRASSLAND	
HORSESHOE CREEK, WY- Area # 76	TOTAL CONSERVATION TARGETS: 13		ACRES: 95,061
% OF AREA ALREADY PROTECTED: 0%	OWNERSHIP- 43.5% FEDERAL; 48.2% PRIVATE; 8.3% STATE		
AMPHIBIANS	BUFO BOREAS POP 1	BOREAL TOAD (SOUTHERN ROCKY MOUNTAIN POPULATION)	G1
AMPHIBIANS	RANA PIPIENS	NORTHERN LEOPARD FROG	G5
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	
AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	
AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS LARGE RIVER GRANITE / VOLCANIC - EDU 1	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS LARGE RIVER GRANITE / VOLCANIC - EDU 1	
MAMMALS	ZAPUS HUDSONIUS PREBLEI	MEADOW JUMPING MOUSE	G2
PLANTS	AQUILEGIA LARAMIENSIS	LARAMIE COLUMBINE	G2
PLANTS	POLYPODIUM SAXIMONTANUM	ROCKY MOUNTAIN POLYPODY	G4
TERRESTRIAL SYSTEM	INTERMONTANE - FOOTHILL GRASSLAND	INTERMONTANE - FOOTHILL GRASSLAND	
TERRESTRIAL SYSTEM	LODGEPOLE PINE FOREST	LODGEPOLE PINE FOREST	
TERRESTRIAL SYSTEM	MONTANE RIPARIAN SHRUBLAND	MONTANE RIPARIAN SHRUBLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
TERRESTRIAL SYSTEM	UPPER MONTANE RIPARIAN FOREST & WOODLAND	UPPER MONTANE RIPARIAN FOREST & WOODLAND	
HUERFANO GRASSLANDS, CO- Area # 77	TOTAL CONSERVATION TARGETS: 6		ACRES: 7,894
% OF AREA ALREADY PROTECTED: 0%	OWNERSHIP- 4.6% FEDERAL; 88.6% PRIVATE; 6.8% STATE		
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 2	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 2	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 2	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 2	
AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 2	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 2	
FISH	ONCORHYNCHUS CLARKI STOMIAS	GREENBACK CUTTHROAT TROUT	G2
TERRESTRIAL SYSTEM	INTERMONTANE - FOOTHILL GRASSLAND	INTERMONTANE - FOOTHILL GRASSLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
HUNTER, CO- Area #78	TOTAL CONSERVATION TARGETS: 5		ACRES: 14,826
% OF AREA ALREADY PROTECTED: 0%	OWNERSHIP- 100% FEDERAL; 0.0% PRIVATE; 0.0% STATE		
AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 4	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 4	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 4	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 4	
FISH	ONCORHYNCHUS CLARKI PLEURITICUS	COLORADO RIVER CUTTHROAT TROUT	G3
PLANTS	DRABA SPECTABILIS VAR OXYLOBA	DRABA SPECTABILIS VAR OXYLOBA	G3
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
HUSTON PARK, WY- Area # 79	TOTAL CONSERVATION TARGETS: 17		ACRES: 176,600
% OF AREA ALREADY PROTECTED: 23.2%	OWNERSHIP- 91.1% FEDERAL; 6.8% PRIVATE; 2.1% STATE		
AMPHIBIANS	BUFO BOREAS POP 1	BOREAL TOAD (SOUTHERN ROCKY MOUNTAIN POPULATION)	G1
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 7	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 7	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	

* Targets in bold provided by reviewers and not yet added in SRM database

TAXON GROUP	SCIENTIFIC NAME	COMMON NAME	GRANK
AQUATIC SYSTEM	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 7	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 7	
FISH	ONCORHYNCHUS CLARKI PLEURITICUS	COLORADO RIVER CUTTHROAT TROUT	G3
MAMMALS	MARTES AMERICANA	PINE MARTEN	G5
PLANTS	IPOMOPSIS AGGREGATA SSP WEBERI	RABBIT EARS GILIA	G2
PLANTS	MACHAERANTHERA COLORADOENSIS	COLORADO TANSY-ASTER	G2
PLANTS	PENSTEMON CYATHOPHORUS	MIDDLE PARK PENSTEMON	G3
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	ALPINE SUBSTRATE - ICE FIELD	ALPINE SUBSTRATE - ICE FIELD	
TERRESTRIAL SYSTEM	ASPEN FOREST	ASPEN FOREST	
TERRESTRIAL SYSTEM	LODGEPOLE PINE FOREST	LODGEPOLE PINE FOREST	
TERRESTRIAL SYSTEM	MONTANE RIPARIAN SHRUBLAND	MONTANE RIPARIAN SHRUBLAND	
TERRESTRIAL SYSTEM	MOUNTAIN SAGEBRUSH SHRUBLAND	MOUNTAIN SAGEBRUSH SHRUBLAND	
TERRESTRIAL SYSTEM	SAGEBRUSH STEPPE	SAGEBRUSH STEPPE	
TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	
IRON CREEK, WY- Area # 80 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 1 OWNERSHIP- 100% FEDERAL; 0% PRIVATE; 0% STATE		ACRES: 2,965
PLANTS	CYPRIPEDIUM FASCICULATUM	PURPLE LADY'S-SLIPPER	
JEMEZ CANYON RESERVOIR, NM- Area # 81 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 5 OWNERSHIP-100% FEDERAL; 0% PRIVATE; 0% STATE		ACRES: 16,296
AQUATIC SYSTEM	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	
TERRESTRIAL SYSTEM	INTERMONTANE - FOOTHILL GRASSLAND	INTERMONTANE - FOOTHILL GRASSLAND	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	SAGEBRUSH STEPPE	SAGEBRUSH STEPPE	
TERRESTRIAL SYSTEM	WINTERFAT SHRUB STEPPE	WINTERFAT SHRUB STEPPE	
JEMEZ MOUNTAINS, NM- Area # 82 % OF AREA ALREADY PROTECTED: 8.6%	TOTAL CONSERVATION TARGETS: 40 OWNERSHIP- 78.3% FEDERAL; 21.4% PRIVATE; 0.3% STATE		ACRES: 870,385
AMPHIBIANS	PLETHODON NEOMEXICANUS	JEMEZ MOUNTAINS SALAMANDER	G2
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 5	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 5	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 5	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 5	
AQUATIC SYSTEM	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	
AQUATIC SYSTEM	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 5	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 5	
AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 5	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 5	
AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	
BIRDS	BUTEO ALBONATUS	ZONE-TAILED HAWK	G4
BIRDS	CYPSELOIDES NIGER	BLACK SWIFT	G4
BIRDS	FALCO PEREGRINUS ANATUM	AMERICAN PEREGRINE FALCON	G3
BIRDS	HALIAEETUS LEUCOCEPHALUS	BALD EAGLE	G4
BIRDS	STRIX OCCIDENTALIS LUCIDA	MEXICAN SPOTTED OWL	G3
FISH	CATOSTOMUS PLEBEIUS	RIO GRANDE SUCKER	G3
FISH	GILA PANDORA	RIO GRANDE CHUB	G3
FISH	ONCORHYNCHUS CLARKI VIRGINALIS	RIO GRANDE CUTTHROAT TROUT	G3
INVERTEBRATES	CORDULEGASTER DORSALIS	PACIFIC SPIKETAIL	G5
INVERTEBRATES	LYMNAEA CAPERATA	SAY'S PONDSNAIL	G3
MAMMALS	CYNOMYS GUNNISONI	GUNNISON'S PRAIRIE DOG	G5
MAMMALS	MARTES AMERICANA	PINE MARTEN	G5
MAMMALS	OCHOTONA PRINCEPS NIGRESCENS	GOAT PEAK PIKA	G1
MAMMALS	SOREX PREBLEI	PREBLE'S SHREW	G4

* Targets in bold provided by reviewers and not yet added in SRM database

APPENDIX 13: CONSERVATION AREA SUMMARIES

TAXON GROUP	SCIENTIFIC NAME	COMMON NAME	GRANK
MAMMALS	ZAPUS HUDSONIUS LUTEUS	NEW MEXICAN JUMPING MOUSE	G2
PLANTS	ASTRAGALUS MICROMERIUS	CHACO MILKVETCH	G2
PLANTS	MENTZELIA SPRINGERI	SANTA FE STICKLEAF	G3
PLANTS	SALIX ARIZONICA	ARIZONA WILLOW	G2
PLANTS	TOWNSENDIA GYPSOPHILA	GYPSUM TOWNSEND'S ASTER	G2
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	FRESHWATER MARSH & WET MEADOW	FRESHWATER MARSH & WET MEADOW	
TERRESTRIAL SYSTEM	GAMBEL'S OAK SHRUBLAND	GAMBEL'S OAK SHRUBLAND	
TERRESTRIAL SYSTEM	INTERMONTANE - FOOTHILL GRASSLAND	INTERMONTANE - FOOTHILL GRASSLAND	
TERRESTRIAL SYSTEM	JUNIPER SAVANNA	JUNIPER SAVANNA	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	MONTANE MIXED CONIFER FOREST (DRY-MESIC & MOIST-MESIC)	MONTANE MIXED CONIFER FOREST (DRY-MESIC & MOIST-MESIC)	
TERRESTRIAL SYSTEM	PINYON - JUNIPER WOODLAND	PINYON - JUNIPER WOODLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
TERRESTRIAL SYSTEM	SAGEBRUSH STEPPE	SAGEBRUSH STEPPE	
TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	
TERRESTRIAL SYSTEM	WINTERFAT SHRUB STEPPE	WINTERFAT SHRUB STEPPE	
KENOSHA, CO- Area # 83 % OF AREA ALREADY PROTECTED: 27.6%	TOTAL CONSERVATION TARGETS: 9 OWNERSHIP- 0.0% FEDERAL; 74.2% PRIVATE; 25.8% STATE		ACRES: 121,575
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER GRANITE / VOLCANIC LAKE - EDU 1	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER GRANITE / VOLCANIC LAKE - EDU 1	
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	
TERRESTRIAL SYSTEM	FRESHWATER MARSH & WET MEADOW	FRESHWATER MARSH & WET MEADOW	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
TERRESTRIAL SYSTEM	SOUTH PARK MONTANE GRASSLANDS	SOUTH PARK MONTANE GRASSLANDS	
TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	
LA BONTE CREEK, WY- Area # 84 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 4 OWNERSHIP- 0% FEDERAL; 74.2% PRIVATE; 25.8% STATE		ACRES: 7,686
AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	
TERRESTRIAL SYSTEM	INTERMONTANE - FOOTHILL GRASSLAND	INTERMONTANE - FOOTHILL GRASSLAND	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	MONTANE - FOOTHILL CLIFF & CANYON	MONTANE - FOOTHILL CLIFF & CANYON	
LA GARITA, CO- Area # 85 % OF AREA ALREADY PROTECTED:6.4%	TOTAL CONSERVATION TARGETS: 32 OWNERSHIP- 87.3% FEDERAL; 12.1% PRIVATE; 0.6% STATE		ACRES: 237,220
AMPHIBIANS	BUFO BOREAS POP 1	BOREAL TOAD (SOUTHERN ROCKY MOUNTAIN POPULATION)	G1
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	
BIRDS	FALCO PEREGRINUS ANATUM	AMERICAN PEREGRINE FALCON	G3
FISH	ONCORHYNCHUS CLARKI VIRGINALIS	RIO GRANDE CUTTHROAT TROUT	G3
INVERTEBRATES	BOLORIA IMPROBA ACROCNEMA	UNCOMPAHGRE FRITILLARY	G2
MAMMALS	MARTES AMERICANA	PINE MARTEN	G5
PLANT COMMUNITIES	DANTHONIA PARRYI	PARRY'S OATGRASS	G2
PLANT COMMUNITIES	FESTUCA ARIZONICA-MUHLENBERGIA FILICULMIS	ARIZONA FESCUE/SLIM-STEM MUHLY	G2
PLANT COMMUNITIES	FESTUCA ARIZONICA-MUHLENBERGIA MONTANA	ARIZONA FESCUE/MOUNTAIN MUHLY	G3
PLANT COMMUNITIES	MUHLENBERGIA FILICULMIS	SLIM-STEM MUHLY	G2
PLANTS	DRABA RECTIFRUCTA	MOUNTAIN WHITLOW-GRASS	G3
PLANTS	DRABA SMITHII	SMITH WHITLOW-GRASS	G2
PLANTS	GILA ROBUSTA	BLACK CANYON GILIA	G3

* Targets in bold provided by reviewers and not yet added in SRM database

APPENDIX 13: CONSERVATION AREA SUMMARIES

TAXON GROUP	SCIENTIFIC NAME	COMMON NAME	GRANK
PLANTS	GILIA PENSTEMONOIDES	BLACK CANYON GILIA	G3
PLANTS	POTENTILLA AMBIGENS	SOUTHERN ROCKY MOUNTAIN CINQUEFOIL	G3
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	ALPINE SUBSTRATE - ICE FIELD	ALPINE SUBSTRATE - ICE FIELD	
TERRESTRIAL SYSTEM	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	
TERRESTRIAL SYSTEM	ASPEN FOREST	ASPEN FOREST	
TERRESTRIAL SYSTEM	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	
TERRESTRIAL SYSTEM	DOUGLAS FIR - PONDEROSA PINE FOREST	DOUGLAS FIR - PONDEROSA PINE FOREST	
TERRESTRIAL SYSTEM	FRESHWATER MARSH & WET MEADOW	FRESHWATER MARSH & WET MEADOW	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	MONTANE - FOOTHILL CLIFF & CANYON	MONTANE - FOOTHILL CLIFF & CANYON	
TERRESTRIAL SYSTEM	MONTANE GRASSLAND	MONTANE GRASSLAND	
TERRESTRIAL SYSTEM	MONTANE RIPARIAN SHRUBLAND	MONTANE RIPARIAN SHRUBLAND	
TERRESTRIAL SYSTEM	PINYON - JUNIPER WOODLAND	PINYON - JUNIPER WOODLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	
LA VETA PASS LINK, CO- Area # 86 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 7 OWNERSHIP- 38.0% FEDERAL; 59.2% PRIVATE; 2.9% STATE		ACRES: 32,617
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 2	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 2	
FISH	ONCORHYNCHUS CLARKI VIRGINALIS	RIO GRANDE CUTTHROAT TROUT	G3
MAMMALS	**MARTES AMERICANA**	**PINE MARTEN**	**G5**
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	GAMBEL'S OAK SHRUBLAND	GAMBEL'S OAK SHRUBLAND	
TERRESTRIAL SYSTEM	MONTANE MIXED CONIFER FOREST (DRY-MESIC & MOIST-MESIC)	MONTANE MIXED CONIFER FOREST (DRY-MESIC & MOIST-MESIC)	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
LARAMIE FOOTHILLS, CO , WY- Area # 87 % OF AREA ALREADY PROTECTED: 7.5%	TOTAL CONSERVATION TARGETS: 22 OWNERSHIP- 20.5% FEDERAL; 65.9% PRIVATE; 13.6% STATE		ACRES: 161,865
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER GRANITE / VOLCANIC LAKE - EDU 1	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER GRANITE / VOLCANIC LAKE - EDU 1	
FISH	ONCORHYNCHUS CLARKI STOMIAS	GREENBACK CUTTHROAT TROUT	G2
INVERTEBRATES	CALLOPHRYS MOSSII SCHRYVERI	MOSS' ELFIN	G3
INVERTEBRATES	CAUCHAS ELONGATA	INCURVARID MOTH	G3
INVERTEBRATES	NEOMINOIS WYOMINGO	SWALE SATYR	G3
MAMMALS	LEMMISCUS CURTATUS	SAGEBRUSH VOLE	G5
MAMMALS	ZAPUS HUDSONIUS PREBLEI	MEADOW JUMPING MOUSE	G2
PLANT COMMUNITIES	CERCOCARPUS MONTANUS/STIPA NEOMEXICANA	ALDER-LEAF MOUNTAIN MAHOGANY/NEW MEXICO NEEDLE GRASS	G2
PLANT COMMUNITIES	CERCOCARPUS MONTANUS/STIPA SCRIBNERI	ALDER-LEAF MOUNTAIN MAHOGANY/SCRIBNER'S NEEDLE GRASS	G3
PLANT COMMUNITIES	JUNIPERUS SCOPULORUM/CERCOCARPUS MONTANUS	FOOTHILLS PINYON-JUNIPER WOODLANDS/SCARP WOODLANDS	G2
PLANT COMMUNITIES	MUHLENBERGIA MONTANA-STIPA COMATA	MOUNTAIN MUHLY/NEEDLE-AND-THREAD	G2
PLANT COMMUNITIES	PINUS PONDEROSA/FESTUCA KINGII	PONDEROSA PINE/SPIKE FESCUE	G2
PLANT COMMUNITIES	POPULUS TREMULOIDES/ACER GLABRUM	QUAKING ASPEN/ROCKY MOUNTAIN MAPLE	G1
PLANT COMMUNITIES	PURSHIA TRIDENTATA/ARTEMESIA FRIGIDA/STIP	BITTERBRUSH/PRAIRIE SAGEBRUSH/NEEDLE-AND-THREAD	G3
PLANTS	ALETES HUMILIS	LARIMER ALETES	G2
PLANTS	CAREX OREOCHARIS	A SEDGE	G3
PLANTS	POTENTILLA AMBIGENS	SOUTHERN ROCKY MOUNTAIN CINQUEFOIL	G3
PLANTS	POTENTILLA RUPINCOLA	ROCKY MOUNTAIN CINQUEFOIL	G2
TERRESTRIAL SYSTEM	INTERMONTANE - FOOTHILL GRASSLAND	INTERMONTANE - FOOTHILL GRASSLAND	
TERRESTRIAL SYSTEM	MONTANE GRASSLAND	MONTANE GRASSLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
LARAMIE RIVER, CO , WY- Area # 88 % OF AREA ALREADY PROTECTED:0%	TOTAL CONSERVATION TARGETS: 16 OWNERSHIP- 38.4% FEDERAL; 53.8% PRIVATE; 7.8% STATE		ACRES: 57,381
AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER GRANITE / VOLCANIC	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER GRANITE / VOLCANIC LAKE - EDU 1	

* Targets in bold provided by reviewers and not yet added in SRM database

APPENDIX 13: CONSERVATION AREA SUMMARIES

TAXON GROUP	SCIENTIFIC NAME	COMMON NAME	GRANK
	LAKE - EDU 1		
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER GRANITE / VOLCANIC LAKE - EDU 1	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER GRANITE / VOLCANIC LAKE - EDU 1	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 1	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 1	
PLANT COMMUNITIES	ARTEMISIA TRIPARTITA/FESTUCA IDAHOENSIS	THREETIP SAGEBRUSH/IDAHO FESCUE	G3
PLANT COMMUNITIES	PINUS FLEXILIS/FESTUCA KINGII	LIMBER PINE/SPIKE FESCUE	G3
PLANTS	SISYRINCHIUM PALLIDUM	PALE BLUE-EYED GRASS	G2
TERRESTRIAL SYSTEM	LODGEPOLE PINE FOREST	LODGEPOLE PINE FOREST	
TERRESTRIAL SYSTEM	MONTANE GRASSLAND	MONTANE GRASSLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
TERRESTRIAL SYSTEM	UPPER MONTANE RIPARIAN FOREST & WOODLAND	UPPER MONTANE RIPARIAN FOREST & WOODLAND	
TERRESTRIAL SYSTEM	INTERMONTANE - FOOTHILL GRASSLAND	INTERMONTANE - FOOTHILL GRASSLAND	
TERRESTRIAL SYSTEM	MOUNTAIN SAGEBRUSH SHRUBLAND	MOUNTAIN SAGEBRUSH SHRUBLAND	
LAWHEAD GULCH, CO- Area # 89 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 4 OWNERSHIP- 5.3% FEDERAL; 94.7% PRIVATE; 0.0% STATE		ACRES: 7,778
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS LARGE RIVER GRANITE / VOLCANIC - EDU 3	MONTANE MODERATE AND LOW GRADIENTS LARGE RIVER GRANITE / VOLCANIC - EDU 3	
AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	
FISH	**ONCORHYNCHUS CLARKI PLEURITICUS**	**COLORADO RIVER CUTTHROAT TROUT**	**G3**
TERRESTRIAL SYSTEM	WINTERFAT SHRUB STEPPE	WINTERFAT SHRUB STEPPE	
LION CREEK, CO- Area # 90 % OF AREA ALREADY PROTECTED:0%	TOTAL CONSERVATION TARGETS: 1 OWNERSHIP- 96.6% FEDERAL; 3.4% PRIVATE; 0.0% STATE		ACRES: 2,966
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 4	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 4	
LITTLE COAL CREEK, CO- Area # 91 % OF AREA ALREADY PROTECTED: 14.1%	TOTAL CONSERVATION TARGETS: 3 OWNERSHIP- 88.6% FEDERAL; 11.4% PRIVATE; 0.0% STATE		ACRES: 11,860
AQUATIC SYSTEM	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
FISH	ONCORHYNCHUS CLARKI PLEURITICUS	COLORADO RIVER CUTTHROAT TROUT	G3
TERRESTRIAL SYSTEM	GAMBEL'S OAK SHRUBLAND	GAMBEL'S OAK SHRUBLAND	
LIZARD HEAD, CO- Area # 92 % OF AREA ALREADY PROTECTED: 37.4%	TOTAL CONSERVATION TARGETS: 11 OWNERSHIP- 96.5% FEDERAL; 3.5% PRIVATE; 0.0% STATE		ACRES: 44,479
AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 3	
BIRDS	CYPSELOIDES NIGER	BLACK SWIFT	G4
PLANTS	DRABA GRAMINEA	SAN JUAN WHITLOW-GRASS	G2
PLANTS	ERIOPHORUM ALTAICUM VAR NEOGAEUM	ALTAI COTTONGRASS	G3
PLANTS	STELLARIA IRRIGUA	ALTAI CHICKWEED	G4
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	ALPINE SUBSTRATE - ICE FIELD	ALPINE SUBSTRATE - ICE FIELD	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	
LONG GULCH, CO- Area # 93 % OF AREA ALREADY PROTECTED:0%	TOTAL CONSERVATION TARGETS: 2 OWNERSHIP- 100% FEDERAL; 0.0% PRIVATE; 0.0% STATE		ACRES: 2,965
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	
PLANTS	PTILAGROSTIS PORTERI	PORTER FEATHERGRASS	G2

* Targets in bold provided by reviewers and not yet added in SRM database

APPENDIX 13: CONSERVATION AREA SUMMARIES

TAXON GROUP	SCIENTIFIC NAME	COMMON NAME	GRANK
LOWER DOLORES RIVER, CO- Area # 94 — % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 8 — OWNERSHIP- 82% FEDERAL; 18.0% PRIVATE; 0.0% STATE		ACRES: 25,300
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 3	
AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE/FOOTHILLS, FOOTHILLS STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	
BIRDS	FALCO PEREGRINUS ANATUM	AMERICAN PEREGRINE FALCON	G3
BIRDS	STRIX OCCIDENTALIS LUCIDA	MEXICAN SPOTTED OWL	G3
INVERTEBRATES	PRODOXUS PHYLLORYCTIS	PRODOXUS PHYLLORYCTIS	G3
TERRESTRIAL SYSTEM	GAMBEL'S OAK SHRUBLAND	GAMBEL'S OAK SHRUBLAND	
TERRESTRIAL SYSTEM	PINYON - JUNIPER WOODLAND	PINYON - JUNIPER WOODLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
LOWER POUDRE, CO- Area # 95 — % OF AREA ALREADY PROTECTED: 20.4%	TOTAL CONSERVATION TARGETS: 21 — OWNERSHIP- 61.8% FEDERAL; 34.3% PRIVATE; 3.9% STATE		ACRES: 77,776
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER GRANITE / VOLCANIC LAKE - EDU 1	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER GRANITE / VOLCANIC LAKE - EDU 1	
BIRDS	**CINCLUS MEXICANUS**	**AMERICAN DIPPER**	**G5**
BIRDS	**PASSERINA AMOENA**	**LAZULI BUNTING**	**G5**
BIRDS	**VERMIVORA VIRGINIAE**	**VIRGINIA'S WARBLER**	**G5**
INVERTEBRATES	CAPNIA ARAPAHOE	A STONEFLY	G1
INVERTEBRATES	CELASTRINA HUMULUS	HOPS AZURE	G2
INVERTEBRATES	GRAMMIS UNDESCRIBED SP #1	A MOTH	G3
INVERTEBRATES	PHRAGMATOBIA ASSIMILANS	PHRAGMATOBIA ASSIMILANS	G5
INVERTEBRATES	STYGOBROMUS HOLSINGERI	A CAVE OBLIGATE AMPHIPOD	G1
MAMMALS	ZAPUS HUDSONIUS PREBLEI	MEADOW JUMPING MOUSE	G2
PLANT COMMUNITIES	DANTHONIA PARRYI	PARRY'S OATGRASS	G2
PLANT COMMUNITIES	JUNIPERUS SCOPULORUM/CERCOCARPUS MONTANUS	FOOTHILLS PINYON-JUNIPER WOODLANDS/SCARP WOODLANDS	G2
PLANT COMMUNITIES	JUNIPERUS SCOPULORUM/PURSHIA TRIDENTATA	ROCKY MOUNTAIN JUNIPER/BITTERBRUSH	G2
PLANT COMMUNITIES	PURSHIA TRIDENTATA/ARTEMESIA FRIGIDA/STIP	BITTERBRUSH/PRAIRIE SAGEBRUSH/NEEDLE-AND-THREAD	G3
PLANT COMMUNITIES	PURSHIA TRIDENTATA/MUHLENBERGIA MONTANA	BITTERBRUSH/MOUNTAIN MAHOGANY	G2
PLANTS	ALETES HUMILIS	LARIMER ALETES	G2
TERRESTRIAL SYSTEM	INTERMONTANE - FOOTHILL GRASSLAND	INTERMONTANE - FOOTHILL GRASSLAND	
TERRESTRIAL SYSTEM	LODGEPOLE PINE FOREST	LODGEPOLE PINE FOREST	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	MONTANE GRASSLAND	MONTANE GRASSLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
LYNX LINK B, CO , WY- Area # 96 — % OF AREA ALREADY PROTECTED: 4.9%	TOTAL CONSERVATION TARGETS: 6 — OWNERSHIP- 93.5% FEDERAL; 0.1% PRIVATE; 6.4% STATE		ACRES: 11,861
AQUATIC SYSTEM	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 7	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 7	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	
FISH	ONCORHYNCHUS CLARKI PLEURITICUS	COLORADO RIVER CUTTHROAT TROUT	G3
MAMMALS	**LYNX CANADENSIS**	**LYNX**	**G5**
TERRESTRIAL SYSTEM	MONTANE RIPARIAN SHRUBLAND	MONTANE RIPARIAN SHRUBLAND	
TERRESTRIAL SYSTEM	LODGEPOLE PINE FOREST	LODGEPOLE PINE FOREST	
LYNX LINKS 3, CO- Area # 97 — % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 7 — OWNERSHIP- 96.9% FEDERAL; 2.2% PRIVATE; 0.9% STATE		ACRES: 11,862
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER GRANITE / VOLCANIC LAKE - EDU 1	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER GRANITE / VOLCANIC LAKE - EDU 1	
INVERTEBRATES	ARCTIA UNDESCRIBED SP	A TIGER MOTH	G3
MAMMALS	**LYNX CANADENSIS**	**LYNX**	**G5**
MAMMALS	MARTES AMERICANA	PINE MARTEN	G5
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	
MARTEN LINK A, CO- Area # 98 — % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 6 — OWNERSHIP- 95.8% FEDERAL; 4.2% PRIVATE; 0.0% STATE		ACRES: 23,722
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES /	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES /	

* Targets in bold provided by reviewers and not yet added in SRM database

TAXON GROUP	SCIENTIFIC NAME	COMMON NAME	GRANK
	SANDSTONES / LIMESTONES - EDU 3	LIMESTONES - EDU 3	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 3	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 4	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 4	
FISH	ONCORHYNCHUS CLARKI PLEURITICUS	COLORADO RIVER CUTTHROAT TROUT	G3
TERRESTRIAL SYSTEM	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	
TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	
MCCLURE PASS, CO- Area # 99 % OF AREA ALREADY PROTECTED: 22%	TOTAL CONSERVATION TARGETS: 21 OWNERSHIP- 78.3% FEDERAL; 21.6% PRIVATE; 0.1% STATE		ACRES: 240,363
AQUATIC SYSTEM	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	
AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS LARGE RIVER SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS LARGE RIVER SHALES / SANDSTONES / LIMESTONES - EDU 3	
BIRDS	CYPSELOIDES NIGER	BLACK SWIFT	G4
BIRDS	PROGNE SUBIS	PURPLE MARTIN	G5
FISH	ONCORHYNCHUS CLARKI PLEURITICUS	COLORADO RIVER CUTTHROAT TROUT	G3
MAMMALS	MARTES AMERICANA	PINE MARTEN	G5
PLANTS	BOTRYCHIUM PALLIDUM	PALE MOONWORT	G2
PLANTS	ILIAMNA GRANDIFLORA	LARGE-FLOWER GLOBE-MALLOW	G3
PLANTS	PENSTEMON HARRINGTONII	HARRINGTON BEARDTONGUE	G3
PLANTS	PENSTEMON MENSARUM	GRAND MESA PENSTEMON	G3
TERRESTRIAL SYSTEM	ALPINE SUBSTRATE - ICE FIELD	ALPINE SUBSTRATE - ICE FIELD	
TERRESTRIAL SYSTEM	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	
TERRESTRIAL SYSTEM	ASPEN FOREST	ASPEN FOREST	
TERRESTRIAL SYSTEM	GAMBEL'S OAK SHRUBLAND	GAMBEL'S OAK SHRUBLAND	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	MONTANE - FOOTHILL CLIFF & CANYON	MONTANE - FOOTHILL CLIFF & CANYON	
TERRESTRIAL SYSTEM	MONTANE GRASSLAND	MONTANE GRASSLAND	
TERRESTRIAL SYSTEM	MOUNTAIN SAGEBRUSH SHRUBLAND	MOUNTAIN SAGEBRUSH SHRUBLAND	
TERRESTRIAL SYSTEM	PINYON - JUNIPER WOODLAND	PINYON - JUNIPER WOODLAND	
TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	
MIDDLE ARKANSAS RIVER, CO- Area # 100 % OF AREA ALREADY PROTECTED: 1.4%	TOTAL CONSERVATION TARGETS: 25 OWNERSHIP- 66.4% FEDERAL; 28.6% PRIVATE; 4.9% STATE		ACRES: 221,921
AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 2	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 2	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 2	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 2	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 2	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 2	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 2	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 2	
AQUATIC SYSTEM	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 2	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 2	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 2	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 2	
AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS LARGE RIVER GRANITE / VOLCANIC - EDU 2	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS LARGE RIVER GRANITE / VOLCANIC - EDU 2	
BIRDS	FALCO PEREGRINUS ANATUM	AMERICAN PEREGRINE FALCON	G3
BIRDS	**PASSERINA AMOENA**	**LAZULI BUNTING**	**G5**
BIRDS	VERMIVORA VIRGINIAE	VIRGINIA'S WARBLER	G5
MAMMALS	CORYNORHINUS TOWNSENDII PALLESCENS	PALE LUMP-NOSED BAT	G4
MAMMALS	DIPODOMYS ORDII MONTANUS	SAN LUIS KANGAROO RAT	G3
PLANT COMMUNITIES	POPULUS ANGUSTIFOLIA/BETULA OCCIDENTALIS	NARROWLEAF COTTONWOOD/WATER BIRCH	G1
PLANT COMMUNITIES	POPULUS ANGUSTIFOLIA/JUNIPERUS SCOPULORUM	NARROWLEAF COTTONWOOD/ROCKY MOUNTAIN JUNIPER WOODLAND	G2

* Targets in bold provided by reviewers and not yet added in SRM database

TAXON GROUP	SCIENTIFIC NAME	COMMON NAME	GRANK
PLANTS	ERIOGONUM BRANDEGEEI	BRANDEGEE WILD BUCKWHEAT	G1
PLANTS	MENTZELIA CHRYSANTHA	GOLDEN BLAZING STAR	G1
PLANTS	MENTZELIA DENSA	ROYAL GORGE STICKLEAF	G2
PLANTS	PENSTEMON DEGENERI	DEGENER BEARDTONGUE	G2
PLANTS	RIBES NIVEUM	SNOW GOOSEBERRY	G3
TERRESTRIAL SYSTEM	INTERMONTANE - FOOTHILL GRASSLAND	INTERMONTANE - FOOTHILL GRASSLAND	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	MONTANE GRASSLAND	MONTANE GRASSLAND	
TERRESTRIAL SYSTEM	PINYON - JUNIPER WOODLAND	PINYON - JUNIPER WOODLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
TERRESTRIAL SYSTEM	SOUTH PARK MONTANE GRASSLANDS	SOUTH PARK MONTANE GRASSLANDS	
MIDDLE FORK POWDERHORN CREEK, CO- Area # 101 % OF AREA ALREADY PROTECTED:99.9%	TOTAL CONSERVATION TARGETS: 2 OWNERSHIP- 100% FEDERAL; 0.0% PRIVATE; 0.0% STATE		ACRES: 2,965
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
MILL CREEK, WY- Area # 102 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 4 OWNERSHIP- 97.9% FEDERAL; 1.4% PRIVATE; 0.7% STATE		ACRES: 11,861
AMPHIBIANS	RANA SYLVATICA	WOOD FROG	G5
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 1	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 1	
MAMMALS	**MARTES AMERICANA**	**PINE MARTEN**	**G5**
TERRESTRIAL SYSTEM	INTERMONTANE - FOOTHILL GRASSLAND	INTERMONTANE - FOOTHILL GRASSLAND	
MONTEZUMA CREEK, CO- Area # 103 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 5 OWNERSHIP- 38.0% FEDERAL; 62.0% PRIVATE; 0.0% STATE		ACRES: 11,861
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 4	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 4	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER GRANITE / VOLCANIC - EDU 4	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER GRANITE / VOLCANIC - EDU 4	
INVERTEBRATES	SPEYERIA NOKOMIS NOKOMIS	GREAT BASIN FRITILLARY	G2
TERRESTRIAL SYSTEM	GAMBEL'S OAK SHRUBLAND	GAMBEL'S OAK SHRUBLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
MORRISON CREEK, CO- Area # 104 % OF AREA ALREADY PROTECTED: 2.5%	TOTAL CONSERVATION TARGETS: 7 OWNERSHIP- 93.6% FEDERAL; 6.4% PRIVATE; 0.0% STATE		ACRES: 14,587
AMPHIBIANS	BUFO BOREAS POP 1	BOREAL TOAD (SOUTHERN ROCKY MOUNTAIN POPULATION)	G1
AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 7	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 7	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 7	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 7	
TERRESTRIAL SYSTEM	LODGEPOLE PINE FOREST	LODGEPOLE PINE FOREST	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
MOSQUITO RANGE, CO- Area # 105 % OF AREA ALREADY PROTECTED: 2.5%	TOTAL CONSERVATION TARGETS: 38 OWNERSHIP- 73.5% FEDERAL; 26.0% PRIVATE; 0.5% STATE		ACRES: 123,840
AQUATIC SYSTEM	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 1	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 1	
AQUATIC SYSTEM	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 2	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 2	
AQUATIC SYSTEM	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 3	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 3	
AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 2	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 2	
AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS,	

* Targets in bold provided by reviewers and not yet added in SRM database

APPENDIX 13: CONSERVATION AREA SUMMARIES

TAXON GROUP	SCIENTIFIC NAME	COMMON NAME	GRANK
	HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	
FISH	ONCORHYNCHUS CLARKI PLEURITICUS	COLORADO RIVER CUTTHROAT TROUT	G3
MAMMALS	MARTES AMERICANA	PINE MARTEN	G5
PLANT COMMUNITIES	PENTAPHYLLOIDES FLORIBUNDA/DESCHAMPSIA CE	SHRUBBY CINQUEFOIL/TUFTED HAIRGRASS	G4
PLANT COMMUNITIES	PINUS ARISTATA/JUNIPERUS COMMUNIS	BRISTLECONE PINE/COMMON JUNIPER	G3
PLANTS	ARMERIA SCABRA SSP SIBIRICA	SEA PINK	G5
PLANTS	ASTRAGALUS MOLYBDENUS	LEADVILLE MILKVETCH	G3
PLANTS	BRAYA HUMILIS	ALPINE BRAYA	G4
PLANTS	CASTILLEJA PUBERULA	DOWNY INDIAN-PAINTBRUSH	G2
PLANTS	CYSTOPTERIS MONTANA	MOUNTAIN BLADDER FERN	G5
PLANTS	DRABA GRAYANA	GRAY'S PEAK WHITLOW-GRASS	G3
PLANTS	DRABA STREPTOBRACHIA	COLORADO DIVIDE WHITLOW-GRASS	G3
PLANTS	DRABA WEBERI	WEBER'S DRABA	G1
PLANTS	ERIOPHORUM ALTAICUM VAR NEOGAEUM	ALTAI COTTONGRASS	G3
PLANTS	**EUTREMA EDWARDSII SSP PENLANDII**	**PENLAND ALPINE FEN MUSTARD**	**G1**
PLANTS	IPOMOPSIS GLOBULARIS	GLOBE GILIA	G2
PLANTS	PHIPPSIA ALGIDA	SNOW GRASS	G5
PLANTS	PHYSARIA ALPINA	AVERY PEAK TWINPOD	G2
PLANTS	PTILAGROSTIS PORTERI	PORTER FEATHERGRASS	G2
PLANTS	SAUSSUREA WEBERI	WEBER SAUSSUREA	G3
PLANTS	TOWNSENDIA ROTHROCKII	ROTHROCK TOWNSEND-DAISY	G2
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	ALPINE SUBSTRATE - ICE FIELD	ALPINE SUBSTRATE - ICE FIELD	
TERRESTRIAL SYSTEM	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	
TERRESTRIAL SYSTEM	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	
MOUNT CALLAHAN, CO- Area # 106 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 6 OWNERSHIP- 50.5% FEDERAL; 49.5% PRIVATE; 0.0% STATE		ACRES: 13,233
AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS LARGE RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 3	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS LARGE RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 3	
PLANTS	**MENTZELIA ARGILLOSA**	**ARAPIEN STICKLEAF**	**G3**
PLANTS	**PENSTEMON DEBILIS**	**PARACHUTE PENSTEMON**	**G1**
PLANTS	**THALICTRUM HELIOPHYLUM**	**SUN-LOVING MEADOWRUE**	**G3**
TERRESTRIAL SYSTEM	MONTANE - FOOTHILL CLIFF & CANYON	MONTANE - FOOTHILL CLIFF & CANYON	
TERRESTRIAL SYSTEM	PINYON - JUNIPER WOODLAND	PINYON - JUNIPER WOODLAND	
MOUNT FALCON NORTH, CO- Area # 107 % OF AREA ALREADY PROTECTED:0%	TOTAL CONSERVATION TARGETS: 5 OWNERSHIP- 0.0% FEDERAL; 100.0% PRIVATE; 0.0% STATE		ACRES: 13,998
BIRDS	**VERMIVORA VIRGINIAE**	**VIRGINIA'S WARBLER**	**G5**
INVERTEBRATES	CICINDELA NEBRASKANA	A TIGER BEETLE	G4
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	MONTANE GRASSLAND	MONTANE GRASSLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
MOUNT MASSIVE, CO- Area # 108 % OF AREA ALREADY PROTECTED: 100%	TOTAL CONSERVATION TARGETS: 4 OWNERSHIP- 100.0% FEDERAL; 0.0% PRIVATE; 0.0% STATE		ACRES: 2,965
AQUATIC SYSTEM	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 2	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 2	
PLANTS	DRABA GLOBOSA	ROCKCRESS DRABA	G3
PLANTS	DRABA VENTOSA	WIND RIVER WHITLOW-GRASS	G3
TERRESTRIAL SYSTEM	ALPINE SUBSTRATE - ICE FIELD	ALPINE SUBSTRATE - ICE FIELD	
MOUNT ZIRKEL, CO , WY- Area # 109 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 53 OWNERSHIP- 82.6% FEDERAL; 16.1% PRIVATE; 1.3% STATE		ACRES: 648,886
AMPHIBIANS	BUFO BOREAS POP 1	BOREAL TOAD (SOUTHERN ROCKY MOUNTAIN POPULATION)	G1
AMPHIBIANS	RANA SYLVATICA	WOOD FROG	G5
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	
AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS,	

* Targets in bold provided by reviewers and not yet added in SRM database

TAXON GROUP	SCIENTIFIC NAME	COMMON NAME	GRANK
	HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 7	CREEKS GRANITE / VOLCANIC - EDU 7	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 1	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 1	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 7	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 7	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 7	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 7	
AQUATIC SYSTEM	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	
AQUATIC SYSTEM	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
AQUATIC SYSTEM	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 7	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 7	
AQUATIC SYSTEM	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 7	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 7	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 7	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 7	
AQUATIC SYSTEM	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	
AQUATIC SYSTEM	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 7	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 7	
BIRDS	BUCEPHALA ALBEOLA	BUFFLEHEAD	G5
BIRDS	CYPSELOIDES NIGER	BLACK SWIFT	G4
BIRDS	FALCO PEREGRINUS ANATUM	AMERICAN PEREGRINE FALCON	G3
BIRDS	GRUS CANADENSIS TABIDA	GREATER SANDHILL CRANE	G4
FISH	ONCORHYNCHUS CLARKI PLEURITICUS	COLORADO RIVER CUTTHROAT TROUT	G3
INVERTEBRATES	ACERPENNA PYGMAEA	A MAYFLY	G5
INVERTEBRATES	PROSERPINUS FLAVOFASCIATA	YELLOW-BANDED DAY SPHINX	G4
MAMMALS	MARTES AMERICANA	PINE MARTEN	G5
MAMMALS	SOREX HOYI MONTANUS	PYGMY SHREW	G2
MOLLUSKS	ACROLOXUS COLORADENSIS	ROCKY MOUNTAIN CAPSHELL	G1
PLANTS	AZALEASTRUM ALBIFLORUM	WHITE-FLOWERED AZALEA	G4
PLANTS	CAREX LASIOCARPA	SLENDER SEDGE	G5
PLANTS	CAREX LIVIDA	LIVID SEDGE	G5
PLANTS	CAREX VIRIDULA	GREEN SEDGE	G5
PLANTS	DROSERA ROTUNDIFOLIA	ROUNDLEAF SUNDEW	G5
PLANTS	ERIOPHORUM GRACILE	SLENDER COTTONGRASS	G5
PLANTS	ILIAMNA GRANDIFLORA	LARGE-FLOWER GLOBE-MALLOW	G3
PLANTS	IPOMOPSIS AGGREGATA SSP WEBERI	RABBIT EARS GILIA	G2
PLANTS	SALIX SERISSIMA	AUTUMN WILLOW	G4
PLANTS	TRILLIUM OVATUM	WESTERN TRILLIUM	G5
PLANTS	ERIOGONUM EXILIFOLIUM	DROPLEAF BUCKWHEAT	G3
PLANTS	LESQUERELLA PARVULA	A BLADDERPOD	G3
PLANTS	MACHAERANTHERA COLORADOENSIS	COLORADO TANSY-ASTER	G2
PLANTS	PENSTEMON CYATHOPHORUS	MIDDLE PARK PENSTEMON	G3
TERRESTRIAL SYSTEM	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	
TERRESTRIAL SYSTEM	ASPEN FOREST	ASPEN FOREST	

* Targets in bold provided by reviewers and not yet added in SRM database

APPENDIX 13: CONSERVATION AREA SUMMARIES

TAXON GROUP	SCIENTIFIC NAME	COMMON NAME	GRANK
TERRESTRIAL SYSTEM	FRESHWATER MARSH & WET MEADOW	FRESHWATER MARSH & WET MEADOW	
TERRESTRIAL SYSTEM	GAMBEL'S OAK SHRUBLAND	GAMBEL'S OAK SHRUBLAND	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	LODGEPOLE PINE FOREST	LODGEPOLE PINE FOREST	
TERRESTRIAL SYSTEM	MONTANE RIPARIAN SHRUBLAND	MONTANE RIPARIAN SHRUBLAND	
TERRESTRIAL SYSTEM	MOUNTAIN SAGEBRUSH SHRUBLAND	MOUNTAIN SAGEBRUSH SHRUBLAND	
TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	
MUDDY CREEK, CO- Area # 110 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 9 OWNERSHIP- 42.8% FEDERAL; 55.9% PRIVATE; 1.3% STATE		ACRES: 41,513
AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 3	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 3	
AQUATIC SYSTEM	MONTANE STEEP & VERY STEEP GRADIENTS O LARGE RIVER SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE STEEP & VERY STEEP GRADIENTS O LARGE RIVER SHALES / SANDSTONES / LIMESTONES - EDU 3	
PLANTS	ASTRAGALUS OSTERHOUTII	OSTERHOUT MILKVETCH	G1
PLANTS	PENSTEMON HARRINGTONII	HARRINGTON BEARDTONGUE	G3
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	MOUNTAIN SAGEBRUSH SHRUBLAND	MOUNTAIN SAGEBRUSH SHRUBLAND	
MULE CREEK, WY- Area # 111 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 4 OWNERSHIP- 32.5% FEDERAL; 58.6% PRIVATE; 8.9% STATE		ACRES: 11,721
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	
TERRESTRIAL SYSTEM	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	
TERRESTRIAL SYSTEM	INTERMONTANE - FOOTHILL GRASSLAND	INTERMONTANE - FOOTHILL GRASSLAND	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
NATURITA CREEK, CO- Area #112 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 5 OWNERSHIP- 17.0% FEDERAL; 77.7% PRIVATE; 5.2% STATE		ACRES: 23,722
AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE/FOOTHILLS, FOOTHILLS STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	
BIRDS	CENTROCERCUS MINIMUS	GUNNISON SAGE GROUSE	G1
TERRESTRIAL SYSTEM	GAMBEL'S OAK SHRUBLAND	GAMBEL'S OAK SHRUBLAND	
TERRESTRIAL SYSTEM	MONTANE GRASSLAND	MONTANE GRASSLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
NORTH BOULDER CREEK, CO- Area # 113 % OF AREA ALREADY PROTECTED: 9.1%	TOTAL CONSERVATION TARGETS: 13 OWNERSHIP- 58.8% FEDERAL; 41.2% PRIVATE; 0.0% STATE		ACRES: 29,653
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER GRANITE / VOLCANIC LAKE - EDU 1	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER GRANITE / VOLCANIC LAKE - EDU 1	
FISH	ONCORHYNCHUS CLARKI STOMIAS	GREENBACK CUTTHROAT TROUT	G2
MAMMALS	CORYNORHINUS TOWNSENDII PALLESCENS	PALE LUMP-NOSED BAT	G4
MOLLUSKS	ACROLOXUS COLORADENSIS	ROCKY MOUNTAIN CAPSHELL	G1
PLANT COMMUNITIES	DANTHONIA PARRYI	PARRY'S OATGRASS	G2
PLANTS	CAREX OREOCHARIS	A SEDGE	G3
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	ALPINE SUBSTRATE - ICE FIELD	ALPINE SUBSTRATE - ICE FIELD	
TERRESTRIAL SYSTEM	LODGEPOLE PINE FOREST	LODGEPOLE PINE FOREST	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	
TERRESTRIAL SYSTEM	UPPER MONTANE RIPARIAN FOREST & WOODLAND	UPPER MONTANE RIPARIAN FOREST & WOODLAND	
NORTH CAMERON PASS, CO- Area # 114 % OF AREA ALREADY PROTECTED: 41%	TOTAL CONSERVATION TARGETS: 25 OWNERSHIP- 74.0% FEDERAL; 5.9% PRIVATE; 20.1% STATE		ACRES: 226,260
AMPHIBIANS	RANA SYLVATICA	WOOD FROG	G5
AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	

* Targets in bold provided by reviewers and not yet added in SRM database

TAXON GROUP	SCIENTIFIC NAME	COMMON NAME	GRANK
	1		
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER GRANITE / VOLCANIC LAKE - EDU 1	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER GRANITE / VOLCANIC LAKE - EDU 1	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	
BIRDS	CINCLUS MEXICANUS	AMERICAN DIPPER	G5
FISH	ONCORHYNCHUS CLARKI STOMIAS	GREENBACK CUTTHROAT TROUT	G2
MAMMALS	MARTES AMERICANA	PINE MARTEN	G5
MAMMALS	SOREX HOYI MONTANUS	PYGMY SHREW	G2
PLANTS	AQUILEGIA SAXIMONTANA	ROCKY MOUNTAIN COLUMBINE	G3
PLANTS	BOTRYCHIUM ECHO	REFLECTED MOONWORT	G2
PLANTS	CAREX LASIOCARPA	SLENDER SEDGE	G5
PLANTS	CAREX LIVIDA	LIVID SEDGE	G5
PLANTS	DRABA STREPTOBRACHIA	COLORADO DIVIDE WHITLOW-GRASS	G3
PLANTS	SALIX CANDIDA	HOARY OR SILVER WILLOW	G5
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	ALPINE SUBSTRATE - ICE FIELD	ALPINE SUBSTRATE - ICE FIELD	
TERRESTRIAL SYSTEM	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	
TERRESTRIAL SYSTEM	ASPEN FOREST	ASPEN FOREST	
TERRESTRIAL SYSTEM	LODGEPOLE PINE FOREST	LODGEPOLE PINE FOREST	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	MONTANE GRASSLAND	MONTANE GRASSLAND	
TERRESTRIAL SYSTEM	MONTANE RIPARIAN SHRUBLAND	MONTANE RIPARIAN SHRUBLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	
TERRESTRIAL SYSTEM	UPPER MONTANE RIPARIAN FOREST & WOODLAND	UPPER MONTANE RIPARIAN FOREST & WOODLAND	
NORTH LARAMIE RIVER, WY- Area # 115 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 12 OWNERSHIP- 24.8% FEDERAL; 63.8% PRIVATE; 11.5% STATE		ACRES: 103,093
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	
AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	
PLANTS	MACHAERANTHERA COLORADOENSIS	COLORADO TANSY-ASTER	G2
PLANTS	SPHAEROMERIA SIMPLEX	LARAMIE FALSE SAGEBRUSH	G2
TERRESTRIAL SYSTEM	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	
TERRESTRIAL SYSTEM	INTERMONTANE - FOOTHILL GRASSLAND	INTERMONTANE - FOOTHILL GRASSLAND	
TERRESTRIAL SYSTEM	JUNIPER SAVANNA	JUNIPER SAVANNA	
TERRESTRIAL SYSTEM	LODGEPOLE PINE FOREST	LODGEPOLE PINE FOREST	
TERRESTRIAL SYSTEM	MONTANE RIPARIAN SHRUBLAND	MONTANE RIPARIAN SHRUBLAND	
TERRESTRIAL SYSTEM	MOUNTAIN SAGEBRUSH SHRUBLAND	MOUNTAIN SAGEBRUSH SHRUBLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
TERRESTRIAL SYSTEM	SAGEBRUSH STEPPE	SAGEBRUSH STEPPE	
NORTH PARK, CO- Area # 116 % OF AREA ALREADY PROTECTED: 9.4%	TOTAL CONSERVATION TARGETS: 23 OWNERSHIP- 47.1% FEDERAL; 45.5% PRIVATE; 7.4% STATE		ACRES: 260,647
	SPECIES AGGREGATION	WATERBIRD STAGING AREA	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 1	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 1	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	
BIRDS	AMPHISPIZA BELLI	SAGE SPARROW	G5
BIRDS	BUTEO SWAINSONI	SWAINSON'S HAWK	G5
BIRDS	CENTROCERCUS UROPHASIANUS	GREATER SAGE GROUSE	G5
BIRDS	FALCO PEREGRINUS ANATUM	AMERICAN PEREGRINE FALCON	G3
BIRDS	SPIZELLA BREWERI	BREWER'S SPARROW	G5
INVERTEBRATES	BAETIS VIRILE	A MAYFLY	G3
INVERTEBRATES	CERACLEA ARIELLES	A CADDISFLY	G3
INVERTEBRATES	CICINDELA NEBRASKANA	A TIGER BEETLE	G4
INVERTEBRATES	EUPHILOTES RITA EMMELI	EMMEL'S BLUE	G3
INVERTEBRATES	HETEROCLOEON FRIVOLUM	A MAYFLY	G4

* Targets in bold provided by reviewers and not yet added in SRM database

APPENDIX 13: CONSERVATION AREA SUMMARIES

TAXON GROUP	SCIENTIFIC NAME	COMMON NAME	GRANK
INVERTEBRATES	LEPIDOSTOMA CINEREUM	A CADDISFLY	G3
INVERTEBRATES	NEOTRICHIA DOWNSI	A CADDISFLY	G3
INVERTEBRATES	RHITHROGENA PELLUCIDA	A MAYFLY	G5
INVERTEBRATES	TAENIOPTERYX PARVULA	A STONEFLY	G5
PLANTS	PHACELIA FORMOSULA	NORTH PARK PHACELIA	G1
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE – FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	MONTANE GRASSLAND	MONTANE GRASSLAND	
TERRESTRIAL SYSTEM	MONTANE RIPARIAN SHRUBLAND	MONTANE RIPARIAN SHRUBLAND	
TERRESTRIAL SYSTEM	MOUNTAIN SAGEBRUSH SHRUBLAND	MOUNTAIN SAGEBRUSH SHRUBLAND	
TERRESTRIAL SYSTEM	NORTH PARK SAND DUNES	NORTH PARK SAND DUNES	
NORTH PARK SAND DUNES, CO- Area # 117 % OF AREA ALREADY PROTECTED: 0%	OWNERSHIP- 0.6% FEDERAL; 13.8% PRIVATE; 85.6% STATE	TOTAL CONSERVATION TARGETS: 4	ACRES: 8,896
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 1	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 1	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	
INVERTEBRATES	EUPHILOTES RITA EMMELI	EMMEL'S BLUE	G3
TERRESTRIAL SYSTEM	NORTH PARK SAND DUNES	NORTH PARK SAND DUNES	
NORTH PLATTE RIVER, WY- Area # 118 % OF AREA ALREADY PROTECTED: 0%	OWNERSHIP- 3.1% FEDERAL; 96.9% PRIVATE; 0% STATE	TOTAL CONSERVATION TARGETS: 3	ACRES: 2,209
AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE – FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	MONTANE - FOOTHILL CLIFF & CANYON	MONTANE - FOOTHILL CLIFF & CANYON	
NORTH ST VRAIN, CO- Area # 119 % OF AREA ALREADY PROTECTED: 4.3%	OWNERSHIP- 47.3% FEDERAL; 51.2% PRIVATE; 1.6% STATE	TOTAL CONSERVATION TARGETS: 21	ACRES: 109,771
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER GRANITE / VOLCANIC LAKE - EDU 1	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER GRANITE / VOLCANIC LAKE - EDU 1	
BIRDS	CINCLUS MEXICANUS	AMERICAN DIPPER	G5
BIRDS	PASSERINA AMOENA	LAZULI BUNTING	G5
BIRDS	VERMIVORA VIRGINIAE	VIRGINIA'S WARBLER	G5
FISH	ONCORHYNCHUS CLARKI STOMIAS	GREENBACK CUTTHROAT TROUT	G2
INVERTEBRATES	POLITES ORIGENES	CROSSLINE SKIPPER	G5
MAMMALS	CORYNORHINUS TOWNSENDII PALLESCENS	PALE LUMP-NOSED BAT	G4
MAMMALS	ZAPUS HUDSONIUS PREBLEI	MEADOW JUMPING MOUSE	G2
PLANT COMMUNITIES	ANDROPOGON GERARDII-SCHIZACHYRIUM SCOPARI	BIG BLUESTEM-LITTLE FALSE BLUESTEM WESTERN GREAT PLAINS	G2
PLANT COMMUNITIES	CERCOCARPUS MONTANUS/STIPA SCRIBNERI	ALDER-LEAF MOUNTAIN MAHOGANY/SCRIBNER'S NEEDLE GRASS	G3
PLANT COMMUNITIES	JUNIPERUS SCOPULORUM/CERCOCARPUS MONTANUS	FOOTHILLS PINYON-JUNIPER WOODLANDS/SCARP WOODLANDS	G2
PLANT COMMUNITIES	PINUS PONDEROSA/CERCOCARPUS MONTANUS/ANDR	PONDEROSA PINE/MOUNTAIN MAHOGANY/BIG BLUESTEM	G2
PLANT COMMUNITIES	PINUS PONDEROSA/FESTUCA KINGII	PONDEROSA PINE/SPIKE FESCUE	G2
PLANT COMMUNITIES	POPULUS TREMULOIDES/CORYLUS CORNUTA	QUAKING ASPEN/BEAKED HAZEL	G3
PLANTS	ALETES HUMILIS	LARIMER ALETES	G2
TERRESTRIAL SYSTEM	INTERMONTANE - FOOTHILL GRASSLAND	INTERMONTANE - FOOTHILL GRASSLAND	
TERRESTRIAL SYSTEM	LODGEPOLE PINE FOREST	LODGEPOLE PINE FOREST	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	MONTANE GRASSLAND	MONTANE GRASSLAND	
TERRESTRIAL SYSTEM	MONTANE RIPARIAN SHRUBLAND	MONTANE RIPARIAN SHRUBLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
OAK RIDGE, CO- Area # 120 % OF AREA ALREADY PROTECTED: 9%	OWNERSHIP- 0.1% FEDERAL; 90.5% PRIVATE; 9.4% STATE	TOTAL CONSERVATION TARGETS: 5	ACRES: 14,826
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 7	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 7	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 7	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 7	
BIRDS	HALIAEETUS LEUCOCEPHALUS	BALD EAGLE	G4
TERRESTRIAL SYSTEM	GAMBEL'S OAK SHRUBLAND	GAMBEL'S OAK SHRUBLAND	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
OJO CALIENTE, NM- Area # 121 % OF AREA ALREADY PROTECTED:0.6%	OWNERSHIP- 82.1% FEDERAL; 14.8% PRIVATE; 3.1% STATE	TOTAL CONSERVATION TARGETS: 23	ACRES: 542,642

* Targets in bold provided by reviewers and not yet added in SRM database

TAXON GROUP	SCIENTIFIC NAME	COMMON NAME	GRANK
AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 5	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 5	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS LARGE RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	MONTANE MODERATE AND LOW GRADIENTS LARGE RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	
AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS LARGE RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS LARGE RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	
BIRDS	EMPIDONAX TRAILLII EXTIMUS	SOUTHWESTERN WILLOW FLYCATCHER	G5
BIRDS	STRIX OCCIDENTALIS LUCIDA	MEXICAN SPOTTED OWL	G3
FISH	CATOSTOMUS PLEBEIUS	RIO GRANDE SUCKER	G3
FISH	GILA PANDORA	RIO GRANDE CHUB	G3
FISH	ONCORHYNCHUS CLARKI VIRGINALIS	RIO GRANDE CUTTHROAT TROUT	G3
PLANTS	ERICAMERIA MICROCEPHALA	SMALL-HEAD GOLDEN-WEED	G2
REPTILES	CHRYSEMYS PICTA	PAINTED TURTLE	G5
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	FOOTHILLS RIPARIAN WOODLAND & SHRUBLAND	FOOTHILLS RIPARIAN WOODLAND & SHRUBLAND	
TERRESTRIAL SYSTEM	INTERMONTANE - FOOTHILL GRASSLAND	INTERMONTANE - FOOTHILL GRASSLAND	
TERRESTRIAL SYSTEM	JUNIPER SAVANNA	JUNIPER SAVANNA	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	MONTANE MIXED CONIFER FOREST (DRY-MESIC & MOIST-MESIC)	MONTANE MIXED CONIFER FOREST (DRY-MESIC & MOIST-MESIC)	
TERRESTRIAL SYSTEM	PINYON - JUNIPER WOODLAND	PINYON - JUNIPER WOODLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
TERRESTRIAL SYSTEM	SAGEBRUSH STEPPE	SAGEBRUSH STEPPE	
TERRESTRIAL SYSTEM	WINTERFAT SHRUB STEPPE	WINTERFAT SHRUB STEPPE	
OURAY, CO- Area # 122 % OF AREA ALREADY PROTECTED: 28.9%	TOTAL CONSERVATION TARGETS: 6 OWNERSHIP- 78.4% FEDERAL; 21.6% PRIVATE; 0.0% STATE	ACRES: 23,722	
AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
BIRDS	CYPSELOIDES NIGER	BLACK SWIFT	G4
PLANT COMMUNITIES	POPULUS TREMULOIDES/ACER GLABRUM	QUAKING ASPEN/ROCKY MOUNTAIN MAPLE	G1
INVERTEBRATES	SPEYERIA NOKOMIS NOKOMIS	GREAT BASIN FRITILLARY	G2
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	
PAGOSA SPRINGS, CO- Area # 123 % OF AREA ALREADY PROTECTED: 0.2%	TOTAL CONSERVATION TARGETS: 22 OWNERSHIP- 50.8% FEDERAL; 48.9% PRIVATE; 0.4% STATE	ACRES: 207,567	
AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 4	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 4	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 4	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 4	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 4	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) – EDU 4	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER GRANITE / VOLCANIC - EDU 4	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER GRANITE / VOLCANIC - EDU 4	
BIRDS	FALCO PEREGRINUS ANATUM	AMERICAN PEREGRINE FALCON	G3
BIRDS	HALIAEETUS LEUCOCEPHALUS	BALD EAGLE	G4
FISH	ONCORHYNCHUS CLARKI PLEURITICUS	COLORADO RIVER CUTTHROAT TROUT	G3
MAMMALS	MARTES AMERICANA	PINE MARTEN	G5
PLANT COMMUNITIES	FESTUCA ARIZONICA-MUHLENBERGIA MONTANA	ARIZONA FESCUE/MOUNTAIN MUHLY	G3
PLANTS	ASTRAGALUS MISSOURIENSIS VAR HUMISTRATUS	MISSOURI MILK-VETCH	G2
PLANTS	BOTRYCHIUM ECHO	REFLECTED MOONWORT	G2
PLANTS	IPOMOPSIS POLYANTHA	PAGOSA GILIA	G1
PLANTS	LESQUERELLA PRUINOSA	PAGOSA BLADDERPOD	G2

* Targets in bold provided by reviewers and not yet added in SRM database

APPENDIX 13: CONSERVATION AREA SUMMARIES

TAXON GROUP	SCIENTIFIC NAME	COMMON NAME	GRANK
PLANTS	PHLOX CARYOPHYLLA	PAGOSA PHLOX	G4
REPTILES	EUMECES MULTIVIRGATUS EPIPLEUROTUS	VARIABLE SKINK	G5
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	GAMBEL'S OAK SHRUBLAND	GAMBEL'S OAK SHRUBLAND	
TERRESTRIAL SYSTEM	JUNIPER SAVANNA	JUNIPER SAVANNA	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	MONTANE GRASSLAND	MONTANE GRASSLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	
DISAPPOINTMENT VALLEY, CO- Area # 124 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 8 OWNERSHIP- 65.5% FEDERAL; 27.6% PRIVATE; 6.9% STATE		ACRES: 77,589
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES – EDU 3	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 3	
AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE/FOOTHILLS, FOOTHILLS STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	
BIRDS	**CENTROCERCUS MINIMUS**	**GUNNISON SAGE GROUSE**	**G1**
TERRESTRIAL SYSTEM	GAMBEL'S OAK SHRUBLAND	GAMBEL'S OAK SHRUBLAND	
TERRESTRIAL SYSTEM	JUNIPER SAVANNA	JUNIPER SAVANNA	
TERRESTRIAL SYSTEM	PINYON - JUNIPER WOODLAND	PINYON - JUNIPER WOODLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
PASS CREEK, WY- Area # 125 % OF AREA ALREADY PROTECTED: 33.3%	TOTAL CONSERVATION TARGETS: 5 OWNERSHIP- 19.4% FEDERAL; 68.3% PRIVATE; 12.3% STATE		ACRES: 29,103
AQUATIC SYSTEM	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	
TERRESTRIAL SYSTEM	ALPINE SUBSTRATE- ICE FIELD	ALPINE SUBSTRATE- ICE FIELD	
TERRESTRIAL SYSTEM	LODGEPOLE PINE FOREST	LODGEPOLE PINE FOREST	
TERRESTRIAL SYSTEM	MOUNTAIN SAGEBRUSH SHRUBLAND	MOUNTAIN SAGEBRUSH SHRUBLAND	
TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	
PENNOCK MOUNTAIN, WY- Area # 126 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 11 OWNERSHIP- 68.6% FEDERAL; 20.5% PRIVATE; 10.9% STATE		ACRES: 56,607
AMPHIBIANS	RANA SYLVATICA	WOOD FROG	G5
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 1	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 1	
AQUATIC SYSTEM	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	ASPEN FOREST	ASPEN FOREST	
TERRESTRIAL SYSTEM	LODGEPOLE PINE FOREST	LODGEPOLE PINE FOREST	
TERRESTRIAL SYSTEM	MOUNTAIN SAGEBRUSH SHRUBLAND	MOUNTAIN SAGEBRUSH SHRUBLAND	
PIEDRA RIVER, CO- Area # 127 % OF AREA ALREADY PROTECTED: 84.3%	TOTAL CONSERVATION TARGETS: 15 OWNERSHIP- 99.4% FEDERAL; 0.6% PRIVATE; 0.0% STATE		ACRES: 85,993
AMPHIBIANS	BUFO BOREAS POP 1	BOREAL TOAD (SOUTHERN ROCKY MOUNTAIN POPULATION)	G1
AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 4	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 4	
AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	
FISH	ONCORHYNCHUS CLARKI PLEURITICUS	COLORADO RIVER CUTTHROAT TROUT	G3
FISH	ONCORHYNCHUS CLARKI VIRGINALIS	RIO GRANDE CUTTHROAT TROUT	G3
PLANTS	ERIOPHORUM ALTAICUM VAR NEOGAEUM	ALTAI COTTONGRASS	G3
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	

* Targets in bold provided by reviewers and not yet added in SRM database

APPENDIX 13: CONSERVATION AREA SUMMARIES

TAXON GROUP	SCIENTIFIC NAME	COMMON NAME	GRANK
TERRESTRIAL SYSTEM	ALPINE SUBSTRATE - ICE FIELD	ALPINE SUBSTRATE - ICE FIELD	
TERRESTRIAL SYSTEM	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	
TERRESTRIAL SYSTEM	FRESHWATER MARSH & WET MEADOW	FRESHWATER MARSH & WET MEADOW	
TERRESTRIAL SYSTEM	MONTANE - FOOTHILL CLIFF & CANYON	MONTANE - FOOTHILL CLIFF & CANYON	
TERRESTRIAL SYSTEM	MONTANE GRASSLAND	MONTANE GRASSLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	
PIKES PEAK, CO- Area # 128 TOTAL CONSERVATION TARGETS: 36 ACRES: 258,807 % OF AREA ALREADY PROTECTED: 5.4% OWNERSHIP- 48.9% FEDERAL; 44.4% PRIVATE; 6.7% STATE			
AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 2	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 2	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 2	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 2	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 2	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 2	
AQUATIC SYSTEM	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 2	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 2	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 2	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 2	
AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 2	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 2	
AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 2	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 2	
BIRDS	FALCO PEREGRINUS ANATUM	AMERICAN PEREGRINE FALCON	G3
BIRDS	STRIX OCCIDENTALIS LUCIDA	MEXICAN SPOTTED OWL	G3
FISH	ONCORHYNCHUS CLARKI STOMIAS	GREENBACK CUTTHROAT TROUT	G2
INVERTEBRATES	GNOPHAELA CLAPPIANA	GNOPHAELA CLAPPIANA	G3
INVERTEBRATES	HETEROCAMPA RUFINANS	HETEROCAMPA RUFINANS	G3
INVERTEBRATES	HYPOCHILUS BONNETI	LAMPSHADE SPIDER	G3
MAMMALS	CORYNORHINUS TOWNSENDII PALLESCENS	PALE LUMP-NOSED BAT	G4
MAMMALS	MARTES AMERICANA	PINE MARTEN	G5
MAMMALS	ZAPUS HUDSONIUS PREBLEI	MEADOW JUMPING MOUSE	G2
PLANT COMMUNITIES	DANTHONIA PARRYI	PARRY'S OATGRASS	G2
PLANT COMMUNITIES	PINUS ARISTATA/TRIFOLIUM DASYPHYLLUM	BRISTLE-CONE PINE/UINTAH CLOVER	G2
PLANTS	AQUILEGIA SAXIMONTANA	ROCKY MOUNTAIN COLUMBINE	G3
PLANTS	BOTRYCHIUM ECHO	REFLECTED MOONWORT	G2
PLANTS	BOTRYCHIUM LINEARE	NARROWLEAF GRAPEFERN	G1
PLANTS	CAREX OREOCHARIS	A SEDGE	G3
PLANTS	OREOXIS HUMILIS	PIKES PEAK SPRING PARSLEY	G1
PLANTS	PENSTEMON GLABER VAR ALPINUS	ALPINE WESTERN PENSTEMON	G3
PLANTS	PLATANTHERA SPARSIFLORA VAR ENSIFOLIA	CANYON BOG-ORCHID	G3
PLANTS	TELESONIX JAMESII	JAMES' TELESONIX	G4
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	ASPEN FOREST	ASPEN FOREST	
TERRESTRIAL SYSTEM	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	
TERRESTRIAL SYSTEM	DOUGLAS FIR - PONDEROSA PINE FOREST	DOUGLAS FIR - PONDEROSA PINE FOREST	
TERRESTRIAL SYSTEM	INTERMONTANE - FOOTHILL GRASSLAND	INTERMONTANE - FOOTHILL GRASSLAND	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	MONTANE GRASSLAND	MONTANE GRASSLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	
PLATTE RIVER, CO , WY- Area # 129 TOTAL CONSERVATION TARGETS: 14 ACRES: 53,801 % OF AREA ALREADY PROTECTED: 31.7% OWNERSHIP- 78.6% FEDERAL; 19.4% PRIVATE; 2.1% STATE			
AMPHIBIANS	RANA SYLVATICA	WOOD FROG	G5
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS LARGE RIVER GRANITE / VOLCANIC - EDU 1	MONTANE MODERATE AND LOW GRADIENTS LARGE RIVER GRANITE / VOLCANIC - EDU 1	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 1	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 1	

* Targets in bold provided by reviewers and not yet added in SRM database

APPENDIX 13: CONSERVATION AREA SUMMARIES

TAXON GROUP	SCIENTIFIC NAME	COMMON NAME	GRANK
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	
BIRDS	HALIAEETUS LEUCOCEPHALUS	BALD EAGLE	G4
MAMMALS	CYNOMYS LEUCURUS	WHITE-TAILED PRAIRIE DOG	G4
MAMMALS	**MARTES AMERICANA**	**PINE MARTEN**	**G5**
MAMMALS	**OVIS CANADENSIS**	**BIGHORN SHEEP**	**G4G5**
PLANTS	POLYPODIUM SAXIMONTANUM	ROCKY MOUNTAIN POLYPODY	G4
TERRESTRIAL SYSTEM	MONTANE RIPARIAN SHRUBLAND	MONTANE RIPARIAN SHRUBLAND	
TERRESTRIAL SYSTEM	UPPER MONTANE RIPARIAN FOREST & WOODLAND	UPPER MONTANE RIPARIAN FOREST & WOODLAND	
TERRESTRIAL SYSTEM	LODGEPOLE PINE FOREST	LODGEPOLE PINE FOREST	
TERRESTRIAL SYSTEM	MOUNTAIN SAGEBRUSH SHRUBLAND	MOUNTAIN SAGEBRUSH SHRUBLAND	
PLEASANT VALLEY CREEK, CO- Area # 130 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 1	OWNERSHIP- 1.9% FEDERAL; 95.4% PRIVATE; 2.7% STATE	ACRES: 5,930
PLANT COMMUNITIES	POPULUS ANGUSTIFOLIA/JUNIPERUS SCOPULORUM	NARROWLEAF COTTONWOOD/ROCKY MOUNTAIN JUNIPER WOODLAND	G2
PRYOR CREEK, CO- Area # 131 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 7	OWNERSHIP- 88.1% FEDERAL; 11.9% PRIVATE; 0.0% STATE	ACRES: 27,872
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	
AQUATIC SYSTEM	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
FISH	ONCORHYNCHUS CLARKI PLEURITICUS	COLORADO RIVER CUTTHROAT TROUT	G3
PLANTS	DRABA SPECTABILIS VAR OXYLOBA	DRABA SPECTABILIS VAR OXYLOBA	G3
TERRESTRIAL SYSTEM	ASPEN FOREST	ASPEN FOREST	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	
PUNCHE VALLEY, CO , NM- Area # 132 % OF AREA ALREADY PROTECTED: 2%	TOTAL CONSERVATION TARGETS: 30	OWNERSHIP- 55.1% FEDERAL; 35.9% PRIVATE; 9% STATE	ACRES: 474,441
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) – EDU 5	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS LARGE RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	MONTANE MODERATE AND LOW GRADIENTS LARGE RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	
AQUATIC SYSTEM	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	
BIRDS	CHARADRIUS MONTANUS	MOUNTAIN PLOVER	G2
BIRDS	BUTEO REGALIS	FERRUGINOUS HAWK	G4
BIRDS	CHARADRIUS MONTANUS	MOUNTAIN PLOVER	G2
FISH	CATOSTOMUS PLEBEIUS	RIO GRANDE SUCKER	G3
FISH	ONCORHYNCHUS CLARKI VIRGINALIS	RIO GRANDE CUTTHROAT TROUT	G3
FISH	GILA PANDORA	RIO GRANDE CHUB	G3
MAMMALS	CYNOMYS GUNNISONI	GUNNISON'S PRAIRIE DOG	G5
MAMMALS	DIPODOMYS ORDII MONTANUS	SAN LUIS KANGAROO RAT	G3
MAMMALS	PEROGNATHUS FLAVUS SANLUISI	SILKY POCKET MOUSE SUBSP.	G3
MAMMALS	SPERMOPHILUS TRIDECEMLINEATUS BLANCA	THIRTEEN-LINED GROUND SQUIRREL SUBSP.	G3
MAMMALS	THOMOMYS BOTTAE PERVAGUS	BOTTA'S POCKET GOPHER SUBSP.PERVAGUS	G3
PLANT COMMUNITIES	POPULUS ANGUSTIFOLIA/SAND DUNE FOREST	NARROWLEAF COTTONWOOD/SAND DUNE FOREST	G1
PLANTS	ASTRAGALUS RIPLEYI	RIPLEY MILKVETCH	G3
REPTILES	EUMECES MULTIVIRGATUS EPIPLEUROTUS	VARIABLE SKINK	G5
TERRESTRIAL SYSTEM	MONTANE GRASSLAND	MONTANE GRASSLAND	
TERRESTRIAL SYSTEM	MOUNTAIN SAGEBRUSH SHRUBLAND	MOUNTAIN SAGEBRUSH SHRUBLAND	
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	INTERMONTANE - FOOTHILL GRASSLAND	INTERMONTANE - FOOTHILL GRASSLAND	
TERRESTRIAL SYSTEM	JUNIPER SAVANNA	JUNIPER SAVANNA	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	

* Targets in bold provided by reviewers and not yet added in SRM database

TAXON GROUP	SCIENTIFIC NAME	COMMON NAME	GRANK
TERRESTRIAL SYSTEM	PINYON - JUNIPER WOODLAND	PINYON - JUNIPER WOODLAND	
TERRESTRIAL SYSTEM	SAGEBRUSH STEPPE	SAGEBRUSH STEPPE	
TERRESTRIAL SYSTEM	SAN LUIS VALLEY WINTERFAT SHRUB STEPPE	SAN LUIS VALLEY WINTERFAT SHRUB STEPPE	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
QUESTA, NM- Area # 133 % OF AREA ALREADY PROTECTED: 2.6%	TOTAL CONSERVATION TARGETS: 5 OWNERSHIP- 73.3% FEDERAL; 26.7% PRIVATE; 0% STATE		ACRES: 14,826
INVERTEBRATES	SPEYERIA NOKOMIS NOKOMIS	GREAT BASIN FRITILLARY	G2
PLANTS	ASTRAGALUS RIPLEYI	RIPLEY MILKVETCH	G3
TERRESTRIAL SYSTEM	JUNIPER SAVANNA	JUNIPER SAVANNA	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
TERRESTRIAL SYSTEM	SAGEBRUSH STEPPE	SAGEBRUSH STEPPE	
RAJADERO CANYON, CO- Area # 134 % OF AREA ALREADY PROTECTED: 2.7%	TOTAL CONSERVATION TARGETS: 21 OWNERSHIP- 67.4% FEDERAL; 19.2% PRIVATE; 13.4% STATE		ACRES: 199,782
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	
FISH	CATOSTOMUS PLEBEIUS	RIO GRANDE SUCKER	G3
FISH	GILA PANDORA	RIO GRANDE CHUB	G3
FISH	ONCORHYNCHUS CLARKI VIRGINALIS	RIO GRANDE CUTTHROAT TROUT	G3
INVERTEBRATES	SPEYERIA NOKOMIS NOKOMIS	GREAT BASIN FRITILLARY	G2
MAMMALS	CYNOMYS GUNNISONI	GUNNISON'S PRAIRIE DOG	G5
MAMMALS	PEROGNATHUS FLAVUS SANLUISI	SILKY POCKET MOUSE SUBSP.	G3
MAMMALS	THOMOMYS BOTTAE PERVAGUS	BOTTA'S POCKET GOPHER SUBSP.PERVAGUS	G3
PLANTS	ASTRAGALUS RIPLEYI	RIPLEY MILKVETCH	G3
PLANTS	DRABA SPECTABILIS VAR OXYLOBA	DRABA SPECTABILIS VAR OXYLOBA	G3
TERRESTRIAL SYSTEM	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	
TERRESTRIAL SYSTEM	ASPEN FOREST	ASPEN FOREST	
TERRESTRIAL SYSTEM	DOUGLAS FIR - PONDEROSA PINE FOREST	DOUGLAS FIR - PONDEROSA PINE FOREST	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	MONTANE GRASSLAND	MONTANE GRASSLAND	
TERRESTRIAL SYSTEM	MONTANE RIPARIAN SHRUBLAND	MONTANE RIPARIAN SHRUBLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
TERRESTRIAL SYSTEM	SAN LUIS VALLEY WINTERFAT SHRUB STEPPE	SAN LUIS VALLEY WINTERFAT SHRUB STEPPE	
TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	
RED & WHITE MTN, CO- Area # 135 % OF AREA ALREADY PROTECTED: 23.9%	TOTAL CONSERVATION TARGETS: 13 OWNERSHIP- 91.1% FEDERAL; 8.4% PRIVATE; 0.5% STATE		ACRES: 100,819
AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 3	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 3	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 3	
AQUATIC SYSTEM	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	
BIRDS	CYPSELOIDES NIGER	BLACK SWIFT	G4
FISH	ONCORHYNCHUS CLARKI PLEURITICUS	COLORADO RIVER CUTTHROAT TROUT	G3
MAMMALS	MARTES AMERICANA	PINE MARTEN	G5
PLANTS	PENSTEMON HARRINGTONII	HARRINGTON BEARDTONGUE	G3
TERRESTRIAL SYSTEM	ALPINE SUBSTRATE - ICE FIELD	ALPINE SUBSTRATE - ICE FIELD	
TERRESTRIAL SYSTEM	ASPEN FOREST	ASPEN FOREST	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	
RED BUTTES, WY- Area # 136 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 3 OWNERSHIP- 0% FEDERAL; 80.9% PRIVATE; 19.1% STATE		ACRES: 2,766
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	

* Targets in bold provided by reviewers and not yet added in SRM database

TAXON GROUP	SCIENTIFIC NAME	COMMON NAME	GRANK
PLANTS	PHACELIA DENTICULATA	ROCKY MOUNTAIN PHACELIA	G3
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
RIFLE HOGBACK, CO- Area #137 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 2 OWNERSHIP- 43.8% FEDERAL; 43.8% PRIVATE; 12.4% STATE		ACRES: 9,685
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 3	
PLANTS	ASTRAGALUS WETHERILLII	WETHERILL MILKVETCH	G3
RIFLE REACH/COLORADO RIVER, CO- Area # 138 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 13 OWNERSHIP- 19.3% FEDERAL; 74.9% PRIVATE; 5.8% STATE		ACRES: 67,416
AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	
AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS LARGE RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 3	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS LARGE RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 3	
BIRDS	FALCO PEREGRINUS ANATUM	AMERICAN PEREGRINE FALCON	G3
BIRDS	HALIAEETUS LEUCOCEPHALUS	BALD EAGLE	G4
FISH	GILA ROBUSTA	ROUNDTAIL CHUB	G2
FISH	PTYCHOCHEILUS LUCIUS	COLORADO PIKEMINNOW	G3
FISH	XYRAUCHEN TEXANUS	RAZORBACK SUCKER	G1
PLANTS	ASTRAGALUS WETHERILLII	WETHERILL MILKVETCH	G3
PLANTS	PENSTEMON HARRINGTONII	HARRINGTON BEARDTONGUE	G3
TERRESTRIAL SYSTEM	GAMBEL'S OAK SHRUBLAND	GAMBEL'S OAK SHRUBLAND	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	MONTANE GRASSLAND	MONTANE GRASSLAND	
TERRESTRIAL SYSTEM	PINYON - JUNIPER WOODLAND	PINYON - JUNIPER WOODLAND	
RIO CHAMA, CO , NM- Area # 139 % OF AREA ALREADY PROTECTED: 19.2%	TOTAL CONSERVATION TARGETS: 33 OWNERSHIP- 41.1% FEDERAL; 45.7% PRIVATE; 13.2% STATE		ACRES: 518,341
AMPHIBIANS	RANA PIPIENS	NORTHERN LEOPARD FROG	G5
AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 5	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 5	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS LARGE RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	MONTANE MODERATE AND LOW GRADIENTS LARGE RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 5	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 5	
AQUATIC SYSTEM	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	
AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 5	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 5	
AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS LARGE RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS LARGE RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	
AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 4	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 4	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 5	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 5	
BIRDS	EMPIDONAX TRAILLII EXTIMUS	SOUTHWESTERN WILLOW FLYCATCHER	G5
BIRDS	HALIAEETUS LEUCOCEPHALUS	BALD EAGLE	G4
BIRDS	STRIX OCCIDENTALIS LUCIDA	MEXICAN SPOTTED OWL	G3
FISH	CATOSTOMUS PLEBEIUS	RIO GRANDE SUCKER	G3

* Targets in bold provided by reviewers and not yet added in SRM database

TAXON GROUP	SCIENTIFIC NAME	COMMON NAME	GRANK
FISH	GILA PANDORA	RIO GRANDE CHUB	G3
FISH	ONCORHYNCHUS CLARKI PLEURITICUS	COLORADO RIVER CUTTHROAT TROUT	G3
FISH	ONCORHYNCHUS CLARKI VIRGINALIS	RIO GRANDE CUTTHROAT TROUT	G3
INVERTEBRATES	UTACAPNIA PODA	GUNNISON STONEFLY	G5
PLANTS	ASTRAGALUS MICROMERIUS	CHACO MILKVETCH	G2
PLANTS	PHLOX CARYOPHYLLA	PAGOSA PHLOX	G4
TERRESTRIAL SYSTEM	FOOTHILLS RIPARIAN WOODLAND & SHRUBLAND	FOOTHILLS RIPARIAN WOODLAND & SHRUBLAND	
TERRESTRIAL SYSTEM	INTERMONTANE - FOOTHILL GRASSLAND	INTERMONTANE - FOOTHILL GRASSLAND	
TERRESTRIAL SYSTEM	JUNIPER SAVANNA	JUNIPER SAVANNA	
TERRESTRIAL SYSTEM	PINYON - JUNIPER WOODLAND	PINYON - JUNIPER WOODLAND	
TERRESTRIAL SYSTEM	SAGEBRUSH STEPPE	SAGEBRUSH STEPPE	
TERRESTRIAL SYSTEM	WINTERFAT SHRUB STEPPE	WINTERFAT SHRUB STEPPE	
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	MONTANE MIXED CONIFER FOREST (DRY-MESIC & MOIST-MESIC)	MONTANE MIXED CONIFER FOREST (DRY-MESIC & MOIST-MESIC)	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
RIO GRANDE, CO- Area # 140 % OF AREA ALREADY PROTECTED: 10%	TOTAL CONSERVATION TARGETS: 17 OWNERSHIP- 20.4% FEDERAL; 79.4% PRIVATE; 0.2% STATE		ACRES: 50,409
	SPECIES AGGREGATION	WATERBIRD STAGING AREA	
AMPHIBIANS	**RANA PIPIENS**	**NORTHERN LEOPARD FROG**	**G5**
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS LARGE RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	MONTANE MODERATE AND LOW GRADIENTS LARGE RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	
BIRDS	AMPHISPIZA BELLI	SAGE SPARROW	G5
BIRDS	EMPIDONAX TRAILLII EXTIMUS	SOUTHWESTERN WILLOW FLYCATCHER	G5
BIRDS	**GRUS CANADENSIS TABIDA**	**GREATER SANDHILL CRANE**	**G4**
BIRDS	**HALIAEETUS LEUCOCEPHALUS**	**BALD EAGLE**	**G4**
BIRDS	SPIZELLA BREWERI	BREWER'S SPARROW	G5
FISH	GILA PANDORA	RIO GRANDE CHUB	G3
PLANTS	CLEOME MULTICAULIS	SLENDER SPIDERFLOWER	G2
TERRESTRIAL SYSTEM	FRESHWATER MARSH & WET MEADOW	FRESHWATER MARSH & WET MEADOW	
TERRESTRIAL SYSTEM	GREASEWOOD FLAT & EPHEMERAL MEADOW COMPLEX	GREASEWOOD FLAT & EPHEMERAL MEADOW COMPLEX	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	MONTANE GRASSLAND	MONTANE GRASSLAND	
TERRESTRIAL SYSTEM	SAGEBRUSH STEPPE	SAGEBRUSH STEPPE	
TERRESTRIAL SYSTEM	SAN LUIS VALLEY WINTERFAT SHRUB STEPPE	SAN LUIS VALLEY WINTERFAT SHRUB STEPPE	
RIO GRANDE GORGE, NM- Area # 141 % OF AREA ALREADY PROTECTED: 30.6%	TOTAL CONSERVATION TARGETS: 3 OWNERSHIP- 52.4% FEDERAL; 33.8% PRIVATE; 13.7% STATE		ACRES: 5,930
BIRDS	FALCO PEREGRINUS ANATUM	AMERICAN PEREGRINE FALCON	G3
INVERTEBRATES	OCHLODES YUMA ANASAZI	YUMA SKIPPER	G5
TERRESTRIAL SYSTEM	JUNIPER SAVANNA	JUNIPER SAVANNA	
RIO GRANDE PYRAMID CO- Area # 142 % OF AREA ALREADY PROTECTED: 100%	TOTAL CONSERVATION TARGETS: 4 OWNERSHIP- 100% FEDERAL; 0.0% PRIVATE; 0.0% STATE		ACRES: 2,965
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	
INVERTEBRATES	BOLORIA IMPROBA ACROCNEMA	UNCOMPAHGRE FRITILLARY	G2
INVERTEBRATES	OENEIS BORE EDWARDSII	WHITE-VEINED ARCTIC	G5
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
RIO HONDO, NM- Area # 143 % OF AREA ALREADY PROTECTED: 27.2%	TOTAL CONSERVATION TARGETS: 12 OWNERSHIP- 89.3% FEDERAL; 10.7% PRIVATE; 0% STATE		ACRES: 44,479
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	
FISH	ONCORHYNCHUS CLARKI VIRGINALIS	RIO GRANDE CUTTHROAT TROUT	G3
INVERTEBRATES	SWELTSA HONDO	A STONEFLY	G3
MAMMALS	MARTES AMERICANA	PINE MARTEN	G5
MOLLUSKS	PISIDIUM SANGUINICHRISTI	SANGRE DE CRISTO PEACLAM	G1
PLANTS	ARTEMISIA PATTERSONII	PATTERSON'S WORMWOOD	G3

* Targets in bold provided by reviewers and not yet added in SRM database

APPENDIX 13: CONSERVATION AREA SUMMARIES

TAXON GROUP	SCIENTIFIC NAME	COMMON NAME	GRANK
PLANTS	DELPHINIUM ALPESTRE	COLORADO LARKSPUR	G2
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	
TERRESTRIAL SYSTEM	MONTANE MIXED CONIFER FOREST (DRY-MESIC & MOIST-MESIC)	MONTANE MIXED CONIFER FOREST (DRY-MESIC & MOIST-MESIC)	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	
ROAN CLIFFS, CO- Area # 144 % OF AREA ALREADY PROTECTED:0%	TOTAL CONSERVATION TARGETS: 17	OWNERSHIP- 51.8% FEDERAL; 48.2% PRIVATE; 0.0% STATE	ACRES: 31,559
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 3	
AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS LARGE RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 3	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS LARGE RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 3	
BIRDS	FALCO PEREGRINUS ANATUM	AMERICAN PEREGRINE FALCON	G3
FISH	GILA ROBUSTA	ROUNDTAIL CHUB	G2
FISH	ONCORHYNCHUS CLARKI PLEURITICUS	COLORADO RIVER CUTTHROAT TROUT	G3
FISH	PTYCHOCHEILUS LUCIUS	COLORADO PIKEMINNOW	G3
FISH	XYRAUCHEN TEXANUS	RAZORBACK SUCKER	G1
PLANTS	ASTRAGALUS DEBEQUAEUS	DEBEQUE MILKVETCH	G2
PLANTS	ASTRAGALUS WETHERILLII	WETHERILL MILKVETCH	G3
PLANTS	**MENTZELIA ARGILLOSA**	**ARAPIEN STICKLEAF**	**G3**
PLANTS	**PENSTEMON DEBILIS**	**PARACHUTE PENSTEMON**	**G1**
PLANTS	**THALICTRUM HELIOPHYLUM**	**SUN-LOVING MEADOWRUE**	**G3**
TERRESTRIAL SYSTEM	GAMBEL'S OAK SHRUBLAND	GAMBEL'S OAK SHRUBLAND	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	MONTANE - FOOTHILL CLIFF & CANYON	MONTANE - FOOTHILL CLIFF & CANYON	
TERRESTRIAL SYSTEM	MONTANE GRASSLAND	MONTANE GRASSLAND	
TERRESTRIAL SYSTEM	PINYON - JUNIPER WOODLAND	PINYON - JUNIPER WOODLAND	
ROCK MOUNTAIN, WY- Area # 145 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 4	OWNERSHIP- 78.6% FEDERAL; 7.5% PRIVATE; 13.9% STATE	ACRES: 23,221
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 1	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 1	
TERRESTRIAL SYSTEM	INTERMONTANE - FOOTHILL GRASSLAND	INTERMONTANE - FOOTHILL GRASSLAND	
TERRESTRIAL SYSTEM	LODGEPOLE PINE FOREST	LODGEPOLE PINE FOREST	
TERRESTRIAL SYSTEM	UPPER MONTANE RIPARIAN FOREST & WOODLAND	UPPER MONTANE RIPARIAN FOREST & WOODLAND	
ROCKY FORK CREEK, CO- Area # 146 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 2	OWNERSHIP-100% FEDERAL; 0% PRIVATE; 0% STATE	ACRES: 2,965
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
FISH	ONCORHYNCHUS CLARKI PLEURITICUS	COLORADO RIVER CUTTHROAT TROUT	G3
RODGERS UNIT, CO- Area # 147 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 3	OWNERSHIP- 37.6% FEDERAL; 60.4% PRIVATE; 2% STATE	ACRES: 2,965
AQUATIC SYSTEM	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 1	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 1	
PLANTS	SISYRINCHIUM PALLIDUM	PALE BLUE-EYED GRASS	G2
ROMLEY, CO- Area # 148 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 2	OWNERSHIP- 64% FEDERAL; 36% PRIVATE; 0% STATE	ACRES: 2,965
AQUATIC SYSTEM	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 2	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 2	
INVERTEBRATES	BOLSHECAPNIA MILAMI	A STONEFLY	G3
ROUBIDEAU, CO- Area # 149 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 12	OWNERSHIP- 94.6% FEDERAL; 5.4% PRIVATE; 0% STATE	ACRES: 75,659
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	
AQUATIC SYSTEM	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
FISH	ONCORHYNCHUS CLARKI PLEURITICUS	COLORADO RIVER CUTTHROAT TROUT	G3
PLANT COMMUNITIES	POPULUS ANGUSTIFOLIA/SALIX LIGULIFOLIA -	NARROWLEAF COTTONWOOD/STRAP-LEAF WILLOW-SILVER	G1

* Targets in bold provided by reviewers and not yet added in SRM database

APPENDIX 13: CONSERVATION AREA SUMMARIES

TAXON GROUP	SCIENTIFIC NAME	COMMON NAME	GRANK
	SHEPHERDIA ARGENTEA WOODLAND	BUFFALOBERRY	
PLANTS	ASTRAGALUS LINIFOLIUS	GRAND JUNCTION MILKVETCH	G3
TERRESTRIAL SYSTEM	ASPEN FOREST	ASPEN FOREST	
TERRESTRIAL SYSTEM	GAMBEL'S OAK SHRUBLAND	GAMBEL'S OAK SHRUBLAND	
TERRESTRIAL SYSTEM	JUNIPER SAVANNA	JUNIPER SAVANNA	
TERRESTRIAL SYSTEM	PINYON - JUNIPER WOODLAND	PINYON - JUNIPER WOODLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	
TERRESTRIAL SYSTEM	WINTERFAT SHRUB STEPPE	WINTERFAT SHRUB STEPPE	
SAGE CREEK, CO- Area # 151 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 20 OWNERSHIP- 26.8% FEDERAL; 65.5% PRIVATE; 7.7% STATE		ACRES: 367,834
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 7	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 7	
AQUATIC SYSTEM	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 7	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 7	
AQUATIC SYSTEM	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 7	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 7	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 7	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 7	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS LARGE RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 7	MONTANE MODERATE AND LOW GRADIENTS LARGE RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 7	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 7	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 7	
AQUATIC SYSTEM	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 7	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 7	
BIRD	**CENTROCERCUS UROPHASIANUS**	**GREATER SAGE GROUSE**	**G5**
BIRDS	GRUS CANADENSIS TABIDA	GREATER SANDHILL CRANE	G4
BIRDS	TYMPANUCHUS PHASIANELLUS COLUMBIANUS	COLUMBIAN SHARP-TAILED GROUSE	G3
FISH	GILA ROBUSTA	ROUNDTAIL CHUB	G2
FISH	ONCORHYNCHUS CLARKI PLEURITICUS	COLORADO RIVER CUTTHROAT TROUT	G3
MAMMALS	MARTES AMERICANA	PINE MARTEN	G5
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	ASPEN FOREST	ASPEN FOREST	
TERRESTRIAL SYSTEM	GAMBEL'S OAK SHRUBLAND	GAMBEL'S OAK SHRUBLAND	
TERRESTRIAL SYSTEM	JUNIPER SAVANNA	JUNIPER SAVANNA	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	MOUNTAIN SAGEBRUSH SHRUBLAND	MOUNTAIN SAGEBRUSH SHRUBLAND	
TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	
SAN JUAN RIVER, CO- Area # 152 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 4 OWNERSHIP- 76% FEDERA;; 24% PRIVATE; 0% STATE		ACRES: 2,965
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 4	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 4	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER GRANITE / VOLCANIC - EDU 4	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER GRANITE / VOLCANIC - EDU 4	
PLANT COMMUNITIES	POPULUS ANGUSTIFOLIA/SALIX LIGULIFOLIA - SHEPHERDIA ARGENTEA WOODLAND	NARROWLEAF COTTONWOOD/STRAP-LEAF WILLOW-SILVER BUFFALOBERRY	G1
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
SAN MIGUEL RIVER, CO- Area # 153 % OF AREA ALREADY PROTECTED: 6.2%	TOTAL CONSERVATION TARGETS: 32 OWNERSHIP- 60.6% FEDERAL; 38.9 % PRIVATE; 0.5% STATE		ACRES: 326,972
AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 4	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 4	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	

* Targets in bold provided by reviewers and not yet added in SRM database

APPENDIX 13: CONSERVATION AREA SUMMARIES

TAXON GROUP	SCIENTIFIC NAME	COMMON NAME	GRANK
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 3	
AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE/FOOTHILLS, FOOTHILLS STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	
BIRDS	CINCLUS MEXICANUS	AMERICAN DIPPER	G5
BIRDS	CYPSELOIDES NIGER	BLACK SWIFT	G4
BIRDS	HALIAEETUS LEUCOCEPHALUS	BALD EAGLE	G4
FISH	ONCORHYNCHUS CLARKI PLEURITICUS	COLORADO RIVER CUTTHROAT TROUT	G3
MAMMALS	CYNOMYS GUNNISONI	GUNNISON'S PRAIRIE DOG	G5
PLANT COMMUNITIES	FORESTIERA PUBESCENS	WILD-PRIVET	G1
PLANT COMMUNITIES	POPULUS ANGUSTIFOLIA/BETULA OCCIDENTALIS	NARROWLEAF COTTONWOOD/WATER BIRCH	G1
PLANT COMMUNITIES	RHUS TRILOBATA	SKUNKBRUSH RIPARIAN SHRUBLAND	G2
PLANTS	ASTRAGALUS WETHERILLII	WETHERILL MILKVETCH	G3
PLANTS	BOTRYCHIUM ECHO	REFLECTED MOONWORT	G2
PLANTS	BOTRYCHIUM PINNATUM	NORTHERN MOONWORT	G4
PLANTS	DRABA GRAMINEA	SAN JUAN WHITLOW-GRASS	G2
PLANTS	DRABA STREPTOBRACHIA	COLORADO DIVIDE WHITLOW-GRASS	G3
PLANTS	ERIOPHORUM ALTAICUM VAR NEOGAEUM	ALTAI COTTONGRASS	G3
PLANTS	LUPINUS CRASSUS	PAYSON LUPINE	G2
PLANTS	STELLARIA IRRIGUA	ALTAI CHICKWEED	G4
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	ASPEN FOREST	ASPEN FOREST	
TERRESTRIAL SYSTEM	DOUGLAS FIR - PONDEROSA PINE FOREST	DOUGLAS FIR - PONDEROSA PINE FOREST	
TERRESTRIAL SYSTEM	GAMBEL'S OAK SHRUBLAND	GAMBEL'S OAK SHRUBLAND	
TERRESTRIAL SYSTEM	INTERMONTANE - FOOTHILL GRASSLAND	INTERMONTANE - FOOTHILL GRASSLAND	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	MOUNTAIN SAGEBRUSH SHRUBLAND	MOUNTAIN SAGEBRUSH SHRUBLAND	
TERRESTRIAL SYSTEM	PINYON - JUNIPER WOODLAND	PINYON - JUNIPER WOODLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	
SANGRE DE CRISTO MTNS, CO- Area # 154 % OF AREA ALREADY PROTECTED: 26.5%	TOTAL CONSERVATION TARGETS: 52 OWNERSHIP- 57.1% FEDERAL; 41.3% PRIVATE; 1.5% STATE	ACRES: 554,349	
AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 2	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 2	
AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	
AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 2	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 2	
AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 5	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 5	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 2	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 2	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 5	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 5	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 2	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 2	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 5	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 5	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 2	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 2	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 2	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 2	
BIRDS	CYPSELOIDES NIGER	BLACK SWIFT	G4
BIRDS	LEUCOSTICTE AUSTRALIS	BROWN-CAPPED ROSY FINCH	G4

* Targets in bold provided by reviewers and not yet added in SRM database

APPENDIX 13: CONSERVATION AREA SUMMARIES

TAXON GROUP	SCIENTIFIC NAME	COMMON NAME	GRANK
FISH	CATOSTOMUS PLEBEIUS	RIO GRANDE SUCKER	G3
FISH	ONCORHYNCHUS CLARKI STOMIAS	GREENBACK CUTTHROAT TROUT	G2
FISH	ONCORHYNCHUS CLARKI VIRGINALIS	RIO GRANDE CUTTHROAT TROUT	G3
INVERTEBRATES	AMBLYDERUS TRIPLEHORNI	GREAT SAND DUNES ANTHICID BEETLE	G1
INVERTEBRATES	APHELIA SPP	APHELIA SPP	G3
INVERTEBRATES	COPABLEPHARON UNDESCRIBED SP	COPABLEPHARON UNDESCRIBED SP	G3
INVERTEBRATES	**ELEODES HIRTIPENNIS**	**CIRCUS BEETLE**	
INVERTEBRATES	EUPROSERPINUS WIESTI	WIEST'S SPHINX MOTH	G3
MAMMALS	CORYNORHINUS TOWNSENDII PALLESCENS	PALE LUMP-NOSED BAT	G4
MAMMALS	MARTES AMERICANA	PINE MARTEN	G5
MAMMALS	PEROGNATHUS FLAVESCENS RELICTUS	PLAINS POCKET MOUSE SUBSP.	G2
PLANT COMMUNITIES	ABIES CONCOLOR-PICEA PUNGENS-POPULUS ANGU	WHITE FIR-BLUE SPRUCE-NARROWLEAF COTTONWOOD/ROCKY MOUNTAIN MAPLE	G2
PLANT COMMUNITIES	DANTHONIA PARRYI	PARRY'S OATGRASS	G2
PLANT COMMUNITIES	FESTUCA ARIZONICA-MUHLENBERGIA MONTANA	ARIZONA FESCUE/MOUNTAIN MUHLY	G3
PLANT COMMUNITIES	PINUS ARISTATA/TRIFOLIUM DASYPHYLLUM	BRISTLE-CONE PINE/UINTAH CLOVER	G2
PLANT COMMUNITIES	POPULUS ANGUSTIFOLIA/JUNIPERUS SCOPULORUM	NARROWLEAF COTTONWOOD/ROCKY MOUNTAIN JUNIPER WOODLAND	G2
PLANT COMMUNITIES	POPULUS ANGUSTIFOLIA/SALIX DRUMMONDIANA-A	NARROWLEAF COTTONWOOD/ROCKY MOUNTAIN MAPLE	G1
PLANT COMMUNITIES	POPULUS TREMULOIDES/ACER GLABRUM	QUAKING ASPEN/ROCKY MOUNTAIN MAPLE	G1
PLANTS	DELPHINIUM ALPESTRE	COLORADO LARKSPUR	G2
PLANTS	DRABA GRAYANA	GRAY'S PEAK WHITLOW-GRASS	G3
PLANTS	DRABA PORSILDII	PORSILD'S WHITLOW-GRASS	G3
PLANTS	DRABA SMITHII	SMITH WHITLOW-GRASS	G2
PLANTS	ERIOPHORUM ALTAICUM VAR NEOGAEUM	ALTAI COTTONGRASS	G3
PLANTS	PODISTERA EASTWOODIAE	EASTWOOD'S PODISTERA	G4
PLANTS	STELLARIA IRRIGUA	ALTAI CHICKWEED	G4
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	ALPINE SUBSTRATE - ICE FIELD	ALPINE SUBSTRATE - ICE FIELD	
TERRESTRIAL SYSTEM	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	
TERRESTRIAL SYSTEM	ASPEN FOREST	ASPEN FOREST	
TERRESTRIAL SYSTEM	DOUGLAS FIR - PONDEROSA PINE FOREST	DOUGLAS FIR - PONDEROSA PINE FOREST	
TERRESTRIAL SYSTEM	GAMBEL'S OAK SHRUBLAND	GAMBEL'S OAK SHRUBLAND	
TERRESTRIAL SYSTEM	INTERMONTANE - FOOTHILL GRASSLAND	INTERMONTANE - FOOTHILL GRASSLAND	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	MONTANE GRASSLAND	MONTANE GRASSLAND	
TERRESTRIAL SYSTEM	MONTANE MIXED CONIFER FOREST (DRY-MESIC & MOIST-MESIC)	MONTANE MIXED CONIFER FOREST (DRY-MESIC & MOIST-MESIC)	
TERRESTRIAL SYSTEM	MOUNTAIN SAGEBRUSH SHRUBLAND	MOUNTAIN SAGEBRUSH SHRUBLAND	
TERRESTRIAL SYSTEM	PINYON - JUNIPER WOODLAND	PINYON - JUNIPER WOODLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	
SAPELLO/MORA VALLEYS, NM- Area # 155 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 6 OWNERSHIP- 0% FEDERAL; 100% PRIVATE; 0% STATE		ACRES: 10,852
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 2	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 2	
INVERTEBRATES	SPEYERIA NOKOMIS NOKOMIS	GREAT BASIN FRITILLARY	G2
TERRESTRIAL SYSTEM	INTERMONTANE - FOOTHILL GRASSLAND	INTERMONTANE - FOOTHILL GRASSLAND	
TERRESTRIAL SYSTEM	JUNIPER SAVANNA	JUNIPER SAVANNA	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
SHARKSTOOTH TRAIL, CO- Area # 156 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 1 OWNERSHIP- 99.1% FEDERAL; 0.9% PRIVATE; 0% STATE		ACRES: 2,966
TERRESTRIAL SYSTEM	ALPINE SUBSTRATE - ICE FIELD	ALPINE SUBSTRATE - ICE FIELD	
SHELL CREEK, CO , WY- Area # 157 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 3 OWNERSHIP- 4755 FEDERAL; 47.9% PRIVATE; 4.6% STATE		ACRES: 3,277
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	
TERRESTRIAL SYSTEM	INTERMONTANE - FOOTHILL GRASSLAND	INTERMONTANE - FOOTHILL GRASSLAND	
TERRESTRIAL SYSTEM	WINTERFAT SHRUB STEPPE	WINTERFAT SHRUB STEPPE	
SLATER PARK, CO , WY- Area # 158 % OF AREA ALREADY PROTECTED: 0.1%	TOTAL CONSERVATION TARGETS: 23 OWNERSHIP- 56.6% FEDERAL; 39.1% PRIVATE; 4.3% STATE		ACRES: 400,651
AMPHIBIANS	BUFO BOREAS POP 1	BOREAL TOAD (SOUTHERN ROCKY MOUNTAIN POPULATION)	G1
AMPHIBIANS	**RANA PIPIENS**	**NORTHERN LEOPARD FROG**	**G5**
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES /	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES /	

* Targets in bold provided by reviewers and not yet added in SRM database

TAXON GROUP	SCIENTIFIC NAME	COMMON NAME	GRANK
	SANDSTONES / LIMESTONES - EDU 7	LIMESTONES - EDU 7	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 7	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 7	
AQUATIC SYSTEM	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 7	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 7	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 7	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 7	
BIRDS	**GRUS CANADENSIS TABIDA**	**GREATER SANDHILL CRANE**	**G4**
BIRDS	TYMPANUCHUS PHASIANELLUS COLUMBIANUS	COLUMBIAN SHARP-TAILED GROUSE	G3
FISH	ONCORHYNCHUS CLARKI PLEURITICUS	COLORADO RIVER CUTTHROAT TROUT	G3
MAMMALS	MARTES AMERICANA	PINE MARTEN	G5
PLANT COMMUNITIES	POPULUS ANGUSTIFOLIA/CRATAEGUS RIVULARIS	NARROWLEAF COTTONWOOD/RIVER HAWTHORN WOODLAND	G2
PLANTS	IPOMOPSIS AGGREGATA SSP WEBERI	RABBIT EARS GILIA	G2
PLANTS	LOMATIUM BICOLOR VAR LEPTOCARPUM	OREGON BISCUITROOT	G3
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE – FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	FRESHWATER MARSH & WET MEADOW	FRESHWATER MARSH & WET MEADOW	
TERRESTRIAL SYSTEM	ASPEN FOREST	ASPEN FOREST	
TERRESTRIAL SYSTEM	INTERMONTANE - FOOTHILL GRASSLAND	INTERMONTANE - FOOTHILL GRASSLAND	
TERRESTRIAL SYSTEM	LODGEPOLE PINE FOREST	LODGEPOLE PINE FOREST	
TERRESTRIAL SYSTEM	MOUNTAIN SAGEBRUSH SHRUBLAND	MOUNTAIN SAGEBRUSH SHRUBLAND	
TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	
TERRESTRIAL SYSTEM	UPPER MONTANE RIPARIAN FOREST & WOODLAND	UPPER MONTANE RIPARIAN FOREST & WOODLAND	
TERRESTRIAL SYSTEM	GAMBEL'S OAK SHRUBLAND	GAMBEL'S OAK SHRUBLAND	
SLV GREASEWOOD, CO- Area # 150 % OF AREA ALREADY PROTECTED: 7.5%	TOTAL CONSERVATION TARGETS: 19 OWNERSHIP- 4.5% FEDERAL; 80.6% PRIVATE; 14.9% STATE		ACRES: 240,185
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	
BIRDS	**ASIO FLAMMEUS**	**SHORT-EARED OWL**	**G5**
BIRDS	**BUTEO REGALIS**	**FERRUGINOUS HAWK**	**G4**
FISH	GILA PANDORA	RIO GRANDE CHUB	G3
MAMMALS	CYNOMYS GUNNISONI	GUNNISON'S PRAIRIE DOG	G5
MAMMALS	DIPODOMYS ORDII MONTANUS	SAN LUIS KANGAROO RAT	G3
MAMMALS	PEROGNATHUS FLAVUS SANLUISI	SILKY POCKET MOUSE SUBSP.	G3
MAMMALS	SPERMOPHILUS TRIDECEMLINEATUS BLANCA	THIRTEEN-LINED GROUND SQUIRREL SUBSP.	G3
MAMMALS	TAMIAS MINIMUS CARYI	SAN LUIS LEAST CHIPMUNK	G3
PLANT COMMUNITIES	POPULUS ANGUSTIFOLIA/BETULA OCCIDENTALIS	NARROWLEAF COTTONWOOD/WATER BIRCH	G1
PLANTS	CLEOME MULTICAULIS	SLENDER SPIDERFLOWER	G2
TERRESTRIAL SYSTEM	GREASEWOOD FLAT & EPHEMERAL MEADOW COMPLEX	GREASEWOOD FLAT & EPHEMERAL MEADOW COMPLEX	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	MONTANE - FOOTHILL CLIFF & CANYON	MONTANE - FOOTHILL CLIFF & CANYON	
TERRESTRIAL SYSTEM	MONTANE GRASSLAND	MONTANE GRASSLAND	
TERRESTRIAL SYSTEM	SAN LUIS VALLEY WINTERFAT SHRUB STEPPE	SAN LUIS VALLEY WINTERFAT SHRUB STEPPE	
SNOWMASS CREEK, CO- Area # 159 % OF AREA ALREADY PROTECTED: 96.1%	TOTAL CONSERVATION TARGETS: 7 OWNERSHIP- 100% FEDERAL; 0% PRIVATE; 0% STATE		ACRES: 17,792
AQUATIC SYSTEM	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	
FISH	ONCORHYNCHUS CLARKI PLEURITICUS	COLORADO RIVER CUTTHROAT TROUT	G3
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	

* Targets in bold provided by reviewers and not yet added in SRM database

TAXON GROUP	SCIENTIFIC NAME	COMMON NAME	GRANK
TERRESTRIAL SYSTEM	ALPINE SUBSTRATE - ICE FIELD	ALPINE SUBSTRATE - ICE FIELD	
TERRESTRIAL SYSTEM	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
SNOWY RANGE, CO- Area # 160 % OF THE AREA ALREADY PROTECTED: 3.1%	TOTAL CONSERVATION TARGETS: 10 OWNERSHIP- 100% FEDERAL; 0% PRIVATE; 0% STATE		ACRES: 22,976
AMPHIBIANS	BUFO BOREAS POP 1	BOREAL TOAD (SOUTHERN ROCKY MOUNTAIN POPULATION)	G1
AMPHIBIANS	RANA SYLVATICA	WOOD FROG	G5
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 1	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 1	
BIRDS	LEUCOSTICTE AUSTRALIS	BROWN-CAPPED ROSY FINCH	G4
MAMMALS	MARTES AMERICANA	PINE MARTEN	G5
PLANTS	ARTEMISIA PATTERSONII	PATTERSON'S WORMWOOD	G3
PLANTS	CAREX NELSONII	NELSON'S SEDGE	G4
PLANTS	DRABA GLOBOSA	ROCKCRESS DRABA	G3
PLANTS	PARONYCHIA PULVINATA	ROCKY MOUNTAIN NAILWORT	G3
TERRESTRIAL SYSTEM	ALPINE SUBSTRATE - ICE FIELD	ALPINE SUBSTRATE - ICE FIELD	
SOUTH ARKANSAS RIVER, CO- Area # 161 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 8 OWNERSHIP- 88.7% FEDERAL; 11.3% PRIVATE; 0% STATE		ACRES: 35,583
AQUATIC SYSTEM	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 2	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 2	
AQUATIC SYSTEM	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 2	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 2	
FISH	ONCORHYNCHUS CLARKI STOMIAS	GREENBACK CUTTHROAT TROUT	G2
PLANTS	DRABA SPECTABILIS VAR OXYLOBA	DRABA SPECTABILIS VAR OXYLOBA	G3
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	
TERRESTRIAL SYSTEM	LODGEPOLE PINE FOREST	LODGEPOLE PINE FOREST	
SOUTH CAMERON PASS, CO- Area # 162 % OF AREA ALREADY PROTECTED: 44%	TOTAL CONSERVATION TARGETS: 30 OWNERSHIP- 85.4% FEDERAL; 10.2% PRIVATE; 4.4% STATE		ACRES: 344,110
AMPHIBIANS	BUFO BOREAS POP 1	BOREAL TOAD (SOUTHERN ROCKY MOUNTAIN POPULATION)	G1
AMPHIBIANS	RANA SYLVATICA	WOOD FROG	G5
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 1	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 1	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER GRANITE / VOLCANIC LAKE - EDU 1	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER GRANITE / VOLCANIC LAKE - EDU 1	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	
BIRDS	HALIAEETUS LEUCOCEPHALUS	BALD EAGLE	G4
BIRDS	LEUCOSTICTE AUSTRALIS	BROWN-CAPPED ROSY FINCH	G4
FISH	ONCORHYNCHUS CLARKI PLEURITICUS	COLORADO RIVER CUTTHROAT TROUT	G3
FISH	ONCORHYNCHUS CLARKI STOMIAS	GREENBACK CUTTHROAT TROUT	G2
INVERTEBRATES	ARCTIA UNDESCRIBED SP	A TIGER MOTH	G3
INVERTEBRATES	EUCOSMA DAPSILIS	TORTRICID MOTH	G3
INVERTEBRATES	GAZORYCTRA UNDESCRIBED SPP	GAZORYCTRA UNDESCRIBED SPP	G3
INVERTEBRATES	PHYCIODES BATESI ANASAZI	CANYON CRESCENT	G2
MAMMALS	MARTES AMERICANA	PINE MARTEN	G5
PLANT COMMUNITIES	PINUS ARISTATA/TRIFOLIUM DASYPHYLLUM	BRISTLE-CONE PINE/UINTAH CLOVER	G2
PLANTS	AQUILEGIA SAXIMONTANA	ROCKY MOUNTAIN COLUMBINE	G3
PLANTS	ASTER ALPINUS VAR VIERHAPPERI	ALPINE ASTER	G3
PLANTS	MIMULUS GEMMIPARUS	WEBER MONKEY-FLOWER	G2
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	

* Targets in bold provided by reviewers and not yet added in SRM database

APPENDIX 13: CONSERVATION AREA SUMMARIES

TAXON GROUP	SCIENTIFIC NAME	COMMON NAME	GRANK
	MEADOW		
TERRESTRIAL SYSTEM	ALPINE SUBSTRATE - ICE FIELD	ALPINE SUBSTRATE - ICE FIELD	
TERRESTRIAL SYSTEM	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	
TERRESTRIAL SYSTEM	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	
TERRESTRIAL SYSTEM	FRESHWATER MARSH & WET MEADOW	FRESHWATER MARSH & WET MEADOW	
TERRESTRIAL SYSTEM	LODGEPOLE PINE FOREST	LODGEPOLE PINE FOREST	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	MONTANE RIPARIAN SHRUBLAND	MONTANE RIPARIAN SHRUBLAND	
TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	
SOUTH COTTONWOOD CREEK, WY- Area # 163 TOTAL CONSERVATION TARGETS: 2 ACRES: 2,966 % OF AREA ALREADY PROTECTED: 0% OWNERSHIP- 100% FEDERAL; 0% PRIVATE; 0% STATE			
AMPHIBIANS	RANA SYLVATICA	WOOD FROG	G5
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS LARGE RIVER GRANITE / VOLCANIC - EDU 1	MONTANE MODERATE AND LOW GRADIENTS LARGE RIVER GRANITE / VOLCANIC - EDU 1	
SOUTH FORK BEAR CREEK, WY- Area # 164 TOTAL CONSERVATION TARGETS: 7 ACRES: 95,000 % OF AREA ALREADY PROTECTED: 0.8% OWNERSHIP- 0% FEDERAL; 86.5% PRIVATE; 13.5% STATE			
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	
MAMMALS	ZAPUS HUDSONIUS PREBLEI	PREBLE'S MEADOW JUMPING MOUSE	G2
TERRESTRIAL SYSTEM	INTERMONTANE - FOOTHILL GRASSLAND	INTERMONTANE - FOOTHILL GRASSLAND	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	MONTANE - FOOTHILL CLIFF & CANYON	MONTANE - FOOTHILL CLIFF & CANYON	
TERRESTRIAL SYSTEM	MONTANE RIPARIAN SHRUBLAND	MONTANE RIPARIAN SHRUBLAND	
TERRESTRIAL SYSTEM	UPPER MONTANE RIPARIAN FOREST & WOODLAND	UPPER MONTANE RIPARIAN FOREST & WOODLAND	
SOUTH PARK, CO- Area # 165 TOTAL CONSERVATION TARGETS: 41 ACRES: 474,474 % OF AREA ALREADY PROTECTED: 0.7% OWNERSHIP- 19.8% FEDERAL; 61% PRIVATE; 19.3% STATE			
AQUATIC SYSTEM	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	
AQUATIC SYSTEM	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	
AQUATIC SYSTEM	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 2	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 2	
AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	
AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 1	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 1	
BIRDS	BUTEO REGALIS	FERRUGINOUS HAWK	G4
BIRDS	CHARADRIUS MONTANUS	MOUNTAIN PLOVER	G2
INVERTEBRATES	CICINDELA NEBRASKANA	A TIGER BEETLE	G4
INVERTEBRATES	OCHROTRICHIA SUSANAE	A CADDISFLY	G3
INVERTEBRATES	SUWALLIA WARDI	A STONEFLY	G3
PLANT COMMUNITIES	KOBRESIA MYOSUROIDES-THALICTRUM ALPINUM	PACIFIC BOG SEDGE-ALPINE MEADOWRUE	G1
PLANT COMMUNITIES	KOBRESIA SIMPLICUSCULA-SCIRPUS PUMILUS	PACIFIC BOG SEDGE-RUSH	G2
PLANT COMMUNITIES	PINUS ARISTATA/TRIFOLIUM DASYPHYLLUM	BRISTLE-CONE PINE/UINTAH CLOVER	G2
PLANTS	CAREX LIVIDA	LIVID SEDGE	G5
PLANTS	CAREX OREOCHARIS	A SEDGE	G3
PLANTS	CAREX VIRIDULA	GREEN SEDGE	G5
PLANTS	ERIOPHORUM GRACILE	SLENDER COTTONGRASS	G5
PLANTS	MACHAERANTHERA COLORADOENSIS	COLORADO TANSY-ASTER	G2
PLANTS	PACKERA PAUCIFLORA	FEW-FLOWERED RAGWORT	G4
PLANTS	PHLOX KELSEYI SSP SALINA	MARSH PHLOX	G3
PLANTS	PRIMULA EGALIKSENSIS	GREENLAND PRIMROSE	G4
PLANTS	PTILAGROSTIS PORTERI	PORTER FEATHERGRASS	G2
PLANTS	SALIX CANDIDA	HOARY OR SILVER WILLOW	G5
PLANTS	SALIX MYRTILLIFOLIA	LOW BLUEBERRY WILLOW	G5

* Targets in bold provided by reviewers and not yet added in SRM database

TAXON GROUP	SCIENTIFIC NAME	COMMON NAME	GRANK
PLANTS	SALIX SERISSIMA	AUTUMN WILLOW	G4
PLANTS	SISYRINCHIUM PALLIDUM	PALE BLUE-EYED GRASS	G2
PLANTS	UTRICULARIA OCHROLEUCA	NORTHERN BLADDERWORT	G4
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	
TERRESTRIAL SYSTEM	ASPEN FOREST	ASPEN FOREST	
TERRESTRIAL SYSTEM	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	
TERRESTRIAL SYSTEM	FRESHWATER MARSH & WET MEADOW	FRESHWATER MARSH & WET MEADOW	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	MONTANE GRASSLAND	MONTANE GRASSLAND	
TERRESTRIAL SYSTEM	MONTANE RIPARIAN SHRUBLAND	MONTANE RIPARIAN SHRUBLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
TERRESTRIAL SYSTEM	SOUTH PARK MONTANE GRASSLANDS	SOUTH PARK MONTANE GRASSLANDS	
TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	
SOUTH SAN JUAN, CO- Area # 166 TOTAL CONSERVATION TARGETS: 32 ACRES: 302,456 % OF AREA ALREADY PROTECTED: 41.3% OWNERSHIP- 80.8% FEDERAL; 19.1 % PRIVATE; 0% STATE			
AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 4	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 4	
AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 4	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 4	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	
BIRDS	CINCLUS MEXICANUS	AMERICAN DIPPER	G5
BIRDS	CYPSELOIDES NIGER	BLACK SWIFT	G4
BIRDS	FALCO PEREGRINUS ANATUM	AMERICAN PEREGRINE FALCON	G3
BIRDS	LEUCOSTICTE AUSTRALIS	BROWN-CAPPED ROSY FINCH	G4
FISH	ONCORHYNCHUS CLARKI PLEURITICUS	COLORADO RIVER CUTTHROAT TROUT	G3
FISH	ONCORHYNCHUS CLARKI VIRGINALIS	RIO GRANDE CUTTHROAT TROUT	G3
MAMMALS	MARTES AMERICANA	PINE MARTEN	G5
PLANT COMMUNITIES	ABIES CONCOLOR-PICEA PUNGENS-POPULUS ANGU	WHITE FIR-BLUE SPRUCE-NARROWLEAF COTTONWOOD/ROCKY MOUNTAIN MAPLE	G2
PLANTS	BOTRYCHIUM ECHO	REFLECTED MOONWORT	G2
PLANTS	BOTRYCHIUM HESPERIUM	WESTERN MOONWORT	G3
PLANTS	BOTRYCHIUM PALLIDUM	PALE MOONWORT	G2
PLANTS	BOTRYCHIUM PINNATUM	NORTHERN MOONWORT	G4
PLANTS	DRABA SPECTABILIS VAR OXYLOBA	DRABA SPECTABILIS VAR OXYLOBA	G3
PLANTS	TRIFOLIUM BRANDEGEEI	BRANDEGEE CLOVER	G5
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	ALPINE SUBSTRATE - ICE FIELD	ALPINE SUBSTRATE - ICE FIELD	
TERRESTRIAL SYSTEM	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	
TERRESTRIAL SYSTEM	ASPEN FOREST	ASPEN FOREST	
TERRESTRIAL SYSTEM	DOUGLAS FIR - PONDEROSA PINE FOREST	DOUGLAS FIR - PONDEROSA PINE FOREST	
TERRESTRIAL SYSTEM	FRESHWATER MARSH & WET MEADOW	FRESHWATER MARSH & WET MEADOW	
TERRESTRIAL SYSTEM	GAMBEL'S OAK SHRUBLAND	GAMBEL'S OAK SHRUBLAND	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	MONTANE - FOOTHILL CLIFF & CANYON	MONTANE - FOOTHILL CLIFF & CANYON	
TERRESTRIAL SYSTEM	MONTANE GRASSLAND	MONTANE GRASSLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	
TERRESTRIAL SYSTEM	UPPER MONTANE RIPARIAN FOREST & WOODLAND	UPPER MONTANE RIPARIAN FOREST & WOODLAND	
SOUTHERN SANGRE DE CRISTO MOUNTAINS, NM- Area # 167 TOTAL CONSERVATION TARGETS: 25 ACRES: 371,326 % OF AREA ALREADY PROTECTED: 52.6% OWNERSHIP- 90.8% FEDERAL; 8.8% PRIVATE; 0.4% STATE			
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 6	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 6	

* Targets in bold provided by reviewers and not yet added in SRM database

TAXON GROUP	SCIENTIFIC NAME	COMMON NAME	GRANK
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 5	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 5	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 6	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 6	
AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 5	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 5	
BIRDS	STRIX OCCIDENTALIS LUCIDA	MEXICAN SPOTTED OWL	G3
FISH	ONCORHYNCHUS CLARKI VIRGINALIS	RIO GRANDE CUTTHROAT TROUT	G3
INVERTEBRATES	HYPOCHILUS JEMEZ	JEMEZ LAMPSHADE SPIDER	G3
INVERTEBRATES	SWELTSA HONDO	A STONEFLY	G3
MOLLUSKS	PISIDIUM LILLJEBORGI	LILLJEBORG'S PEACLAM	G5
PLANTS	ASTRAGALUS CYANEUS	CYANIC MILKVETCH	G4
PLANTS	ASTRAGALUS FEENSIS	SANTA FE MILKVETCH	G3
PLANTS	CALOCHORTUS GUNNISONII VAR PERPULCHER	PECOS MARIPOSA LILY	G4
PLANTS	ERIGERON SUBGLABER	HAIRLESS FLEABANE	G3
PLANTS	IPOMOPSIS SANCTI-SPIRITUS	HOLY GHOST IPOMOPSIS	G1
PLANTS	OPUNTIA VIRIDIFLORA	SANTA FE CHOLLA	G3
PLANTS	PODISTERA EASTWOODIAE	EASTWOOD'S PODISTERA	G4
PLANTS	SALIX ARIZONICA	ARIZONA WILLOW	G2
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	ASPEN FOREST	ASPEN FOREST	
TERRESTRIAL SYSTEM	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	MONTANE MIXED CONIFER FOREST (DRY-MESIC & MOIST-MESIC)	MONTANE MIXED CONIFER FOREST (DRY-MESIC & MOIST-MESIC)	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	
SQUAW CREEK, CO- Area # 168 % OF AREA ALREADY PROTECTED: 99.8%	TOTAL CONSERVATION TARGETS: 8 OWNERSHIP- 100% FEDERAL; 0% PRIVATE; 0% STATE		ACRES: 23,722
AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 4	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 4	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	
PLANTS	BOTRYCHIUM ECHO	REFLECTED MOONWORT	G2
PLANTS	DRABA SPECTABILIS VAR OXYLOBA	DRABA SPECTABILIS VAR OXYLOBA	G3
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	
SQUIRREL CREEK, CO , WY- Area # 169 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 9 OWNERSHIP- 96.7% FEDERAL; 2.3% PRIVATE; 1% STATE		ACRES: 60,897
AMPHIBIANS	RANA SYLVATICA	WOOD FROG	G5
AMPHIBIANS	BUFO BOREAS POP 1	BOREAL TOAD (SOUTHERN ROCKY MOUNTAIN POPULATION)	G1
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 1	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 1	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	
BIRDS	HALIAEETUS LEUCOCEPHALUS	BALD EAGLE	G4
MAMMALS	MARTES AMERICANA	PINE MARTEN	G5
PLANTS	FESTUCA HALLII	HALL FESCUE	G3
TERRESTRIAL SYSTEM	LODGEPOLE PINE FOREST	LODGEPOLE PINE FOREST	
ST CHARLES RIVER, CO- Area # 170 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 4 OWNERSHIP- 25.5% FEDERAL; 63.5% PRIVATE; 11% STATE		ACRES: 5,852
AQUATIC SYSTEM	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 2	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 2	
AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES /	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES /	

* Targets in bold provided by reviewers and not yet added in SRM database

TAXON GROUP	SCIENTIFIC NAME	COMMON NAME	GRANK
	SANDSTONES / LIMESTONES - EDU 2	LIMESTONES - EDU 2	
BIRDS	STRIX OCCIDENTALIS LUCIDA	MEXICAN SPOTTED OWL	G3
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
TAOS PUEBLO, NM- Area # 171 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 7 OWNERSHIP- 74.7% FEDERAL; 25.3% PRIVATE; 0% STATE		ACRES: 14,826
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 5	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 5	
INVERTEBRATES	SPEYERIA NOKOMIS NOKOMIS	GREAT BASIN FRITILLARY	G2
TERRESTRIAL SYSTEM	INTERMONTANE - FOOTHILL GRASSLAND	INTERMONTANE - FOOTHILL GRASSLAND	
TERRESTRIAL SYSTEM	JUNIPER SAVANNA	JUNIPER SAVANNA	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
TERRESTRIAL SYSTEM	SAGEBRUSH STEPPE	SAGEBRUSH STEPPE	
TIPPERARY CREEK, CO- Area # 172 % OF AREA ALREADY PROTECTED: 2.3%	TOTAL CONSERVATION TARGETS: 1 OWNERSHIP- 100% FEDERAL; 0% PRIVATE; 0% STATE		ACRES: 2,966
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
TOMICHI CREEK, CO- Area # 173 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 1 OWNERSHIP- 99.3% FEDERAL; 0.7% PRIVATE; 0% STATE		ACRES: 2,965
AQUATIC SYSTEM	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
TRICKLE MOUNTAIN, CO- Area # 174 % OF AREA ALREADY PROTECTED: 1.4%	TOTAL CONSERVATION TARGETS: 28 OWNERSHIP- 93.2% FEDERAL; 6.4% PRIVATE; 0.5% STATE		ACRES: 349,900
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 2	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 2	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	
BIRDS	CHARADRIUS MONTANUS	MOUNTAIN PLOVER	G2
FISH	CATOSTOMUS PLEBEIUS	RIO GRANDE SUCKER	G3
FISH	GILA PANDORA	RIO GRANDE CHUB	G3
FISH	ONCORHYNCHUS CLARKI VIRGINALIS	RIO GRANDE CUTTHROAT TROUT	G3
MAMMALS	MARTES AMERICANA	PINE MARTEN	G5
PLANT COMMUNITIES	FESTUCA ARIZONICA-MUHLENBERGIA FILICULMIS	ARIZONA FESCUE/SLIM-STEM MUHLY	G2
PLANT COMMUNITIES	MUHLENBERGIA FILICULMIS	SLIM-STEM MUHLY	G2
PLANT COMMUNITIES	PINUS EDULIS/STIPA SCRIBNERI	TWO-NEEDLE PINYON/SCRIBNER'S NEEDLE GRASS	G3
PLANTS	**NEOPARRYA LITHOPHILIA = ALETES LITHOPHILUS**	**ROCK-LOVING ALTETES**	**G3**
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	
TERRESTRIAL SYSTEM	ASPEN FOREST	ASPEN FOREST	
TERRESTRIAL SYSTEM	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	
TERRESTRIAL SYSTEM	DOUGLAS FIR - PONDEROSA PINE FOREST	DOUGLAS FIR - PONDEROSA PINE FOREST	
TERRESTRIAL SYSTEM	LODGEPOLE PINE FOREST	LODGEPOLE PINE FOREST	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	MONTANE - FOOTHILL CLIFF & CANYON	MONTANE - FOOTHILL CLIFF & CANYON	
TERRESTRIAL SYSTEM	MONTANE GRASSLAND	MONTANE GRASSLAND	
TERRESTRIAL SYSTEM	PINYON - JUNIPER WOODLAND	PINYON - JUNIPER WOODLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
TERRESTRIAL SYSTEM	SAN LUIS VALLEY WINTERFAT SHRUB STEPPE	SAN LUIS VALLEY WINTERFAT SHRUB STEPPE	
TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	

* Targets in bold provided by reviewers and not yet added in SRM database

APPENDIX 13: CONSERVATION AREA SUMMARIES

TAXON GROUP	SCIENTIFIC NAME	COMMON NAME	GRANK
TROUBLESOME CREEK, CO- Area # 175 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 7 OWNERSHIP- 28.2% FEDERAL; 70.3% PRIVATE; 1.5% STATE		ACRES: 32,618
AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 3	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 3	
PLANTS	ASTRAGALUS OSTERHOUTII	OSTERHOUT MILKVETCH	G1
PLANTS	PENSTEMON PENLANDII	PENLAND BEARDTONGUE	G1
TERRESTRIAL SYSTEM	MOUNTAIN SAGEBRUSH SHRUBLAND	MOUNTAIN SAGEBRUSH SHRUBLAND	
TROUBLESOME HEADWATERS, CO- Area # 176 % OF AREA ALREADY PROTECTED:0%	TOTAL CONSERVATION TARGETS: 17 OWNERSHIP- 79.7% FEDERAL; 14.6% PRIVATE; 5.7% STATE		ACRES: 263,907
AMPHIBIANS	RANA SYLVATICA	WOOD FROG	G5
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	
AQUATIC SYSTEM	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	
AQUATIC SYSTEM	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 3	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 3	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 3	
FISH	ONCORHYNCHUS CLARKI PLEURITICUS	COLORADO RIVER CUTTHROAT TROUT	G3
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	ASPEN FOREST	ASPEN FOREST	
TERRESTRIAL SYSTEM	LODGEPOLE PINE FOREST	LODGEPOLE PINE FOREST	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	MOUNTAIN SAGEBRUSH SHRUBLAND	MOUNTAIN SAGEBRUSH SHRUBLAND	
TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	
TURTLE ROCK, WY- Area # 177 % OF AREA ALREADY PROTECTED: 1.6%	TOTAL CONSERVATION TARGETS: 17 OWNERSHIP- 66.5% FEDERAL; 27.8% PRIVATE; 5.7% STATE		ACRES: 83,027
AMPHIBIANS	BUFO BOREAS POP 1	BOREAL TOAD (SOUTHERN ROCKY MOUNTAIN POPULATION)	G1
AMPHIBIANS	RANA PIPIENS	NORTHERN LEOPARD FROG	G5
BIRDS	SPIZELLA BREWERI	BREWER'S SPARROW	G5
INVERTEBRATES	GAZORYCTRA UNDESCRIBED SPP	GAZORYCTRA UNDESCRIBED SPP	G3
MAMMALS	ZAPUS HUDSONIUS PREBLEI	MEADOW JUMPING MOUSE	G2
PLANTS	CAREX OREOCHARIS	A SEDGE	G3
PLANTS	DRABA STREPTOBRACHIA	COLORADO DIVIDE WHITLOW-GRASS	G3
PLANTS	PENSTEMON GLABER VAR ALPINUS	ALPINE WESTERN PENSTEMON	G3
PLANTS	PHACELIA DENTICULATA	ROCKY MOUNTAIN PHACELIA	G3
PLANTS	POLYPODIUM SAXIMONTANUM	ROCKY MOUNTAIN POLYPODY	G4
PLANTS	SALIX CANDIDA	HOARY OR SILVER WILLOW	G5
PLANTS	SALIX SERISSIMA	AUTUMN WILLOW	G4
TERRESTRIAL SYSTEM	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	

* Targets in bold provided by reviewers and not yet added in SRM database

TAXON GROUP	SCIENTIFIC NAME	COMMON NAME	GRANK
TERRESTRIAL SYSTEM	INTERMONTANE - FOOTHILL GRASSLAND	INTERMONTANE - FOOTHILL GRASSLAND	
TERRESTRIAL SYSTEM	LODGEPOLE PINE FOREST	LODGEPOLE PINE FOREST	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
UNAWEEP, CO- Area # 178 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 6 OWNERSHIP- 96.3% FEDERAL; 3.7% PRIVATE; 0% STATE		ACRES: 21,687
AQUATIC SYSTEM	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE/FOOTHILLS, FOOTHILLS STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	
INVERTEBRATES	EUPHILOTES ELLISI	ELLIS' DOTTED BLUE	G4
INVERTEBRATES	SPEYERIA NOKOMIS NOKOMIS	GREAT BASIN FRITILLARY	G2
TERRESTRIAL SYSTEM	GAMBEL'S OAK SHRUBLAND	GAMBEL'S OAK SHRUBLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
UNCOMPAGHRE/RED CLOUD, CO- Area # 179 % OF AREA ALREADY PROTECTED:14.6%	TOTAL CONSERVATION TARGETS: 25 OWNERSHIP- 95% FEDERAL; 5% PRIVATE; 0% STATE		ACRES: 228,325
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 4	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 4	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
BIRDS	CINCLUS MEXICANUS	AMERICAN DIPPER	G5
BIRDS	CYPSELOIDES NIGER	BLACK SWIFT	G4
BIRDS	LEUCOSTICTE AUSTRALIS	BROWN-CAPPED ROSY FINCH	G4
FISH	ONCORHYNCHUS CLARKI VIRGINALIS	RIO GRANDE CUTTHROAT TROUT	G3
INVERTEBRATES	ALLOPERLA PILOSA	A STONEFLY	G3
INVERTEBRATES	BOLORIA IMPROBA ACROCNEMA	UNCOMPAHGRE FRITILLARY	G2
INVERTEBRATES	EREBIA THEANO	THEANO ALPINE	G4
INVERTEBRATES	EUCOSMA FOFANA	TORTRICID MOTH	G3
INVERTEBRATES	GRAMMIA UNDESCRIBED SP #3	GRAMMIA UNDESCRIBED SP #3	G3
INVERTEBRATES	OENEIS BORE EDWARDSII	WHITE-VEINED ARCTIC	G5
PLANTS	BOTRYCHIUM ECHO	REFLECTED MOONWORT	G2
PLANTS	DRABA GRAMINEA	SAN JUAN WHITLOW-GRASS	G2
PLANTS	ERIOPHORUM ALTAICUM VAR NEOGAEUM	ALTAI COTTONGRASS	G3
PLANTS	SALIX CANDIDA	HOARY OR SILVER WILLOW	G5
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	ALPINE SUBSTRATE - ICE FIELD	ALPINE SUBSTRATE - ICE FIELD	
TERRESTRIAL SYSTEM	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	
TERRESTRIAL SYSTEM	DOUGLAS FIR - PONDEROSA PINE FOREST	DOUGLAS FIR - PONDEROSA PINE FOREST	
TERRESTRIAL SYSTEM	FRESHWATER MARSH & WET MEADOW	FRESHWATER MARSH & WET MEADOW	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	
UPPER SAN LUIS VALLEY, CO- Area # 180 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 23 OWNERSHIP- 51.5% FEDERAL; 44.9% PRIVATE; 3.6% STATE		ACRES: 139,367
AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5	
BIRDS	CENTROCERCUS MINIMUS	GUNNISON SAGE GROUSE	G1
FISH	GILA PANDORA	RIO GRANDE CHUB	G3
MAMMALS	**CYNOMYS GUNNISONI**	**GUNNISON'S PRAIRIE DOG**	**G5**
MAMMALS	PEROGNATHUS FLAVUS SANLUISI	SILKY POCKET MOUSE SUBSP.	G3
MAMMALS	SPERMOPHILUS TRIDECEMLINEATUS BLANCA	THIRTEEN-LINED GROUND SQUIRREL SUBSP.	G3
MOLLUSKS	PHYSA CUPREONITENS	HOT SPRINGS PHYSA	G3

* Targets in bold provided by reviewers and not yet added in SRM database

APPENDIX 13: CONSERVATION AREA SUMMARIES

TAXON GROUP	SCIENTIFIC NAME	COMMON NAME	GRANK
PLANT COMMUNITIES	PINUS EDULIS/STIPA COMATA	XERIC WESTERN SLOPE PINYON-JUNIPER WOODLANDS	G2
PLANT COMMUNITIES	PINUS EDULIS/STIPA SCRIBNERI	TWO-NEEDLE PINYON/SCRIBNER'S NEEDLE GRASS	G3
PLANTS	SISYRINCHIUM PALLIDUM	PALE BLUE-EYED GRASS	G2
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	
TERRESTRIAL SYSTEM	GAMBEL'S OAK SHRUBLAND	GAMBEL'S OAK SHRUBLAND	
TERRESTRIAL SYSTEM	GREASEWOOD FLAT & EPHEMERAL MEADOW COMPLEX	GREASEWOOD FLAT & EPHEMERAL MEADOW COMPLEX	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	MONTANE - FOOTHILL CLIFF & CANYON	MONTANE - FOOTHILL CLIFF & CANYON	
TERRESTRIAL SYSTEM	MONTANE GRASSLAND	MONTANE GRASSLAND	
TERRESTRIAL SYSTEM	MOUNTAIN SAGEBRUSH SHRUBLAND	MOUNTAIN SAGEBRUSH SHRUBLAND	
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
TERRESTRIAL SYSTEM	SAN LUIS VALLEY WINTERFAT SHRUB STEPPE	SAN LUIS VALLEY WINTERFAT SHRUB STEPPE	
UTE TRAIL, CO- Area # 181 % OF AREA ALREADY PROTECTED: 99.5%	OWNERSHIP- 99.5% FEDERAL; 0.5% PRIVATE; 0% STATE	TOTAL CONSERVATION TARGETS: 5	ACRES: 11,859
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS LARGE RIVER GRANITE / VOLCANIC - EDU 3	MONTANE MODERATE AND LOW GRADIENTS LARGE RIVER GRANITE / VOLCANIC - EDU 3	
PLANTS	ASTRAGALUS WETHERILLII	WETHERILL MILKVETCH	G3
TERRESTRIAL SYSTEM	JUNIPER SAVANNA	JUNIPER SAVANNA	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	WINTERFAT SHRUB STEPPE	WINTERFAT SHRUB STEPPE	
VERMEJO PARK/LOWER PURGATOIRE, CO , NM- Area # 182 % OF AREA ALREADY PROTECTED: 0.4%	OWNERSHIP- 5.4% FEDERAL; 89.9% PRIVATE; 4.7% STATE	TOTAL CONSERVATION TARGETS: 36	ACRES: 1,067,879
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 2	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 2	
AQUATIC SYSTEM	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 2	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 2	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 2	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 2	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 2	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 2	
BIRDS	**PASSERINA AMOENA**	**LAZULI BUNTING**	**G5**
BIRDS	PROGNE SUBIS	PURPLE MARTIN	G5
BIRDS	**VERMIVORA VIRGINIAE**	**VIRGINIA'S WARBLER**	**G5**
FISH	ONCORHYNCHUS CLARKI VIRGINALIS	RIO GRANDE CUTTHROAT TROUT	G3
INVERTEBRATES	SPEYERIA HESPERIS RATONENSIS	NORTHWESTERN FRITILLARY	G1
INVERTEBRATES	OENEIS ALBERTA CAPULINENSIS	CAPULIN MOUNTAIN ARCTIC	G2
INVERTEBRATES	POLITES ORIGENES RHENA	RHENA SKIPPER	G3
MAMMALS	CORYNORHINUS TOWNSENDII PALLESCENS	PALE LUMP-NOSED BAT	G4
MAMMALS	**CYNOMYS GUNNISONI**	**GUNNISON'S PRAIRIE DOG**	**G5**
MAMMALS	THOMOMYS BOTTAE CULTELLUS	BOTTA'S POCKET GOPHER SUBSP.CULTELLUS	G3
MAMMALS	ZAPUS HUDSONIUS LUTEUS	NEW MEXICAN JUMPING MOUSE	G2
PLANT COMMUNITIES	PINUS PONDEROSA/CERCOCARPUS MONTANUS/ANDR	PONDEROSA PINE/MOUNTAIN MAHOGANY/BIG BLUESTEM	G2
PLANT COMMUNITIES	POPULUS ANGUSTIFOLIA/BETULA OCCIDENTALIS	NARROWLEAF COTTONWOOD/WATER BIRCH	G1
PLANTS	GRINDELIA ACUTIFOLIA	SHARP-LEAF GUMWEED	G2
PLANTS	AGASTACHE FOENICULUM	LAVENDER HYSSOP	G3
PLANTS	DRABA SMITHII	SMITH WHITLOW-GRASS	G2
PLANTS	GRINDELIA ACUTIFOLIA	SHARP-LEAF GUMWEED	G2
REPTILES	EUMECES MULTIVIRGATUS EPIPLEUROTUS	VARIABLE SKINK	G5
TERRESTRIAL SYSTEM	MONTANE GRASSLAND	MONTANE GRASSLAND	
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	ASPEN FOREST	ASPEN FOREST	
TERRESTRIAL SYSTEM	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	
TERRESTRIAL SYSTEM	JUNIPER SAVANNA	JUNIPER SAVANNA	
TERRESTRIAL SYSTEM	MONTANE - FOOTHILL CLIFF & CANYON	MONTANE - FOOTHILL CLIFF & CANYON	
TERRESTRIAL SYSTEM	GAMBEL'S OAK SHRUBLAND	GAMBEL'S OAK SHRUBLAND	
TERRESTRIAL SYSTEM	INTERMONTANE - FOOTHILL GRASSLAND	INTERMONTANE - FOOTHILL GRASSLAND	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	MONTANE MIXED CONIFER FOREST (DRY-MESIC & MOIST-MESIC)	MONTANE MIXED CONIFER FOREST (DRY-MESIC & MOIST-MESIC)	
TERRESTRIAL SYSTEM	PINYON - JUNIPER WOODLAND	PINYON - JUNIPER WOODLAND	

* Targets in bold provided by reviewers and not yet added in SRM database

TAXON GROUP	SCIENTIFIC NAME	COMMON NAME	GRANK
TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND	PONDEROSA PINE WOODLAND	
TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	
TERRESTRIAL SYSTEM	UPPER MONTANE RIPARIAN FOREST & WOODLAND	UPPER MONTANE RIPARIAN FOREST & WOODLAND	
WALLROCK CREEK, WY- Area # 183 % OF AREA ALREADY PROTECTED: 0%	TOTAL CONSERVATION TARGETS: 7 OWNERSHIP- 19.9% FEDERAL; 78.4% PRIVATE; 1.6% STATE		ACRES: 6,682
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 1	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 1	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1	
BIRD	**CENTROCERCUS UROPHASIANUS**	**GREATER SAGE GROUSE**	**G5**
BIRDS	**CHARADRIUS MONTANUS**	**MOUNTAIN PLOVER**	**G2**
PLANTS	**SISYRINCHIUM PALLIDUM**	**PALE BLUE-EYED GRASS**	**G2**
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	MONTANE - FOOTHILL CLIFF & CANYON	MONTANE - FOOTHILL CLIFF & CANYON	
WEST DALLAS CREEK, CO- Area # 184 % OF AREA ALREADY PROTECTED: 16%	TOTAL CONSERVATION TARGETS: 7 OWNERSHIP- 52.6% FEDERAL; 46.8% PRIVATE; 0.6% STATE		ACRES: 17,792
AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 3	
PLANTS	DRABA RECTIFRUCTA	MOUNTAIN WHITLOW-GRASS	G3
PLANTS	DRABA STREPTOBRACHIA	COLORADO DIVIDE WHITLOW-GRASS	G3
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	GAMBEL'S OAK SHRUBLAND	GAMBEL'S OAK SHRUBLAND	
WEST LAKE CREEK, CO- Area # 185 % OF AREA ALREADY PROTECTED: 72.7%	TOTAL CONSERVATION TARGETS: 4 OWNERSHIP- 99.4% FEDERAL; 0.6% PRIVATE; 0% STATE		ACRES: 5,931
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 3	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 3	
FISH	ONCORHYNCHUS CLARKI PLEURITICUS	COLORADO RIVER CUTTHROAT TROUT	G3
TERRESTRIAL SYSTEM	ALPINE SUBSTRATE - ICE FIELD	ALPINE SUBSTRATE - ICE FIELD	
WOLF CREEK, CO- Area # 186 % OF AREA ALREADY PROTECTED: 0.5%	TOTAL CONSERVATION TARGETS: 13 OWNERSHIP- 92.9% FEDERAL; 7.1% PRIVATE; 0% STATE		ACRES: 26,687
AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 4	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 4	
AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5	
BIRDS	CYPSELOIDES NIGER	BLACK SWIFT	G4
FISH	ONCORHYNCHUS CLARKI PLEURITICUS	COLORADO RIVER CUTTHROAT TROUT	G3
FISH	ONCORHYNCHUS CLARKI VIRGINALIS	RIO GRANDE CUTTHROAT TROUT	G3
PLANTS	BOTRYCHIUM ECHO	REFLECTED MOONWORT	G2
PLANTS	BOTRYCHIUM HESPERIUM	WESTERN MOONWORT	G3
PLANTS	BOTRYCHIUM PINNATUM	NORTHERN MOONWORT	G4
PLANTS	TRIFOLIUM BRANDEGEEI	BRANDEGEE CLOVER	G5
TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW	
TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND	LOWER MONTANE - FOOTHILLS SHRUBLAND	
TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	
WOODY CREEK HEADWATERS, CO- Area # 187 % OF AREA ALREADY PROTECTED: 24.4	TOTAL CONSERVATION TARGETS: 8 OWNERSHIP- 95.9% FEDERAL; 3.3% PRIVATE; 0.7% STATE		ACRES: 44,479
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3	
FISH	ONCORHYNCHUS CLARKI PLEURITICUS	COLORADO RIVER CUTTHROAT TROUT	G3

* Targets in bold provided by reviewers and not yet added in SRM database

TAXON GROUP	SCIENTIFIC NAME	COMMON NAME	GRANK
PLANTS	CYSTOPTERIS MONTANA	MOUNTAIN BLADDER FERN	G5
PLANTS	ERIOPHORUM ALTAICUM VAR NEOGAEUM	ALTAI COTTONGRASS	G3
TERRESTRIAL SYSTEM	ALPINE SUBSTRATE - ICE FIELD	ALPINE SUBSTRATE - ICE FIELD	
TERRESTRIAL SYSTEM	GAMBEL'S OAK SHRUBLAND	GAMBEL'S OAK SHRUBLAND	
TERRESTRIAL SYSTEM	MONTANE - FOOTHILL CLIFF & CANYON	MONTANE - FOOTHILL CLIFF & CANYON	
TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)	
YAMPA RIVER, CO- Area # 188 % OF AREA ALREADY PROTECTED: 0.6%	TOTAL CONSERVATION TARGETS: 10 OWNERSHIP- 6.6% FEDERAL; 90% PRIVATE; 3.3% STATE		ACRES: 49,771
AMPHIBIANS	**RANA PIPIENS**	**NORTHERN LEOPARD FROG**	**G5**
AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 7	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 7	
AQUATIC SYSTEM	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 7	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 7	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS LARGE RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 7	MONTANE MODERATE AND LOW GRADIENTS LARGE RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 7	
AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 7	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES – EDU 7	
BIRDS	GRUS CANADENSIS TABIDA	GREATER SANDHILL CRANE	G4
BIRDS	HALIAEETUS LEUCOCEPHALUS	BALD EAGLE	G4
BIRDS	TYMPANUCHUS PHASIANELLUS COLUMBIANUS	COLUMBIAN SHARP-TAILED GROUSE	G3
FISH	GILA ROBUSTA	ROUNDTAIL CHUB	G2
PLANT COMMUNITIES	ACER NEGUNDO-POPULUS ANGUSTIFOLIA/CORNUS SERICEA	ASHLEAF MAPLE(BOX ELDER)-NARROWLEAF COTTONWOOD//RED OSIER DOGWOOD FOREST	G2
TERRESTRIAL SYSTEM	GAMBEL'S OAK SHRUBLAND	GAMBEL'S OAK SHRUBLAND	

* Targets in bold provided by reviewers and not yet added in SRM database

APPENDIX 14. CONSERVATION GOALS/RESULTS BY TARGET

Major Group	Taxon Group	Scientific Name	Common Name	SRM Goal	Known Amount in Portfolio	Known % Goal Met
ANIMAL	AMPHIB/REPTILES	BUFO BOREAS	BOREAL TOAD	25	43	172%
ANIMAL	AMPHIB/REPTILES	BUFO COGNATUS	GREAT PLAINS TOAD	15	DATA GAP	DATA GAP
ANIMAL	AMPHIB/REPTILES	CHRYSEMYS PICTA	PAINTED TURTLE	15	3	20%
ANIMAL	AMPHIB/REPTILES	EUMECES MULTIVIRGATUS EPIPLEUROTUS	VARIABLE SKINK	20	8	40%
ANIMAL	AMPHIB/REPTILES	PHRYNOSOMA HERNANDESI	SHORT-HORNED LIZARD	15	DATA GAP	DATA GAP
ANIMAL	AMPHIB/REPTILES	PLETHODON NEOMEXICANUS	JEMEZ MOUNTAINS SALAMANDER	25	245	980%
ANIMAL	AMPHIB/REPTILES	RANA PIPIENS	NORTHERN LEOPARD FROG	10	17	170%
ANIMAL	AMPHIB/REPTILES	RANA SYLVATICA	WOOD FROG	15	53	353%
ANIMAL	BIRDS	AMPHISPIZA BELLI	SAGE SPARROW	10	3	30%
ANIMAL	BIRDS	ASIO FLAMMEUS	SHORT-EARED OWL	10	2	20%
ANIMAL	BIRDS	BUCEPHALA ALBEOLA	BUFFLEHEAD	15	1	7%
ANIMAL	BIRDS	BUCEPHALA ISLANDICA	BARROW'S GOLDENEYE	15	7	47%
ANIMAL	BIRDS	BUTEO ALBONATUS	ZONE-TAILED HAWK	15	1	7%
ANIMAL	BIRDS	BUTEO REGALIS	FERRUGINOUS HAWK	10	6	60%
ANIMAL	BIRDS	BUTEO SWAINSONI	SWAINSON'S HAWK	10	1	10%
ANIMAL	BIRDS	CENTROCERCUS MINIMUS	GUNNISON SAGE GROUSE	25	2	8%
ANIMAL	BIRDS	CENTROCERCUS UROPHASIANUS	GREATER SAGE GROUSE	10	1	10%
ANIMAL	BIRDS	CHARADRIUS MONTANUS	MOUNTAIN PLOVER	3	8	267%
ANIMAL	BIRDS	CINCLUS MEXICANUS	AMERICAN DIPPER	10	6	60%
ANIMAL	BIRDS	CYPSELOIDES NIGER	BLACK SWIFT	30	27	90%
ANIMAL	BIRDS	EMPIDONAX TRAILLII	SOUTHWESTERN WILLOW FLYCATCHER	14.5	15	103%
ANIMAL	BIRDS	FALCO PEREGRINUS ANATUM	AMERICAN PEREGRINE FALCON	25	38	152%
ANIMAL	BIRDS	GRUS CANADENSIS	GREATER SANDHILL CRANE	10	13	130%
ANIMAL	BIRDS	HALIAEETUS LEUCOCEPHALUS	BALD EAGLE	25	28	112%
ANIMAL	BIRDS	LEUCOSTICTE AUSTRALIS	BROWN-CAPPED ROSY FINCH	25	13	52%
ANIMAL	BIRDS	PASSERINA AMOENA	LAZULI BUNTING	10	2	20%
ANIMAL	BIRDS	PROGNE SUBIS	PURPLE MARTIN	30	2	7%
ANIMAL	BIRDS	SPIZELLA BREWERI	BREWER'S SPARROW	15	5	33%
ANIMAL	BIRDS	STRIX OCCIDENTALIS LUCIDA	MEXICAN SPOTTED OWL	10	31	310%
ANIMAL	BIRDS	TYMPANUCHUS PHASIANELLUS COLUMBIANUS	COLUMBIAN SHARP-TAILED GROUSE	15	5	33%
ANIMAL	BIRDS	VERMIVORA VIRGINIAE	VIRGINIA'S WARBLER	20	6	30%
ANIMAL	FISH	CATOSTOMUS PLEBEIUS	RIO GRANDE SUCKER	20	18	90%
ANIMAL	FISH	GILA PANDORA	RIO GRANDE CHUB	20	18	90%
ANIMAL	FISH	GILA ROBUSTA	ROUNDTAIL CHUB	25	5	20%
ANIMAL	FISH	ONCORHYNCHUS CLARKI PLEURITICUS	COLORADO RIVER CUTTHROAT TROUT	20	135	675%
ANIMAL	FISH	ONCORHYNCHUS CLARKI STOMIAS	GREENBACK CUTTHROAT TROUT	25	32	128%
ANIMAL	FISH	ONCORHYNCHUS CLARKI VIRGINALIS	RIO GRANDE CUTTHROAT TROUT	20	101	505%
ANIMAL	FISH	PHOXINUS ERYTHROGASTER	SOUTHERN REDBELLY DACE	15	DATA GAP	DATA GAP
ANIMAL	FISH	PTYCHOCHEILUS LUCIUS	COLORADO PIKEMINNOW	20	4	20%
ANIMAL	FISH	XYRAUCHEN TEXANUS	RAZORBACK SUCKER	25	3	12%
ANIMAL	INVERTEBRATES	ACERPENNA PYGMAEA	A MAYFLY	15	1	7%
ANIMAL	INVERTEBRATES	AGRYPNIA COLORATA HAGEN 1873	A CADDISFLY	1	DATA GAP	DATA GAP
ANIMAL	INVERTEBRATES	ALLOPERLA PILOSA	A STONEFLY	25	1	4%
ANIMAL	INVERTEBRATES	AMBLYDERUS TRIPLEHORNI	GREAT SAND DUNES ANTHICID BEETLE 1	13.5	26	193%

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APPENDIX 14. CONSERVATION GOALS/RESULTS BY TARGET

Major Group	Taxon Group	Scientific Name	Common Name	SRM Goal	Known Amount in Portfolio	Known % Goal Met
ANIMAL	INVERTEBRATES	AMBLYDERUS WERNERI	GREAT SAND DUNES ANTHICID BEETLE 2	1	DATA GAP	DATA GAP
ANIMAL	INVERTEBRATES	ANDRENA DURANGOENSIS	ANDRENID BEE	1	DATA GAP	DATA GAP
ANIMAL	INVERTEBRATES	APHELIA SPP	APHELIA SPP	1	2	200%
ANIMAL	INVERTEBRATES	APHONOPELMA ECHINUM	TARANTULA	2	DATA GAP	DATA GAP
ANIMAL	INVERTEBRATES	ARCTIA UNDESCRIBED SP	A TIGER MOTH	25	2	8%
ANIMAL	INVERTEBRATES	ARCYNOPTERYX COMPACTA	A STONEFLY	1	DATA GAP	DATA GAP
ANIMAL	INVERTEBRATES	BAETIS ADONIS	A MAYFLY	15	DATA GAP	DATA GAP
ANIMAL	INVERTEBRATES	BAETIS BUNDYAE LEHMKUHL	A MAYFLY	15	DATA GAP	DATA GAP
ANIMAL	INVERTEBRATES	BAETIS VIRILE	A MAYFLY	25	3	12%
ANIMAL	INVERTEBRATES	BOLORIA IMPROBA ACROCNEMA	UNCOMPAHGRE FRITILLARY	10	21	210%
ANIMAL	INVERTEBRATES	BOLSHECAPNIA MILAMI	A STONEFLY	15	1	7%
ANIMAL	INVERTEBRATES	BRACHYCERCUS PRUDENS	A MAYFLY	15	DATA GAP	DATA GAP
ANIMAL	INVERTEBRATES	CALLOPHRYS MOSSII SCHRYVERI	MOSS' ELFIN	25	7	28%
ANIMAL	INVERTEBRATES	CAPNIA ARAPAHOE	A STONEFLY	0.75	1	133%
ANIMAL	INVERTEBRATES	CAPNIA NELSONII	CAPNIA NELSONII	1	DATA GAP	DATA GAP
ANIMAL	INVERTEBRATES	CAPNIA UINTAHI GAUFIN	CAPNIA UINTAHI GAUFIN	25	7	28%
ANIMAL	INVERTEBRATES	CAPNIA UNDESCRIBED SP	CAPNIA UNDESCRIBED SP	0.5	1	200%
ANIMAL	INVERTEBRATES	CATOCALA COCCINATA SSP	A MOTH	15	DATA GAP	DATA GAP
ANIMAL	INVERTEBRATES	CAUCHAS ELONGATA	INCURVARID MOTH	25	2	8%
ANIMAL	INVERTEBRATES	CELASTRINA HUMULUS	HOPS AZURE	2.75	6	218%
ANIMAL	INVERTEBRATES	CERACLEA ARIELLES	A CADDISFLY	25	1	4%
ANIMAL	INVERTEBRATES	CHROMAGRION CONDITUM	AURORA DAMSEL	15	DATA GAP	DATA GAP
ANIMAL	INVERTEBRATES	CICINDELA NEBRASKANA	A TIGER BEETLE	10	3	30%
ANIMAL	INVERTEBRATES	CICINDELA THEATINA	SAN LUIS DUNES TIGER BEETLE	1	1	100%
ANIMAL	INVERTEBRATES	CLISTORONIA MACULATA	A CADDISFLY	20	1	5%
ANIMAL	INVERTEBRATES	COPABLEPHARON UNDESCRIBED SP	COPABLEPHARON UNDESCRIBED SP	11	22	200%
ANIMAL	INVERTEBRATES	CORDULEGASTER DORSALIS	PACIFIC SPIKETAIL	15	1	7%
ANIMAL	INVERTEBRATES	CORTICARIA UNDESCR SP	A BEETLE	1	DATA GAP	DATA GAP
ANIMAL	INVERTEBRATES	DAIHINIBAENETES GIGANTEUS	GIANT SAND TREADER CRICKET	20	2	10%
ANIMAL	INVERTEBRATES	DAIHINIOIDES LARVALE	STROHECKER'S CAMEL CRICKET	1	DATA GAP	DATA GAP
ANIMAL	INVERTEBRATES	DASYLOPHIA ANGUINA SSP SATYRATA	PROMINENT MOTH	1	DATA GAP	DATA GAP
ANIMAL	INVERTEBRATES	DECODES STEVENSI	STEVENS' TORTRICID MOTH	1	DATA GAP	DATA GAP
ANIMAL	INVERTEBRATES	DISTICHLICOCCUS FONTANUS	A MEALYBUG	25	DATA GAP	DATA GAP
ANIMAL	INVERTEBRATES	EPHEMERA SIMULANS	A MAYFLY	1	DATA GAP	DATA GAP
ANIMAL	INVERTEBRATES	EPHEMERELLA APOPSIS	A MAYFLY	1	DATA GAP	DATA GAP
ANIMAL	INVERTEBRATES	EREBIA THEANO	THEANO ALPINE	25	4	16%
ANIMAL	INVERTEBRATES	ETHMIA MONACHELLA	LOST ETHMID MOTH	1	DATA GAP	DATA GAP
ANIMAL	INVERTEBRATES	EUCHLOA LOTTA	DESERT MARBLE BUTTERFLY	1	DATA GAP	DATA GAP
ANIMAL	INVERTEBRATES	EUCOSMA DAPSILIS	TORTRICID MOTH	25	2	8%
ANIMAL	INVERTEBRATES	EUCOSMA FANDANA	A MOTH	1	DATA GAP	DATA GAP
ANIMAL	INVERTEBRATES	EUCOSMA FOFANA	TORTRICID MOTH	25	6	24%
ANIMAL	INVERTEBRATES	EUHYPARPAX ROSEA	PROMINENT MOTH	1	DATA GAP	DATA GAP
ANIMAL	INVERTEBRATES	EUPHILOTES ELLISI	ELLIS' DOTTED BLUE	20	1	5%
ANIMAL	INVERTEBRATES	EUPHILOTES RITA EMMELI	EMMEL'S BLUE	25	5	20%

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APPENDIX 14. CONSERVATION GOALS/RESULTS BY TARGET

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ANIMAL	INVERTEBRATES	EUPHYES BIMACULA	TWO-SPOTTED SKIPPER	20	1	5%
ANIMAL	INVERTEBRATES	EUPROSERPINUS WIESTI	WIEST'S SPHINX MOTH	20	22	110%
ANIMAL	INVERTEBRATES	GAZORYCTRA UNDESCRIBED SPP	GAZORYCTRA UNDESCRIBED SPP	2	4	200%
ANIMAL	INVERTEBRATES	GLOSSOSOMA ALASCENSE	A CADDISFLY	15	1	7%
ANIMAL	INVERTEBRATES	GNOPHAELA CLAPPIANA	GNOPHAELA CLAPPIANA	25	5	20%
ANIMAL	INVERTEBRATES	GRAMMIA CERVINOIDES	ALPINE TIGER MOTH	15	DATA GAP	DATA GAP
ANIMAL	INVERTEBRATES	GRAMMIA UNDESCRIBED SP #1	A MOTH	25	2	8%
ANIMAL	INVERTEBRATES	GRAMMIA UNDESCRIBED SP #2	A MOTH	1	DATA GAP	DATA GAP
ANIMAL	INVERTEBRATES	GRAMMIA UNDESCRIBED SP #3	A MOTH	25	1	4%
ANIMAL	INVERTEBRATES	HESPERIA LEONARDUS MONTANA	PAWNEE MONTANE SKIPPER	4.25	7	165%
ANIMAL	INVERTEBRATES	HETEROCAMPA RUFINANS	HETEROCAMPA RUFINANS	2	4	200%
ANIMAL	INVERTEBRATES	HETEROCLOEON FRIVOLUM	A MAYFLY	15	1	7%
ANIMAL	INVERTEBRATES	HYPOCHILUS BONNETI	LAMPSHADE SPIDER	25	1	4%
ANIMAL	INVERTEBRATES	HYPOCHILUS JEMEZ	JEMEZ LAMPSHADE SPIDER	25	1	4%
ANIMAL	INVERTEBRATES	HYPTIOTES SP	TRIANGLE WEBSPIDER	25	1	4%
ANIMAL	INVERTEBRATES	LEPIDOSTOMA CINEREUM	A CADDISFLY	25	1	4%
ANIMAL	INVERTEBRATES	LEUCROCUTA PETERSI	A MAYFLY	25	DATA GAP	DATA GAP
ANIMAL	INVERTEBRATES	LIBELLULA NODISTICTA	HOARY SKIMMER	10	1	10%
ANIMAL	INVERTEBRATES	LYCIA UNDESCRIBED SP	A GEOMETRID MOTH	1	DATA GAP	DATA GAP
ANIMAL	INVERTEBRATES	LYMNAEA CAPERATA	SAY'S PONDSNAIL	15	1	7%
ANIMAL	INVERTEBRATES	MACDUNNOA PERSIMPLEX	A MAYFLY	1	DATA GAP	DATA GAP
ANIMAL	INVERTEBRATES	MELEMAEA UNDESCR SPP	A GEOMETRID MOTH	1	DATA GAP	DATA GAP
ANIMAL	INVERTEBRATES	MEXIMACHILIS N. SP.	A BRISTLETAIL	25	DATA GAP	DATA GAP
ANIMAL	INVERTEBRATES	NEOARCTIA BRUCE	ALPINE TIGER MOTH	25	DATA GAP	DATA GAP
ANIMAL	INVERTEBRATES	NEOCYRTUSA N. SP.	A BEETLE	25	DATA GAP	DATA GAP
ANIMAL	INVERTEBRATES	NEOMINOIS RIDINGSII	RIDING'S SATYR	25	21	84%
ANIMAL	INVERTEBRATES	NEOMINOIS WYOMINGO	SWALE SATYR	25	2	8%
ANIMAL	INVERTEBRATES	NEOTRICHIA DOWNSI	A CADDISFLY	25	1	4%
ANIMAL	INVERTEBRATES	OCHLODES YUMA ANASAZI	YUMA SKIPPER	25	1	4%
ANIMAL	INVERTEBRATES	OCHROTRICHIA SUSANAE	A CADDISFLY	25	2	8%
ANIMAL	INVERTEBRATES	OCHROTRICHIA TRAPOIZA	A CADDISFLY	1	DATA GAP	DATA GAP
ANIMAL	INVERTEBRATES	OENEIS ALBERTA CAPULINENSIS	CAPULIN MOUNTAIN ARCTIC	0.75	1	133%
ANIMAL	INVERTEBRATES	OENEIS ALBERTA SP	ALBERTA ARCTIC	1	DATA GAP	DATA GAP
ANIMAL	INVERTEBRATES	OENEIS BORE EDWARDSII	WHITE-VEINED ARCTIC	25	4	16%
ANIMAL	INVERTEBRATES	PAPILIO INDRA MINORI	MINOR'S SWALLOWTAIL	1	DATA GAP	DATA GAP
ANIMAL	INVERTEBRATES	PARALEPTOPHLEBIA TEMPORALIS	A STONEFLY	1	DATA GAP	DATA GAP
ANIMAL	INVERTEBRATES	PARALEUCTRA JEWETTI	A STONEFLY	15	DATA GAP	DATA GAP
ANIMAL	INVERTEBRATES	PARALEUCTRA PROJECTA	PARALEUCTRA PROJECTA	1	2	200%
ANIMAL	INVERTEBRATES	PARALEUCTRA RICKERI	A STONEFLY	15	DATA GAP	DATA GAP
ANIMAL	INVERTEBRATES	PHANETA INSIGNATA	TORTRICID MOTH	25	5	20%
ANIMAL	INVERTEBRATES	PHANETA UNDESCRIBED SPECIES	PHANETA UNDESCRIBED SPECIES	2.5	5	200%
ANIMAL	INVERTEBRATES	PHRAGMATOBIA ASSIMILANS	PHRAGMATOBIA ASSIMILANS	25	1	4%
ANIMAL	INVERTEBRATES	PHYCIODES BATESI ANASAZI	CANYON CRESCENT	4	8	200%
ANIMAL	INVERTEBRATES	PHYLLOGOMPHOIDES ALBRIGHTI	FIVE-STRIPED LEAFTAIL	15	DATA GAP	DATA GAP

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APPENDIX 14. CONSERVATION GOALS/RESULTS BY TARGET

Major Group	Taxon Group	Scientific Name	Common Name	SRM Goal	Known Amount in Portfolio	Known % Goal Met
ANIMAL	INVERTEBRATES	PLAUDITUS CESTUS	A MAYFLY	1	DATA GAP	DATA GAP
ANIMAL	INVERTEBRATES	POANES HOBOMOK WETONA	HOBOMOK SKIPPER	20	DATA GAP	DATA GAP
ANIMAL	INVERTEBRATES	POLITES ORIGENES RHENA	RHENA SKIPPER	25	2	8%
ANIMAL	INVERTEBRATES	PRODOXUS PHYLLORYCTIS	PRODOXUS PHYLLORYCTIS	3.5	8	229%
ANIMAL	INVERTEBRATES	PROSERPINUS FLAVOFASCIATA	YELLOW-BANDED DAY SPHINX	25	3	12%
ANIMAL	INVERTEBRATES	PSEUDEXERITERA UNDESCR SP	TORTRICID MOTH	1	DATA GAP	DATA GAP
ANIMAL	INVERTEBRATES	PSYCHORONIA BROOKSI RUITER 1999	CADDISFLY	15	DATA GAP	DATA GAP
ANIMAL	INVERTEBRATES	PTERONARCELLA REGULARIS	A STONEFLY	15	DATA GAP	DATA GAP
ANIMAL	INVERTEBRATES	RHITHROGENA FLAVIANULA	A MAYFLY	1	DATA GAP	DATA GAP
ANIMAL	INVERTEBRATES	RHITHROGENA PELLUCIDA	A MAYFLY	15	1	7%
ANIMAL	INVERTEBRATES	RHYACIONIA SALMONICOLOR	PINETIP MOTH	1	DATA GAP	DATA GAP
ANIMAL	INVERTEBRATES	SCHINIA AVEMENSIS	GOLD-EDGED GEM	25	1	4%
ANIMAL	INVERTEBRATES	SCHINIA CARMINATRA	A FLOWER MOTH	1	DATA GAP	DATA GAP
ANIMAL	INVERTEBRATES	SCHINIA MASONI	MASON'S FLOWER MOTH	1	DATA GAP	DATA GAP
ANIMAL	INVERTEBRATES	SCHINIA UNDESCR SP	HARDWICK'S FLOWER MOTH	1	DATA GAP	DATA GAP
ANIMAL	INVERTEBRATES	SERICODERUS LATERALIS	A BEETLE	25	DATA GAP	DATA GAP
ANIMAL	INVERTEBRATES	SOMATOCHLORA HUDSONICA	HUDSONIAN EMERALD	10	DATA GAP	DATA GAP
ANIMAL	INVERTEBRATES	SPEYERIA HESPERIS RATONENSIS	NORTHWESTERN FRITILLARY	0.75	1	133%
ANIMAL	INVERTEBRATES	SPEYERIA NOKOMIS NOKOMIS	GREAT BASIN FRITILLARY	4.75	9	189%
ANIMAL	INVERTEBRATES	SPHINX ASELLA	UNKNOWN	20	DATA GAP	DATA GAP
ANIMAL	INVERTEBRATES	STYGOBROMUS COLORADENSIS	A CAVE OBLIGATE AMPHIPOD	9	DATA GAP	DATA GAP
ANIMAL	INVERTEBRATES	STYGOBROMUS HOLSINGERI	A CAVE OBLIGATE AMPHIPOD	0.75	1	133%
ANIMAL	INVERTEBRATES	STYGOBROMUS PENNAKI	A CAVE OBLIGATE AMPHIPOD	25	DATA GAP	DATA GAP
ANIMAL	INVERTEBRATES	SUWALLIA WARDI	A STONEFLY	20	2	10%
ANIMAL	INVERTEBRATES	SWELTSA HONDO	A STONEFLY	20	2	10%
ANIMAL	INVERTEBRATES	TAENIOPTERYX PARVULA	A STONEFLY	15	1	7%
ANIMAL	INVERTEBRATES	TRACHYSMIA GRANDIS	TRACHYSMIA GRANDIS	0.5	1	200%
ANIMAL	INVERTEBRATES	TRIMEROTROPIS FRATERCULA	GRASSHOPPER	25	DATA GAP	DATA GAP
ANIMAL	INVERTEBRATES	UTACAPNIA PODA	GUNNISON STONEFLY	20	1	5%
ANIMAL	MAMMALS	CORYNORHINUS TOWNSENDII PALLESCENS	PALE LUMP-NOSED BAT	10	18	180%
ANIMAL	MAMMALS	CYNOMYS GUNNISONI	GUNNISON'S PRAIRIE DOG	10	29	290%
ANIMAL	MAMMALS	CYNOMYS LEUCURUS	WHITE-TAILED PRAIRIE DOG	5	1	20%
ANIMAL	MAMMALS	DIPODOMYS ORDII EVEXUS	ORDS KANGAROO RAT	25	DATA GAP	DATA GAP
ANIMAL	MAMMALS	DIPODOMYS ORDII MONTANUS	SAN LUIS KANGAROO RAT	25	5	20%
ANIMAL	MAMMALS	GULO GULO	WOLVERINE	5	4	80%
ANIMAL	MAMMALS	LEMMISCUS CURTATUS	SAGEBRUSH VOLE	10	1	10%
ANIMAL	MAMMALS	LEPUS AMERICANUS	SNOWSHOE HARE	15	DATA GAP	DATA GAP
ANIMAL	MAMMALS	LYNX CANADENSIS	LYNX	5	13	260%
ANIMAL	MAMMALS	MARTES AMERICANA	PINE MARTEN	10	46	460%
ANIMAL	MAMMALS	MICROTUS MOGOLLONENSIS	MOGOLLON VOLE	15	DATA GAP	DATA GAP
ANIMAL	MAMMALS	MUSTELA NIGRIPES	BLACK-FOOTED FERRET	1	DATA GAP	DATA GAP
ANIMAL	MAMMALS	OCHOTONA PRINCEPS NIGRESCENS	GOAT PEAK PIKA	6	12	200%
ANIMAL	MAMMALS	PEROGNATHUS FLAVESCENS RELICTUS	PLAINS POCKET MOUSE SUBSP.	25	6	24%
ANIMAL	MAMMALS	PEROGNATHUS FLAVUS SANLUISI	SILKY POCKET MOUSE SUBSP.	25	17	68%

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APPENDIX 14. CONSERVATION GOALS/RESULTS BY TARGET

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ANIMAL	MAMMALS	REITHRODONTOMYS MEGALOTIS CARYI	WESTERN HARVEST MOUSE	25	DATA GAP	DATA GAP
ANIMAL	MAMMALS	SOREX HOYI MONTANUS	PYGMY SHREW	25	3	12%
ANIMAL	MAMMALS	SOREX PREBLEI	PREBLE'S SHREW	15	2	13%
ANIMAL	MAMMALS	SPERMOPHILUS TRIDECEMLINEATUS BLANCA	THIRTEEN-LINED GROUND SQUIRREL SUBSP.	25	10	40%
ANIMAL	MAMMALS	TADARIDA BRASILIENSIS	MEXICAN FREE-TAILED BAT	1	DATA GAP	DATA GAP
ANIMAL	MAMMALS	TAMIAS MINIMUS CARYI	SAN LUIS LEAST CHIPMUNK	25	2	8%
ANIMAL	MAMMALS	THOMOMYS BOTTAE CULTELLUS	BOTTA'S POCKET GOPHER SUBSP.CULTELLUS	25	2	8%
ANIMAL	MAMMALS	THOMOMYS BOTTAE INTERNATUS	A POCKET GOPHER	15	DATA GAP	DATA GAP
ANIMAL	MAMMALS	THOMOMYS BOTTAE PERVAGUS	BOTTA'S POCKET GOPHER SUBSP.PERVAGUS	25	3	12%
ANIMAL	MAMMALS	THOMOMYS BOTTAE RUBIDUS	BOTTA'S POCKET GOPHER SUBSP	25	DATA GAP	DATA GAP
ANIMAL	MAMMALS	THOMOMYS TALPOIDES AGRESTIS	NORTHERN POCKET GOPHER SUBSP	1	DATA GAP	DATA GAP
ANIMAL	MAMMALS	ZAPUS HUDSONIUS LUTEUS	NEW MEXICAN JUMPING MOUSE	25	5	20%
ANIMAL	MAMMALS	ZAPUS HUDSONIUS PREBLEI	MEADOW JUMPING MOUSE	25	26	104%
ANIMAL	MAMMALS,WR	BOS BISON	AMERICAN BISON	1	DATA GAP	DATA GAP
ANIMAL	MAMMALS,WR	CANIS LUPUS	GRAY WOLF	1	DATA GAP	DATA GAP
ANIMAL	MAMMALS,WR	OVIS CANADENSIS	BIGHORN SHEEP	3	DATA GAP	DATA GAP
ANIMAL	MAMMALS,WR	URSUS ARCTOS	BROWN BEAR	1	DATA GAP	DATA GAP
ANIMAL	MOLLUSKS	ACROLOXUS COLORADENSIS	ROCKY MOUNTAIN CAPSHELL	2.5	5	200%
ANIMAL	MOLLUSKS	ANODONTOIDES FERUSSACIANUS	CYLINDRICAL PAPERSHELL	15	DATA GAP	DATA GAP
ANIMAL	MOLLUSKS	LYMNAEA STAGNALIS	SWAMPY LYMNAEA	1	DATA GAP	DATA GAP
ANIMAL	MOLLUSKS	PHYSA CUPREONITENS	HOT SPRINGS PHYSA	10	1	10%
ANIMAL	MOLLUSKS	PHYSA SKINNERI	GLASS PHYSA	1	DATA GAP	DATA GAP
ANIMAL	MOLLUSKS	PHYSA UTAHENSIS	BANDED PHYSA	1	DATA GAP	DATA GAP
ANIMAL	MOLLUSKS	PISIDIUM LILLJEBORGI	LILLJEBORG'S PEACLAM	5	2	40%
ANIMAL	MOLLUSKS	PISIDIUM SANGUINICHRISTI	SANGRE DE CRISTO PEACLAM	1.5	2	133%
ANIMAL	MOLLUSKS	PROMENETUS EXACUOUS	SHARP SPRITE	1	DATA GAP	DATA GAP
ANIMAL	MOLLUSKS	PROMENETUS UMBILICATELLUS	UMBILICATE SPRITE	1	DATA GAP	DATA GAP
ANIMAL	MOLLUSKS	VALVATA SINCERA	MOSSY VALVATA	1	DATA GAP	DATA GAP
COMMUNITY	PLANT COMMUNITIES	ABIES CONCOLOR-PICEA PUNGENS-POPULUS ANGU	WHITE FIR-BLUE SPRUCE-NARROWLEAF COTTONWOOD/ROCKY MOUNTAIN MAPLE	5	5	100%
COMMUNITY	PLANT COMMUNITIES	ABIES LASIOCARPA/TRAUTVETTERIA CAROLINIENSIS	SUBALPINE FIR/CAROLINA TASSEL-RUE	1	DATA GAP	DATA GAP
COMMUNITY	PLANT COMMUNITIES	AMELANCHIER UTAHENSIS/CAREX GEYERI	UTAH SERVICEBERRY/GEYER'S SEDGE	1	DATA GAP	DATA GAP
COMMUNITY	PLANT COMMUNITIES	AMELANCHIER UTAHENSIS/CERCOCARPUS MONTANUS	UTAH SERVICEBERRY/MOUNTAIN MAHOGANY	1	DATA GAP	DATA GAP
COMMUNITY	PLANT COMMUNITIES	AMELANCHIER UTAHENSIS/PSEUDOROEGNERIA SPICATA	UTAH SERVICEBERRY/BLUEBLUNCH WHEATGRASS	1	DATA GAP	DATA GAP
COMMUNITY	PLANT COMMUNITIES	ANDROPOGON GERARDII/SORGHASTRUM NUTANS	BIG BLUESTEM-YELLOW INDIAN GRASS	1	DATA GAP	DATA GAP
COMMUNITY	PLANT COMMUNITIES	ANDROPOGON GERARDII/SPOROBOLUS HETEROLEPIS	BIG BLUESTEM-PRAIRIE DROPSEED	1	DATA GAP	DATA GAP
COMMUNITY	PLANT COMMUNITIES	ANDROPOGON GERARDII-SCHIZACHYRIUM SCOPARI	BIG BLUESTEM-LITTLE FALSE BLUESTEM WESTERN GREAT PLAINS	4	3	75%
COMMUNITY	PLANT COMMUNITIES	ARCTOSTAPHYLOS PATULA/CEANOTHUS VELUTINUS	GREENLEAF MANZANITA/SKUNKBUSH SUMAC/SQUAW CARPET	1	1	100%
COMMUNITY	PLANT COMMUNITIES	ARTEMISIA CANA/FESTUCA THURBERI	SILVER SAGEBRUSH/THURBER'S FESCUE	2	1	50%
COMMUNITY	PLANT COMMUNITIES	ARTEMISIA TRIDENTATA SSP VASEYANA/FESTUCA KINGII	MOUNTAIN BIG SAGEBRUSH/SPIKE FESCUE	1	DATA GAP	DATA GAP

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APPENDIX 14. CONSERVATION GOALS/RESULTS BY TARGET

Major Group	Taxon Group	Scientific Name	Common Name	SRM Goal	Known Amount in Portfolio	Known % Goal Met
COMMUNITY	PLANT COMMUNITIES	ARTEMISIA TRIDENTATA SSP. TRIDENTATA/LEYMUS CINEREUS	BIG SAGEBRUSH/GREAT BASIN LYME GRASS	1	1	100%
COMMUNITY	PLANT COMMUNITIES	ARTEMISIA TRIDENTATA SSP. VASEYANA/CAREX GEYERI	MOUNTAIN BIG SAGEBRUSH/GEYER'S SEDGE	1	DATA GAP	DATA GAP
COMMUNITY	PLANT COMMUNITIES	ARTEMISIA TRIPARTITA/FESTUCA IDAHOENSIS	THREETIP SAGEBRUSH/IDAHO FESCUE	10	1	10%
COMMUNITY	PLANT COMMUNITIES	BOUTELOUA GRACILIS/BUCHLOE DACTYLOIDES	BLUE GRAMA/BUFFALO GRASS	1	DATA GAP	DATA GAP
COMMUNITY	PLANT COMMUNITIES	CALTHA LEPTOSEPALA-DESCHAMPSIA CESPITOSA	WHITE MARSH MARIGOLD-TUFTED HAIRGRASS	1	DATA GAP	DATA GAP
COMMUNITY	PLANT COMMUNITIES	CALTHA LEPTOSEPALA-POLYGONUM BISTORTOIDES	WHITE MARSH MARIGOLD-AMERICAN BISTORT	1	DATA GAP	DATA GAP
COMMUNITY	PLANT COMMUNITIES	CAREX AQUATILIS-SPHAGHUM SPP	WATER SEDGE-SPHAGNUM MOSS	1	DATA GAP	DATA GAP
COMMUNITY	PLANT COMMUNITIES	CAREX ROSTELLATA	BEAKED SPIKERUSH	1	DATA GAP	DATA GAP
COMMUNITY	PLANT COMMUNITIES	CERCOCARPUS MONTANUS/RHUS TRILOBATA/ANDROPOGON GERARDII	MOUNTAIN MAHOGANY/SKUNKBUSH SUMAC/BIG BLUESTEM	1	DATA GAP	DATA GAP
COMMUNITY	PLANT COMMUNITIES	CERCOCARPUS MONTANUS/STIPA COMATA	ALDER-LEAF MOUNTAIN MAHOGANY/NEEDLE-AND-THREAD	1	10	1000%
COMMUNITY	PLANT COMMUNITIES	CERCOCARPUS MONTANUS/STIPA NEOMEXICANA	ALDER-LEAF MOUNTAIN MAHOGANY/NEW MEXICO NEEDLE GRASS	2	1	50%
COMMUNITY	PLANT COMMUNITIES	CERCOCARPUS MONTANUS/STIPA SCRIBNERI	ALDER-LEAF MOUNTAIN MAHOGANY/SCRIBNER'S NEEDLE GRASS	25	2	8%
COMMUNITY	PLANT COMMUNITIES	DANTHONIA INTERMEDIA	TIMBER OATGRASS	25	1	4%
COMMUNITY	PLANT COMMUNITIES	DANTHONIA PARRYI	PARRY'S OATGRASS	15	13	87%
COMMUNITY	PLANT COMMUNITIES	FESTUCA ARIZONICA-MUHLENBERGIA FILICULMIS	ARIZONA FESCUE/SLIM-STEM MUHLY	6	6	100%
COMMUNITY	PLANT COMMUNITIES	FESTUCA ARIZONICA-MUHLENBERGIA MONTANA	ARIZONA FESCUE/MOUNTAIN MUHLY	5	5	100%
COMMUNITY	PLANT COMMUNITIES	FESTUCA IDAHOENSIS-GERANIUM VICCOSISSIMUM	IDAHO FESCUE-STICKY GERANIUM	1	DATA GAP	DATA GAP
COMMUNITY	PLANT COMMUNITIES	FESTUCA THURBERI SUBALPINE GRASSLAND	THURBER'S FESCUE SUBALPINE GRASSLAND	1	DATA GAP	DATA GAP
COMMUNITY	PLANT COMMUNITIES	FORESTIERA PUBESCENS	WILD-PRIVET	1	1	100%
COMMUNITY	PLANT COMMUNITIES	JUNIPERUS MONOSPERMA/ANDROPOGON HALLII	ONE-SEED JUNIPER/SAND BLUESTEM	1	DATA GAP	DATA GAP
COMMUNITY	PLANT COMMUNITIES	JUNIPERUS OSTEOSPERMA/LEYMUS SALINUS SSP SALMONIS	ONE-SEED JUNIPER/GREAT BASIN WILD RYE	1	DATA GAP	DATA GAP
COMMUNITY	PLANT COMMUNITIES	JUNIPERUS OSTEOSPERMA/STIPA COMATA	ONE-SEED JUNIPER/NEEDLE-AND-THREAD	1	1	100%
COMMUNITY	PLANT COMMUNITIES	JUNIPERUS SCOPULORUM/ARTEMISIA TRIDENTATA	ROCKY MOUNTAIN JUNIPER/BIG SAGEBRUSH	1	DATA GAP	DATA GAP
COMMUNITY	PLANT COMMUNITIES	JUNIPERUS SCOPULORUM/CERCOCARPUS MONTANUS	FOOTHILLS PINYON-JUNIPER WOODLANDS/SCARP WOODLANDS	4	4	100%
COMMUNITY	PLANT COMMUNITIES	JUNIPERUS SCOPULORUM/PURSHIA TRIDENTATA	ROCKY MOUNTAIN JUNIPER/BITTERBRUSH	25	3	12%
COMMUNITY	PLANT COMMUNITIES	KOBRESIA MYOSUROIDES-THALICTRUM ALPINUM	PACIFIC BOG SEDGE-ALPINE MEADOWRUE	14	14	100%
COMMUNITY	PLANT COMMUNITIES	KOBRESIA SIMPLICUSCULA-SCIRPUS PUMILUS	PACIFIC BOG SEDGE-RUSH	11	11	100%
COMMUNITY	PLANT COMMUNITIES	MUHLENBERGIA FILICULMIS	SLIM-STEM MUHLY	6	6	100%
COMMUNITY	PLANT COMMUNITIES	MUHLENBERGIA MONTANA-STIPA COMATA	MOUNTAIN MUHLY/NEEDLE-AND-THREAD	5	4	80%
COMMUNITY	PLANT COMMUNITIES	PICEA ENGELMANNII/TRIFOLIUM DASYPHYLLUM	ENGELMANN'S SPRUCE/UINTA CLOVER	1	DATA GAP	DATA GAP
COMMUNITY	PLANT COMMUNITIES	PINUS ARISTATA/TRIFOLIUM DASYPHYLLUM	BRISTLE-CONE PINE/UINTAH CLOVER	10	10	100%
COMMUNITY	PLANT COMMUNITIES	PINUS EDULIS/STIPA COMATA	XERIC WESTERN SLOPE PINYON-JUNIPER WOODLANDS	25	3	12%
COMMUNITY	PLANT COMMUNITIES	PINUS EDULIS/STIPA SCRIBNERI	TWO-NEEDLE PINYON/SCRIBNER'S NEEDLE GRASS	25	3	12%
COMMUNITY	PLANT COMMUNITIES	PINUS FLEXILIS/FESTUCA KINGII	LIMBER PINE/SPIKE FESCUE	10	1	10%
COMMUNITY	PLANT COMMUNITIES	PINUS PONDEROSA/CERCOCARPUS MONTANUS/ANDR	PONDEROSA PINE/MOUNTAIN MAHOGANY/BIG BLUESTEM	6	6	100%

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APPENDIX 14. CONSERVATION GOALS/RESULTS BY TARGET

Major Group	Taxon Group	Scientific Name	Common Name	SRM Goal	Known Amount in Portfolio	Known % Goal Met
COMMUNITY	PLANT COMMUNITIES	PINUS PONDEROSA/FESTUCA KINGII	PONDEROSA PINE/SPIKE FESCUE	6	6	100%
COMMUNITY	PLANT COMMUNITIES	PINUS PONDEROSA/ORYZOPSIS HYMENOIDES	PONDEROSA PINE/INDIAN MOUNTAIN-RICE GRASS	1	DATA GAP	DATA GAP
COMMUNITY	PLANT COMMUNITIES	POLIOMINTHA INCANA/BOUTELOUA GRACILIS	HOARY ROSEMARY-MINT/BLUE GRAMA	1	DATA GAP	DATA GAP
COMMUNITY	PLANT COMMUNITIES	POPULUS ANGUSTIFOLIA/BETULA OCCIDENTALIS	NARROWLEAF COTTONWOOD/WATER BIRCH	10	8	80%
COMMUNITY	PLANT COMMUNITIES	POPULUS ANGUSTIFOLIA/CRATAEGUS RIVULARIS	NARROWLEAF COTTONWOOD/RIVER HAWTHORN WOODLAND	7	5	71%
COMMUNITY	PLANT COMMUNITIES	POPULUS ANGUSTIFOLIA/JUNIPERUS SCOPULORUM	NARROWLEAF COTTONWOOD/ROCKY MOUNTAIN JUNIPER WOODLAND	23	23	100%
COMMUNITY	PLANT COMMUNITIES	POPULUS ANGUSTIFOLIA/SALIX DRUMMONDIANA-A	NARROWLEAF COTTONWOOD/ROCKY MOUNTAIN MAPLE	25	1	4%
COMMUNITY	PLANT COMMUNITIES	POPULUS ANGUSTIFOLIA/SALIX IRRORATA	NARROWLEAF COTTONWOOD/BLUESTEM WILLOW	25	1	4%
COMMUNITY	PLANT COMMUNITIES	POPULUS ANGUSTIFOLIA/SALIX LIGULIFOLIA - SHEPHERDIA ARGENTEA WOODLAND	NARROWLEAF COTTONWOOD/STRAP-LEAF WILLOW-SILVER BUFFALOBERRY	6	4	67%
COMMUNITY	PLANT COMMUNITIES	POPULUS ANGUSTIFOLIA/SAND DUNE FOREST	NARROWLEAF COTTONWOOD/SAND DUNE FOREST	2	2	100%
COMMUNITY	PLANT COMMUNITIES	POPULUS DELTOIDES SSP. WISLIZENII/RHUS TR	EASTERN COTTONWOOD / SKUNKBUSH SUMAC	1	3	300%
COMMUNITY	PLANT COMMUNITIES	POPULUS DELTOIDES/SYMPHORICARPOS	EASTERN COTTONWOOD/WESTERN SNOWBERRY	1	DATA GAP	DATA GAP
COMMUNITY	PLANT COMMUNITIES	POPULUS TREMULOIDES/ACER GLABRUM	QUAKING ASPEN/ROCKY MOUNTAIN MAPLE	3	3	100%
COMMUNITY	PLANT COMMUNITIES	POPULUS TREMULOIDES/CEANOTHUS VELUTINUS	QUAKING ASPEN/TOBACCO-BRUSH	25	2	8%
COMMUNITY	PLANT COMMUNITIES	POPULUS TREMULOIDES/CORYLUS CORNUTA	QUAKING ASPEN/BEAKED HAZEL	10	1	10%
COMMUNITY	PLANT COMMUNITIES	POPULUS TREMULOIDES/RIBES MONTIGENUM	QUAKING ASPEN/WESTERN PRICKLY GOOSEBERRY	1	DATA GAP	DATA GAP
COMMUNITY	PLANT COMMUNITIES	POPULUS TREMULOIDES/SENECIO BIGELOVII	QUAKING ASPEN/NODDING RAGWORT	1	DATA GAP	DATA GAP
COMMUNITY	PLANT COMMUNITIES	POPULUS TREMULOIDES/VACCINIUM MYRTILLUS	QUAKING ASPEN/WHORTLE-BERRY	1	DATA GAP	DATA GAP
COMMUNITY	PLANT COMMUNITIES	PSEUDOROEGNERIA SPICATA	BLUEBUNCH WHEATGRASS	1	DATA GAP	DATA GAP
COMMUNITY	PLANT COMMUNITIES	PSEUDOROEGNERIA SPICATA-POA SECUNDA	BLUEBUNCH WHEATGRASS-CURLY BLUEGRASS	1	DATA GAP	DATA GAP
COMMUNITY	PLANT COMMUNITIES	PUCCINELLIA NUTTALLIANA	NUTTALL'S ALKALI GRASS	1	DATA GAP	DATA GAP
COMMUNITY	PLANT COMMUNITIES	PURSHIA TRIDENTATA/ARTEMESIA FRIGIDA/STIP	BITTERBRUSH/PRAIRIE SAGEBRUSH/NEEDLE-AND-THREAD	25	2	8%
COMMUNITY	PLANT COMMUNITIES	PURSHIA TRIDENTATA/MUHLENBERGIA MONTANA	BITTERBRUSH/MOUNTAIN MAHOGANY	3	3	100%
COMMUNITY	PLANT COMMUNITIES	PURSHIA TRIDENTATA/STIPA COMATA	BITTERBRUSH/NEEDLE-AND-THREAD	1	DATA GAP	DATA GAP
COMMUNITY	PLANT COMMUNITIES	REDFIELDIA FLEXUOSA	BLOWOUT GRASS	1	1	100%
COMMUNITY	PLANT COMMUNITIES	RHUS TRILOBATA	SKUNKBRUSH RIPARIAN SHRUBLAND	6	6	100%
COMMUNITY	PLANT COMMUNITIES	RIBES CEREUM/LEYMUS AMBIGUUS	WHITE SQUAW CURRANT/ROCKY MOUNTAIN LYME GRASS	25	1	4%
COMMUNITY	PLANT COMMUNITIES	SALICORNIA RUBRA	RED SALTWORT	1	1	100%
COMMUNITY	PLANT COMMUNITIES	SALIX AMYGDALOIDEES	PEACH-LEAF WILLOW	1	DATA GAP	DATA GAP
COMMUNITY	PLANT COMMUNITIES	SALIX EXIGUA/ELYMUS X PSEUDOREPENS SHRUBLAND	NARROW-LEAF WILLOW/QUACKGRASS	1	2	200%
COMMUNITY	PLANT COMMUNITIES	SCHIZACHYRIUM SCOPARIUM-BOUTELOUA CURTIPENDULA	LITTLE FALSE BLUESTEM-SIDE OATS GRAMA	1	DATA GAP	DATA GAP
COMMUNITY	PLANT COMMUNITIES	STIPA COMATA - COLORADO FRONT RANGE	NEEDLE-AND-THREAD/BLUE GRAMA FRONT RANGE VARIANT	1	1	100%
COMMUNITY	PLANT COMMUNITIES	STIPA COMATA-ORYZOPSIS HYMENOIDES	NEEDLE-AND-THREAD/INDIAN MOUNTAIN RICE-GRASS	3	3	100%
COMMUNITY	PLANT COMMUNITIES	STIPA NEOMEXICANA	NEW MEXICO NEEDLE GRASS	3	2	67%
PLANT	PLANTS	AGASTACHE FOENICULUM	LAVENDER HYSSOP	15	1	7%
PLANT	PLANTS	ALETES HUMILIS	LARIMER ALETES	25	35	140%

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APPENDIX 14. CONSERVATION GOALS/RESULTS BY TARGET

Major Group	Taxon Group	Scientific Name	Common Name	SRM Goal	Known Amount in Portfolio	Known % Goal Met
PLANT	PLANTS	ALSINANTHE MACRANTHA	UNKNOWN	20	DATA GAP	DATA GAP
PLANT	PLANTS	AQUILEGIA LARAMIENSIS	LARAMIE COLUMBINE	25	2	8%
PLANT	PLANTS	AQUILEGIA SAXIMONTANA	ROCKY MOUNTAIN COLUMBINE	25	15	60%
PLANT	PLANTS	ARABIS CRANDALII	UNKNOWN	20	DATA GAP	DATA GAP
PLANT	PLANTS	ARABIS GUNNISONIANA	UNKNOWN	25	DATA GAP	DATA GAP
PLANT	PLANTS	ARMERIA SCABRA SSP SIBIRICA	SEA PINK	15	3	20%
PLANT	PLANTS	ARTEMISIA PATTERSONII	PATTERSON'S WORMWOOD	25	2	8%
PLANT	PLANTS	ASCLEPIAS UNCIALIS	DWARF MILKWEED	1	DATA GAP	DATA GAP
PLANT	PLANTS	ASTER ALPINUS VAR VIERHAPPERI	ALPINE ASTER	15	1	7%
PLANT	PLANTS	ASTRAGALUS ANISUS	GUNNISON MILKVETCH	25	12	48%
PLANT	PLANTS	ASTRAGALUS CERUSSATUS	POWDERY MILKVETCH	25	DATA GAP	DATA GAP
PLANT	PLANTS	ASTRAGALUS CYANEUS	CYANIC MILKVETCH	20	1	5%
PLANT	PLANTS	ASTRAGALUS DEBEQUAEUS	DEBEQUE MILKVETCH	25	19	76%
PLANT	PLANTS	ASTRAGALUS FEENSIS	SANTA FE MILKVETCH	20	1	5%
PLANT	PLANTS	ASTRAGALUS HALLII VAR HALLII	HALL'S MILKVETCH	25	DATA GAP	DATA GAP
PLANT	PLANTS	ASTRAGALUS IODOPETALUS	VIOLET MILKVETCH	1	DATA GAP	DATA GAP
PLANT	PLANTS	ASTRAGALUS LEPTALEUS	PARK MILKVETCH	20	1	5%
PLANT	PLANTS	ASTRAGALUS LINIFOLIUS	GRAND JUNCTION MILKVETCH	20	19	95%
PLANT	PLANTS	ASTRAGALUS MICROCYMBUS	SKIFF MILKVETCH	20.5	38	185%
PLANT	PLANTS	ASTRAGALUS MICROMERIUS	CHACO MILKVETCH	25	2	8%
PLANT	PLANTS	ASTRAGALUS MISSOURIENSIS VAR HUMISTRATUS	MISSOURI MILK-VETCH	25	1	4%
PLANT	PLANTS	ASTRAGALUS MOLYBDENUS	LEADVILLE MILKVETCH	25	9	36%
PLANT	PLANTS	ASTRAGALUS OSTERHOUTII	OSTERHOUT MILKVETCH	4.5	6	133%
PLANT	PLANTS	ASTRAGALUS PUNICEUS VAR GERTRUDIS	TAOS MILKVETCH	1	DATA GAP	DATA GAP
PLANT	PLANTS	ASTRAGALUS RIPLEYI	RIPLEY MILKVETCH	25	81	324%
PLANT	PLANTS	ASTRAGALUS SPARSIFLORUS	FRONT RANGE MILKVETCH	25	DATA GAP	DATA GAP
PLANT	PLANTS	ASTRAGALUS WETHERILLII	WETHERILL MILKVETCH	20	19	95%
PLANT	PLANTS	AZALEASTRUM ALBIFLORUM	WHITE-FLOWERED AZALEA	15	8	53%
PLANT	PLANTS	BESSEYA RITTERIANA	RITTER'S CORALDROPS	1	DATA GAP	DATA GAP
PLANT	PLANTS	BOTRYCHIUM CAMPESTRE	PRAIRIE MOONWORT	10	1	10%
PLANT	PLANTS	BOTRYCHIUM ECHO	REFLECTED MOONWORT	25	17	68%
PLANT	PLANTS	BOTRYCHIUM HESPERIUM	WESTERN MOONWORT	10	9	90%
PLANT	PLANTS	BOTRYCHIUM LINEARE	NARROWLEAF GRAPEFERN	25	3	12%
PLANT	PLANTS	BOTRYCHIUM PALLIDUM	PALE MOONWORT	25	3	12%
PLANT	PLANTS	BOTRYCHIUM PINNATUM	NORTHERN MOONWORT	15	6	40%
PLANT	PLANTS	BOTRYPUS VIRGINIANUS	RATTLESNAKE FERN	15	1	7%
PLANT	PLANTS	BRAYA GLABELLA VAR GLABELLA	ARCTIC BRAYA	15	7	47%
PLANT	PLANTS	BRAYA HUMILIS	ALPINE BRAYA	15	15	100%
PLANT	PLANTS	CALOCHORTUS GUNNISONII VAR PERPULCHER	PECOS MARIPOSA LILY	25	1	4%
PLANT	PLANTS	CAREX CONCINNA	LOW NORTHERN SEDGE	15	2	13%
PLANT	PLANTS	CAREX LASIOCARPA	SLENDER SEDGE	15	4	27%
PLANT	PLANTS	CAREX LIVIDA	LIVID SEDGE	15	6	40%
PLANT	PLANTS	CAREX NELSONII	NELSON'S SEDGE	20	1	5%
PLANT	PLANTS	CAREX OREOCHARIS	A SEDGE	20	9	45%

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APPENDIX 14. CONSERVATION GOALS/RESULTS BY TARGET

Major Group	Taxon Group	Scientific Name	Common Name	SRM Goal	Known Amount in Portfolio	Known % Goal Met
PLANT	PLANTS	CAREX PERGLOBOSA	GLOBE SEDGE	20	DATA GAP	DATA GAP
PLANT	PLANTS	CAREX VIRIDULA	GREEN SEDGE	15	3	20%
PLANT	PLANTS	CASTILLEJA LINEATA	MARSH MEADOW INDIAN PAINTBRUSH	25	DATA GAP	DATA GAP
PLANT	PLANTS	CASTILLEJA PUBERULA	DOWNY INDIAN-PAINTBRUSH	25	1	4%
PLANT	PLANTS	CHONDROPHYLLA NUTANS	UNKNOWN	15	DATA GAP	DATA GAP
PLANT	PLANTS	CIRSIUM PERPLEXANS	ROCKY MOUNTAIN THISTLE	25	7	28%
PLANT	PLANTS	CIRSIUM SCAPANOLEPIS	MOUNTAIN SLOPE THISTLE	25	DATA GAP	DATA GAP
PLANT	PLANTS	CLEOME MULTICAULIS	SLENDER SPIDERFLOWER	25	46	184%
PLANT	PLANTS	CRATAEGUS SALIGNA	WILLOW HAWTHORN	1	DATA GAP	DATA GAP
PLANT	PLANTS	CRYPTANTHA WEBERI	WEBERS CATS-EYE	25	DATA GAP	DATA GAP
PLANT	PLANTS	CYSTOPTERIS MONTANA	MOUNTAIN BLADDER FERN	15	3	20%
PLANT	PLANTS	DELPHINIUM ALPESTRE	COLORADO LARKSPUR	25	2	8%
PLANT	PLANTS	DELPHINIUM SAPELLONIS	SAPELLO CANYON LARKSPUR	20	DATA GAP	DATA GAP
PLANT	PLANTS	DELPHNIUM ROBUSTUM	WAHATOYA CREEK LARKSPUR	1	DATA GAP	DATA GAP
PLANT	PLANTS	DESCURAINIA RAMOSISSIMA	VILLA GROVE TANSY-MUSTARD	25	DATA GAP	DATA GAP
PLANT	PLANTS	DRABA GLOBOSA	ROCKCRESS DRABA	20	6	30%
PLANT	PLANTS	DRABA GRAMINEA	SAN JUAN WHITLOW-GRASS	25	5	20%
PLANT	PLANTS	DRABA GRAYANA	GRAY'S PEAK WHITLOW-GRASS	25	12	48%
PLANT	PLANTS	DRABA PORSILDII	PORSILD'S WHITLOW-GRASS	15	2	13%
PLANT	PLANTS	DRABA RECTIFRUCTA	MOUNTAIN WHITLOW-GRASS	15	8	53%
PLANT	PLANTS	DRABA SMITHII	SMITH WHITLOW-GRASS	25	14	56%
PLANT	PLANTS	DRABA SPECTABILIS VAR OXYLOBA	DRABA SPECTABILIS VAR OXYLOBA	20	20	100%
PLANT	PLANTS	DRABA STREPTOBRACHIA	COLORADO DIVIDE WHITLOW-GRASS	25	16	64%
PLANT	PLANTS	DRABA VENTOSA	WIND RIVER WHITLOW-GRASS	20	4	20%
PLANT	PLANTS	DRABA WEBERI	WEBER'S DRABA	25	1	4%
PLANT	PLANTS	DROSERA ROTUNDIFOLIA	ROUNDLEAF SUNDEW	15	7	47%
PLANT	PLANTS	DRYOPTERIS EXPANSA	SPREADING WOOD FERN	15	4	27%
PLANT	PLANTS	ERICAMERIA MICROCEPHALA	SMALL-HEAD GOLDEN-WEED	25	1	4%
PLANT	PLANTS	ERIGERON LANATUS	WOOLLY FLEABANE	15	4	27%
PLANT	PLANTS	ERIGERON SUBGLABER	HAIRLESS FLEABANE	25	4	16%
PLANT	PLANTS	ERIOGONUM BRANDEGEEI	BRANDEGEE WILD BUCKWHEAT	13.25	17	128%
PLANT	PLANTS	ERIOGONUM COLORADENSE	COLORADO WILD BUCKWHEAT	1	DATA GAP	DATA GAP
PLANT	PLANTS	ERIOGONUM EXILIFOLIUM	DROPLEAF BUCKWHEAT	20	1	5%
PLANT	PLANTS	ERIOGONUM LACHNOGYNUM	LONGROOT WILD BUCKWHEAT	15	1	7%
PLANT	PLANTS	ERIOPHORUM ALTAICUM VAR NEOGAEUM	ALTAI COTTONGRASS	10	17	170%
PLANT	PLANTS	ERIOPHORUM GRACILE	SLENDER COTTONGRASS	15	6	40%
PLANT	PLANTS	EUTREMA EDWARDSII SSP PENLANDII	PENLAND ALPINE FEN MUSTARD	25	31	124%
PLANT	PLANTS	FESTUCA HALLII	HALL FESCUE	10	2	20%
PLANT	PLANTS	GILIA PENSTEMONOIDES	BLACK CANYON GILIA	25	13	52%
PLANT	PLANTS	GILIA SEDIFOLIA	STONECROP GILIA	1	DATA GAP	DATA GAP
PLANT	PLANTS	GRINDELIA ACUTIFOLIA	SHARP-LEAF GUMWEED	25	3	12%
PLANT	PLANTS	GRINDELIA DECUMBENS VAR. SUBINCISA	STEYERMARK RECLINED GUMWEED	25	DATA GAP	DATA GAP
PLANT	PLANTS	ILIAMNA CRANDALLII	CRANDALL'S WILD HOLLYHOCK	1	DATA GAP	DATA GAP
PLANT	PLANTS	ILIAMNA GRANDIFLORA	LARGE-FLOWER GLOBE-MALLOW	20	3	15%

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PLANT	PLANTS	IPOMOPSIS AGGREGATA SSP WEBERI	RABBIT EARS GILIA	25	30	120%
PLANT	PLANTS	IPOMOPSIS GLOBULARIS	GLOBE GILIA	25	9	36%
PLANT	PLANTS	IPOMOPSIS POLYANTHA	PAGOSA GILIA	25	3	12%
PLANT	PLANTS	IPOMOPSIS SANCTI-SPIRITUS	HOLY GHOST IPOMOPSIS	1.5	3	200%
PLANT	PLANTS	JUNCUS TWEEDYI	TWEEDY RUSH	15	1	7%
PLANT	PLANTS	LESQUERELLA PARVULA	A BLADDERPOD	20	2	10%
PLANT	PLANTS	LESQUERELLA PRUINOSA	PAGOSA BLADDERPOD	9.25	14	151%
PLANT	PLANTS	LOMATIUM BICOLOR VAR LEPTOCARPUM	OREGON BISCUITROOT	15	1	7%
PLANT	PLANTS	LUPINUS CRASSUS	PAYSON LUPINE	25	4	16%
PLANT	PLANTS	LUZULA SUBCAPITATA	COLORADO WOODRUSH	25	DATA GAP	DATA GAP
PLANT	PLANTS	MACHAERANTHERA COLORADOENSIS	COLORADO TANSY-ASTER	25	13	52%
PLANT	PLANTS	MENTZELIA CHRYSANTHA	GOLDEN BLAZING STAR	25	1	4%
PLANT	PLANTS	MENTZELIA CONSPICUA	CHAMA BLAZING STAR	1	DATA GAP	DATA GAP
PLANT	PLANTS	MENTZELIA DENSA	ROYAL GORGE STICKLEAF	14.25	20	140%
PLANT	PLANTS	MENTZELIA MULTICAULIS	MANY STEM STICKLEAF	25	DATA GAP	DATA GAP
PLANT	PLANTS	MENTZELIA SPRINGERI	SANTA FE STICKLEAF	25	1	4%
PLANT	PLANTS	MIMULUS GEMMIPARUS	WEBER MONKEY-FLOWER	25	6	24%
PLANT	PLANTS	MYRIOPHYLLUM VERTICILLATUM	WATER MILFOIL	15	DATA GAP	DATA GAP
PLANT	PLANTS	NEOPARRYA LITHOPHILA	ROCK LOVING ALETES	25	DATA GAP	DATA GAP
PLANT	PLANTS	OPUNTIA VIRIDIFLORA	SANTA FE CHOLLA	1	2	200%
PLANT	PLANTS	OREOXIS ALPINA SSP PUBERULENTA	ALPINE OREOXIS	2	DATA GAP	DATA GAP
PLANT	PLANTS	OREOXIS BAKERI	UNKNOWN	25	DATA GAP	DATA GAP
PLANT	PLANTS	OREOXIS HUMILIS	PIKES PEAK SPRING PARSLEY	4.5	5	111%
PLANT	PLANTS	PACKERA PAUCIFLORA	FEW-FLOWERED RAGWORT	15	13	87%
PLANT	PLANTS	PAPAVER KLUANENSE	ALPINE POPPY	15	1	7%
PLANT	PLANTS	PARONYCHIA PULVINATA	ROCKY MOUNTAIN NAILWORT	25	5	20%
PLANT	PLANTS	PARTHENIUM TETRANEURIS	BARNBEY'S FEVERFEW	20	DATA GAP	DATA GAP
PLANT	PLANTS	PEDICULARIS SCOPULORUM	SUDETIC LOUSEWORT	25	DATA GAP	DATA GAP
PLANT	PLANTS	PENSTEMON BRANDEGEI	UNKNOWN	25	DATA GAP	DATA GAP
PLANT	PLANTS	PENSTEMON CRANDALLI VAR. GLABRESCENS	UNKNOWN	25	DATA GAP	DATA GAP
PLANT	PLANTS	PENSTEMON CYATHOPHORUS	MIDDLE PARK PENSTEMON	25	3	12%
PLANT	PLANTS	PENSTEMON DEGENERI	DEGENER BEARDTONGUE	5	8	160%
PLANT	PLANTS	PENSTEMON GLABER VAR ALPINUS	ALPINE WESTERN PENSTEMON	25	2	8%
PLANT	PLANTS	PENSTEMON HALLII	HALLS BEARDTONGUE	25	DATA GAP	DATA GAP
PLANT	PLANTS	PENSTEMON HARBOURII	HARBOUR'S BEARDTONGUE	1	DATA GAP	DATA GAP
PLANT	PLANTS	PENSTEMON HARRINGTONII	HARRINGTON BEARDTONGUE	25	70	280%
PLANT	PLANTS	PENSTEMON MENSARUM	GRAND MESA PENSTEMON	25	7	28%
PLANT	PLANTS	PENSTEMON PENLANDII	PENLAND BEARDTONGUE	1.5	2	133%
PLANT	PLANTS	PENSTEMON SAXOSORUM	UPLAND BEARDTONGUE	25	DATA GAP	DATA GAP
PLANT	PLANTS	PHACELIA DENTICULATA	ROCKY MOUNTAIN PHACELIA	25	3	12%
PLANT	PLANTS	PHACELIA FORMOSULA	NORTH PARK PHACELIA	4.5	6	133%
PLANT	PLANTS	PHACELIA SCOPULINA VAR SUBMUTICA	DEBEQUE PHACELIA	25	DATA GAP	DATA GAP
PLANT	PLANTS	PHIPPSIA ALGIDA	SNOW GRASS	15	1	7%
PLANT	PLANTS	PHLOX CARYOPHYLLA	PAGOSA PHLOX	25	16	64%

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APPENDIX 14. CONSERVATION GOALS/RESULTS BY TARGET

Major Group	Taxon Group	Scientific Name	Common Name	SRM Goal	Known Amount in Portfolio	Known % Goal Met
PLANT	PLANTS	PHLOX CONDENSATA	UNKNOWN	20	DATA GAP	DATA GAP
PLANT	PLANTS	PHLOX KELSEYI SSP SALINA	MARSH PHLOX	15	1	7%
PLANT	PLANTS	PHYSARIA ALPINA	AVERY PEAK TWINPOD	25	3	12%
PLANT	PLANTS	PHYSARIA BELLII	BELLS TWINPOD	25	DATA GAP	DATA GAP
PLANT	PLANTS	PHYSARIA ROLLINSII	ROLLINS TWINPOD	25	DATA GAP	DATA GAP
PLANT	PLANTS	PLATANTHERA SPARSIFLORA VAR ENSIFOLIA	CANYON BOG-ORCHID	20	1	5%
PLANT	PLANTS	PODISTERA EASTWOODIAE	EASTWOOD'S PODISTERA	20	2	10%
PLANT	PLANTS	POLEMONIUM CONFERTUM	ROCKY MOUNTAIN JACOB'S LADDER	1	DATA GAP	DATA GAP
PLANT	PLANTS	POLYPODIUM SAXIMONTANUM	ROCKY MOUNTAIN POLYPODY	25	5	20%
PLANT	PLANTS	POTENTILLA AMBIGENS	SOUTHERN ROCKY MOUNTAIN CINQUEFOIL	20	8	40%
PLANT	PLANTS	POTENTILLA RUPINCOLA	ROCKY MOUNTAIN CINQUEFOIL	25	16	64%
PLANT	PLANTS	PRIMULA EGALIKSENSIS	GREENLAND PRIMROSE	15	16	107%
PLANT	PLANTS	PTILAGROSTIS PORTERI	PORTER FEATHERGRASS	25	10	40%
PLANT	PLANTS	RIBES COLORADENSE	COLORADO CURRANT	25	DATA GAP	DATA GAP
PLANT	PLANTS	RIBES NIVEUM	SNOW GOOSEBERRY	15	1	7%
PLANT	PLANTS	RUBUS ARCTICUS SPP ACAULIS	NAGOON BERRY	15	1	7%
PLANT	PLANTS	SALIX ARIZONICA	ARIZONA WILLOW	25	17	68%
PLANT	PLANTS	SALIX CALCICOLA	LIMESTONE WILLOW	15	DATA GAP	DATA GAP
PLANT	PLANTS	SALIX CANDIDA	HOARY OR SILVER WILLOW	20	18	90%
PLANT	PLANTS	SALIX MYRTILLIFOLIA	LOW BLUEBERRY WILLOW	15	4	27%
PLANT	PLANTS	SALIX SERISSIMA	AUTUMN WILLOW	10	7	70%
PLANT	PLANTS	SAUSSUREA WEBERI	WEBER SAUSSUREA	15	18	120%
PLANT	PLANTS	SCIRPUS ROLLANDII	LITTLE BULRUSH	15	DATA GAP	DATA GAP
PLANT	PLANTS	SENECIO CROCATUS	SAFFRON GROUNDSEL	1	DATA GAP	DATA GAP
PLANT	PLANTS	SENECIO DIMORPHOPHYLLUS VAR INTERMEDIUS	DIFFERENT GROUNDSEL	25	DATA GAP	DATA GAP
PLANT	PLANTS	SENECIO SOLDANELLA	COLORADO RAGWORT	1	DATA GAP	DATA GAP
PLANT	PLANTS	SENECIO TARAXACOIDES	GREENE DANDELION RAGWORT	25	DATA GAP	DATA GAP
PLANT	PLANTS	SISYRINCHIUM PALLIDUM	PALE BLUE-EYED GRASS	25	29	116%
PLANT	PLANTS	SPHAEROMERIA SIMPLEX	LARAMIE FALSE SAGEBRUSH	25	1	4%
PLANT	PLANTS	SPIRANTHES DILUVIALIS	UTE LADIES' TRESSES	25	3	12%
PLANT	PLANTS	STELLARIA IRRIGUA	ALTAI CHICKWEED	25	13	52%
PLANT	PLANTS	SULLIVANTIA HAPEMANII VAR PURPUSII	HANGING GARDEN SULLIVANTIA	20	9	45%
PLANT	PLANTS	TELESONIX JAMESII	JAMES' TELESONIX	15	13	87%
PLANT	PLANTS	THELYPODIUM PANICULATUM	NORTHWESTERN THELYPODY	25	DATA GAP	DATA GAP
PLANT	PLANTS	TOWNSENDIA GYPSOPHILA	GYPSUM TOWNSEND'S ASTER	25	14	56%
PLANT	PLANTS	TOWNSENDIA ROTHROCKII	ROTHROCK TOWNSEND-DAISY	25	1	4%
PLANT	PLANTS	TRIFOLIUM ATTENUATUM	ROCKY MOUNTAIN CLOVER	25	DATA GAP	DATA GAP
PLANT	PLANTS	TRIFOLIUM BRANDEGEEI	BRANDEGEE CLOVER	25	6	24%
PLANT	PLANTS	TRIFOLIUM DASYPHYLLUM VAR ANEMOPHILUM	WINDLOVING ALPINE CLOVER	25	DATA GAP	DATA GAP
PLANT	PLANTS	TRIFOLIUM DASYPHYLLUM VAR DASYPHYLLUM	ALPINE CLOVER	20	DATA GAP	DATA GAP
PLANT	PLANTS	TRIFOLIUM SALICTORUM	PARRYS CLOVER	25	DATA GAP	DATA GAP
PLANT	PLANTS	TRILLIUM OVATUM	WESTERN TRILLIUM	15	1	7%
PLANT	PLANTS	UTRICULARIA OCHROLEUCA	NORTHERN BLADDERWORT	15	1	7%

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APPENDIX 14. CONSERVATION GOALS/RESULTS BY TARGET

Major Group	Taxon Group	Scientific Name	Common Name	SRM Goal	Known Amount in Portfolio	Known % Goal Met
SYSTEM	AQUATIC SYSTEM	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 1		1	0.6	60%
SYSTEM	AQUATIC SYSTEM	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 2		86	188	219%
SYSTEM	AQUATIC SYSTEM	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 3		29	70	241%
SYSTEM	AQUATIC SYSTEM	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5		5	14.4	288%
SYSTEM	AQUATIC SYSTEM	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1		47	104.2	222%
SYSTEM	AQUATIC SYSTEM	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 2		112	265.6	237%
SYSTEM	AQUATIC SYSTEM	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3		222	633.6	285%
SYSTEM	AQUATIC SYSTEM	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC LAKE - EDU 3		72	169.1	235%
SYSTEM	AQUATIC SYSTEM	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC LAKE - EDU 7		96	312.4	325%
SYSTEM	AQUATIC SYSTEM	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1		46	138.1	300%
SYSTEM	AQUATIC SYSTEM	ALPINE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 2		33	60.8	184%
SYSTEM	AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1		42	98.1	234%
SYSTEM	AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 2		61	176.4	289%
SYSTEM	AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3		410	1067.7	260%
SYSTEM	AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 4		233	532.6	229%
SYSTEM	AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5		153	441.4	288%
SYSTEM	AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 7		44	142.2	323%

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APPENDIX 14. CONSERVATION GOALS/RESULTS BY TARGET

Major Group	Taxon Group	Scientific Name	Common Name	SRM Goal	Known Amount in Portfolio	Known % Goal Met
SYSTEM	AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1		85	217.2	256%
SYSTEM	AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 2		96	162.1	169%
SYSTEM	AQUATIC SYSTEM	ALPINE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 5		1	0.1	10%
SYSTEM	AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 1		373	981.5	263%
SYSTEM	AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 2		15	32.7	218%
SYSTEM	AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 3		164	317.9	194%
SYSTEM	AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5		232	530.5	229%
SYSTEM	AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 7		1	0.9	90%
SYSTEM	AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1		172	411.9	239%
SYSTEM	AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 2		125	306.8	245%
SYSTEM	AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3		373	932.5	250%
SYSTEM	AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 4		57	132	232%
SYSTEM	AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5		1415	3760.5	266%
SYSTEM	AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 7		1	0.2	20%
SYSTEM	AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1		202	544	269%
SYSTEM	AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 2		167	465.2	279%

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APPENDIX 14. CONSERVATION GOALS/RESULTS BY TARGET

Major Group	Taxon Group	Scientific Name	Common Name	SRM Goal	Known Amount in Portfolio	Known % Goal Met
SYSTEM	AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3		158	344.8	218%
SYSTEM	AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 5		1	0.6	60%
SYSTEM	AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 7		128	365.6	286%
SYSTEM	AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5		196	549	280%
SYSTEM	AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER GRANITE / VOLCANIC LAKE - EDU 1		1270	3416.2	269%
SYSTEM	AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER GRANITE / VOLCANIC LAKE - EDU 2		1	2.3	230%
SYSTEM	AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 1		96	306	319%
SYSTEM	AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 2		919	2729.6	297%
SYSTEM	AQUATIC SYSTEM	ALPINE/MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 5		1	1.9	190%
SYSTEM	AQUATIC SYSTEM	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1		1	3.3	330%
SYSTEM	AQUATIC SYSTEM	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 2		263	773.3	294%
SYSTEM	AQUATIC SYSTEM	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3		150	391.8	261%
SYSTEM	AQUATIC SYSTEM	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 7		339	1019.5	301%
SYSTEM	AQUATIC SYSTEM	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1		97	247.5	255%
SYSTEM	AQUATIC SYSTEM	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3		153	429.7	281%
SYSTEM	AQUATIC SYSTEM	ALPINE/MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 7		1	2.5	250%

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APPENDIX 14. CONSERVATION GOALS/RESULTS BY TARGET

Major Group	Taxon Group	Scientific Name	Common Name	SRM Goal	Known Amount in Portfolio	Known % Goal Met
SYSTEM	AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 1		11	3.4	31%
SYSTEM	AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 2		24	59.7	249%
SYSTEM	AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5		381	941	247%
SYSTEM	AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 6		1	0.5	50%
SYSTEM	AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1		390	886.6	227%
SYSTEM	AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 2		130	304.6	234%
SYSTEM	AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3		588	1572.6	267%
SYSTEM	AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 4		11	19.6	178%
SYSTEM	AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5		395	1267	321%
SYSTEM	AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1		161	426.9	265%
SYSTEM	AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 2		122	274.6	225%
SYSTEM	AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3		603	1434.5	238%
SYSTEM	AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 4		216	469.1	217%
SYSTEM	AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 5		256	525.1	205%
SYSTEM	AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 6		1	2.4	240%
SYSTEM	AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 7		317	928.2	293%

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APPENDIX 14. CONSERVATION GOALS/RESULTS BY TARGET

Major Group	Taxon Group	Scientific Name	Common Name	SRM Goal	Known Amount in Portfolio	Known % Goal Met
SYSTEM	AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS LARGE RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5		133	375.1	282%
SYSTEM	AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS LARGE RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 7		65	194.4	299%
SYSTEM	AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS LARGE RIVER GRANITE / VOLCANIC - EDU 1		55	132.4	241%
SYSTEM	AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS LARGE RIVER GRANITE / VOLCANIC - EDU 3		62	143.6	232%
SYSTEM	AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 2		89	211.9	238%
SYSTEM	AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 3		178	427	240%
SYSTEM	AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 4		19	41.8	220%
SYSTEM	AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5		210	566.3	270%
SYSTEM	AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER GRANITE / VOLCANIC - EDU 1		44	116.4	265%
SYSTEM	AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER GRANITE / VOLCANIC - EDU 3		92	292	317%
SYSTEM	AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER GRANITE / VOLCANIC - EDU 4		80	190.8	239%
SYSTEM	AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 1		26	76	292%
SYSTEM	AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 2		3	9.8	327%
SYSTEM	AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 3		260	676.5	260%
SYSTEM	AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 4		62	173.5	280%
SYSTEM	AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 5		156	467.8	300%
SYSTEM	AQUATIC SYSTEM	MONTANE MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 7		383	1078.2	282%
SYSTEM	AQUATIC SYSTEM	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 1		1	0.4	40%
SYSTEM	AQUATIC SYSTEM	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 3		242	523.3	216%

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APPENDIX 14. CONSERVATION GOALS/RESULTS BY TARGET

Major Group	Taxon Group	Scientific Name	Common Name	SRM Goal	Known Amount in Portfolio	Known % Goal Met
SYSTEM	AQUATIC SYSTEM	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 5		376	1007.8	268%
SYSTEM	AQUATIC SYSTEM	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS GRANITE / VOLCANIC - EDU 7		121	390.4	323%
SYSTEM	AQUATIC SYSTEM	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1		30	73.6	245%
SYSTEM	AQUATIC SYSTEM	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3		97	220.3	227%
SYSTEM	AQUATIC SYSTEM	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 5		82	258	315%
SYSTEM	AQUATIC SYSTEM	MONTANE STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 7		141	405.3	287%
SYSTEM	AQUATIC SYSTEM	MONTANE STEEP & VERY STEEP GRADIENTS O LARGE RIVER SHALES / SANDSTONES / LIMESTONES - EDU 3		127	345	272%
SYSTEM	AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 2		28	90.1	322%
SYSTEM	AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 1		177	493.1	279%
SYSTEM	AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 2		1	1.1	110%
SYSTEM	AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3		89	155.3	174%
SYSTEM	AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 5		201	506.3	252%
SYSTEM	AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS LARGE RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 1		2	5.8	290%
SYSTEM	AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS LARGE RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 3		124	342.6	276%
SYSTEM	AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS LARGE RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5		140	364.9	261%

Known amount refers to number of occurrences for species and communities, kilometers for aquatic systems, or hectares for terrestrial systems

APPENDIX 14. CONSERVATION GOALS/RESULTS BY TARGET

Major Group	Taxon Group	Scientific Name	Common Name	SRM Goal	Known Amount in Portfolio	Known % Goal Met
SYSTEM	AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS LARGE RIVER GRANITE / VOLCANIC - EDU 1		13	24.5	188%
SYSTEM	AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS LARGE RIVER GRANITE / VOLCANIC - EDU 2		50	136.8	274%
SYSTEM	AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS LARGE RIVER SHALES / SANDSTONES / LIMESTONES - EDU 3		29	53.7	185%
SYSTEM	AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 2		1	0.3	30%
SYSTEM	AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 3		20	48.1	241%
SYSTEM	AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS SMALL RIVER ALLUVIUM (WIDE CHANNELS AND BASINS) - EDU 5		37	107.8	291%
SYSTEM	AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS MODERATE AND LOW GRADIENTS SMALL RIVER SHALES / SANDSTONES / LIMESTONES - EDU 2		10	15.5	155%
SYSTEM	AQUATIC SYSTEM	MONTANE/FOOTHILLS, FOOTHILLS STEEP & VERY STEEP GRADIENTS O HEADWATERS, CREEKS SHALES / SANDSTONES / LIMESTONES - EDU 3		136	304.9	224%
SYSTEM	TERRESTRIAL SYSTEM	ACTIVE SAND DUNE & SWALE COMPLEX		4000	10044.6	251%
SYSTEM	TERRESTRIAL SYSTEM	ALPINE DRY TUNDRA & ALPINE/SUBALPINE WET MEADOW		191103	404878.0	212%
SYSTEM	TERRESTRIAL SYSTEM	ALPINE SUBSTRATE - ICE FIELD		61969	136420.9	220%
SYSTEM	TERRESTRIAL SYSTEM	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD		47556	64080.8	135%
SYSTEM	TERRESTRIAL SYSTEM	ASPEN FOREST		399827	600181.2	150%
SYSTEM	TERRESTRIAL SYSTEM	BRISTLECONE - LIMBER PINE FOREST & WOODLAND		23312	44137.8	189%
SYSTEM	TERRESTRIAL SYSTEM	CAVE SYSTEMS		25	25.0	100%
SYSTEM	TERRESTRIAL SYSTEM	DOUGLAS FIR - PONDEROSA PINE FOREST		66585	178166.1	268%
SYSTEM	TERRESTRIAL SYSTEM	FOOTHILL RIPARIAN WOODLAND & SHRUBLAND		5	4.6	93%
SYSTEM	TERRESTRIAL SYSTEM	FRESHWATER MARSH & WET MEADOW		12500	12396.6	99%
SYSTEM	TERRESTRIAL SYSTEM	GAMBEL'S OAK SHRUBLAND		210190	217971.5	104%
SYSTEM	TERRESTRIAL SYSTEM	GREASEWOOD FLAT & EPHEMERAL MEADOW COMPLEX		58457	103889.5	178%
SYSTEM	TERRESTRIAL SYSTEM	INTERMONTANE - FOOTHILL GRASSLAND		290272	291980.6	101%
SYSTEM	TERRESTRIAL SYSTEM	JUNIPER SAVANNA		82766	145382.2	176%
SYSTEM	TERRESTRIAL SYSTEM	LODGEPOLE PINE FOREST		332450	492649.0	148%
SYSTEM	TERRESTRIAL SYSTEM	LOWER MONTANE - FOOTHILLS SHRUBLAND		246402	321649.8	131%
SYSTEM	TERRESTRIAL SYSTEM	MONTANE - FOOTHILL CLIFF & CANYON		6142	9382.2	153%
SYSTEM	TERRESTRIAL SYSTEM	MONTANE GRASSLAND		96775	138318.4	143%

Known amount refers to number of occurrences for species and communities, kilometers for aquatic systems, or hectares for terrestrial systems

APPENDIX 14. CONSERVATION GOALS/RESULTS BY TARGET

Major Group	Taxon Group	Scientific Name	Common Name	SRM Goal	Known Amount in Portfolio	Known % Goal Met
SYSTEM	TERRESTRIAL SYSTEM	MONTANE MIXED CONIFER FOREST (DRY-MESIC & MOIST-MESIC)		172856	302186.3	175%
SYSTEM	TERRESTRIAL SYSTEM	MONTANE RIPARIAN SHRUBLAND		10	8.0	80%
SYSTEM	TERRESTRIAL SYSTEM	MOUNTAIN SAGEBRUSH SHRUBLAND		398787	577531.5	145%
SYSTEM	TERRESTRIAL SYSTEM	NORTH PARK SAND DUNES		103	339.8	330%
SYSTEM	TERRESTRIAL SYSTEM	PINYON - JUNIPER WOODLAND		463998	712738.2	154%
SYSTEM	TERRESTRIAL SYSTEM	PONDEROSA PINE SAVANNA		6	6.0	100%
SYSTEM	TERRESTRIAL SYSTEM	PONDEROSA PINE WOODLAND		663227	852398.1	129%
SYSTEM	TERRESTRIAL SYSTEM	SAGEBRUSH SHRUBLAND		10	6.0	60%
SYSTEM	TERRESTRIAL SYSTEM	SAGEBRUSH STEPPE		79471	123285.0	155%
SYSTEM	TERRESTRIAL SYSTEM	SAN LUIS VALLEY WINTERFAT SHRUB STEPPE		50047	74448.7	149%
SYSTEM	TERRESTRIAL SYSTEM	SOUTH PARK MONTANE GRASSLAND		72317	134092.9	185%
SYSTEM	TERRESTRIAL SYSTEM	SPRUCE-FIR FOREST (DRY-MESIC & MOIST-MESIC)		674148	1285121.1	191%
SYSTEM	TERRESTRIAL SYSTEM	STABILIZED SAND DUNE		11162	33063.8	296%
SYSTEM	TERRESTRIAL SYSTEM	UPPER MONTANE RIPARIAN FOREST & WOODLAND		10	10.3	103%
SYSTEM	TERRESTRIAL SYSTEM	WINTERFAT SHRUB STEPPE		22209	33830.9	152%

Known amount refers to number of occurrences for species and communities, kilometers for aquatic systems, or hectares for terrestrial systems

APPENDIX 15. CONSERVATION TARGET DATA GAPS

Major Group	Taxon Group	Scientific Name	Common Name
ANIMAL	AMPHIB/REPTILES	BUFO COGNATUS	GREAT PLAINS TOAD
ANIMAL	AMPHIB/REPTILES	PHRYNOSOMA HERNANDESI	SHORT-HORNED LIZARD
ANIMAL	FISH	PHOXINUS ERYTHROGASTER	SOUTHERN REDBELLY DACE
ANIMAL	INVERTEBRATES	AGRYPNIA COLORATA HAGEN 1873	A CADDISFLY
ANIMAL	INVERTEBRATES	AMBLYDERUS WERNERI	GREAT SAND DUNES ANTHICID BEETLE 2
ANIMAL	INVERTEBRATES	ANDRENA DURANGOENSIS	ANDRENID BEE
ANIMAL	INVERTEBRATES	APHONOPELMA ECHINUM	TARANTULA
ANIMAL	INVERTEBRATES	ARCYNOPTERYX COMPACTA	A STONEFLY
ANIMAL	INVERTEBRATES	BAETIS ADONIS	A MAYFLY
ANIMAL	INVERTEBRATES	BAETIS BUNDYAE LEHMKUHL	A MAYFLY
ANIMAL	INVERTEBRATES	BRACHYCERCUS PRUDENS	A MAYFLY
ANIMAL	INVERTEBRATES	CAPNIA NELSONII	CAPNIA NELSONII
ANIMAL	INVERTEBRATES	CATOCALA COCCINATA SSP	A MOTH
ANIMAL	INVERTEBRATES	CHROMAGRION CONDITUM	AURORA DAMSEL
ANIMAL	INVERTEBRATES	CORTICARIA UNDESCR SP	A BEETLE
ANIMAL	INVERTEBRATES	DAIHINIOIDES LARVALE	STROHECKER'S CAMEL CRICKET
ANIMAL	INVERTEBRATES	DASYLOPHIA ANGUINA SSP SATYRATA	PROMINENT MOTH
ANIMAL	INVERTEBRATES	DECODES STEVENSI	STEVENS' TORTRICID MOTH
ANIMAL	INVERTEBRATES	DISTICHLICOCCUS FONTANUS	A MEALYBUG
ANIMAL	INVERTEBRATES	EPHEMERA SIMULANS	A MAYFLY
ANIMAL	INVERTEBRATES	EPHEMERELLA APOPSIS	A MAYFLY
ANIMAL	INVERTEBRATES	ETHMIA MONACHELLA	LOST ETHMID MOTH
ANIMAL	INVERTEBRATES	EUCHLOA LOTTA	DESERT MARBLE BUTTERFLY
ANIMAL	INVERTEBRATES	EUCOSMA FANDANA	A MOTH
ANIMAL	INVERTEBRATES	EUHYPARPAX ROSEA	PROMINENT MOTH
ANIMAL	INVERTEBRATES	GRAMMIA CERVINOIDES	ALPINE TIGER MOTH
ANIMAL	INVERTEBRATES	GRAMMIA UNDESCRIBED SP #2	A MOTH
ANIMAL	INVERTEBRATES	LEUCROCUTA PETERSI	A MAYFLY
ANIMAL	INVERTEBRATES	LYCIA UNDESCRIBED SP	A GEOMETRID MOTH
ANIMAL	INVERTEBRATES	MACDUNNOA PERSIMPLEX	A MAYFLY
ANIMAL	INVERTEBRATES	MELEMAEA UNDESCR SPP	A GEOMETRID MOTH
ANIMAL	INVERTEBRATES	MEXIMACHILIS N. SP.	A BRISTLETAIL
ANIMAL	INVERTEBRATES	NEOARCTIA BRUCE	ALPINE TIGER MOTH
ANIMAL	INVERTEBRATES	NEOCYRTUSA N. SP.	A BEETLE
ANIMAL	INVERTEBRATES	OCHROTRICHIA TRAPOIZA	A CADDISFLY
ANIMAL	INVERTEBRATES	OENEIS ALBERTA SP	ALBERTA ARCTIC
ANIMAL	INVERTEBRATES	PAPILIO INDRA MINORI	MINOR'S SWALLOWTAIL
ANIMAL	INVERTEBRATES	PARALEPTOPHLEBIA TEMPORALIS	A STONEFLY
ANIMAL	INVERTEBRATES	PARALEUCTRA JEWETTI	A STONEFLY
ANIMAL	INVERTEBRATES	PARALEUCTRA RICKERI	A STONEFLY
ANIMAL	INVERTEBRATES	PHYLLOGOMPHOIDES ALBRIGHTI	FIVE-STRIPED LEAFTAIL
ANIMAL	INVERTEBRATES	PLAUDITUS CESTUS	A MAYFLY
ANIMAL	INVERTEBRATES	POANES HOBOMOK WETONA	HOBOMOK SKIPPER
ANIMAL	INVERTEBRATES	PSEUDEXERITERA UNDESCR SP	TORTRICID MOTH
ANIMAL	INVERTEBRATES	PSYCHORONIA BROOKSI RUITER 1999	CADDISFLY

Targets with no documented viable occurrences (ranked A, B, or C) in the portfolio within the last 15 years

APPENDIX 15. CONSERVATION TARGET DATA GAPS

Major Group	Taxon Group	Scientific Name	Common Name
ANIMAL	INVERTEBRATES	PTERONARCELLA REGULARIS	A STONEFLY
ANIMAL	INVERTEBRATES	RHITHROGENA FLAVIANULA	A MAYFLY
ANIMAL	INVERTEBRATES	RHYACIONIA SALMONICOLOR	PINETIP MOTH
ANIMAL	INVERTEBRATES	SCHINIA CARMINATRA	A FLOWER MOTH
ANIMAL	INVERTEBRATES	SCHINIA MASONI	MASON'S FLOWER MOTH
ANIMAL	INVERTEBRATES	SCHINIA UNDESCR SP	HARDWICK'S FLOWER MOTH
ANIMAL	INVERTEBRATES	SERICODERUS LATERALIS	A BEETLE
ANIMAL	INVERTEBRATES	SOMATOCHLORA HUDSONICA	HUDSONIAN EMERALD
ANIMAL	INVERTEBRATES	SPHINX ASELLA	UNKNOWN
ANIMAL	INVERTEBRATES	STYGOBROMUS COLORADENSIS	A CAVE OBLIGATE AMPHIPOD
ANIMAL	INVERTEBRATES	STYGOBROMUS PENNAKI	A CAVE OBLIGATE AMPHIPOD
ANIMAL	INVERTEBRATES	TRIMEROTROPIS FRATERCULA	GRASSHOPPER
ANIMAL	MAMMALS	DIPODOMYS ORDII EVEXUS	ORDS KANGAROO RAT
ANIMAL	MAMMALS	LEPUS AMERICANUS	SNOWSHOE HARE
ANIMAL	MAMMALS	MICROTUS MOGOLLONENSIS	MOGOLLON VOLE
ANIMAL	MAMMALS	MUSTELA NIGRIPES	BLACK-FOOTED FERRET
ANIMAL	MAMMALS	REITHRODONTOMYS MEGALOTIS CARYI	WESTERN HARVEST MOUSE
ANIMAL	MAMMALS	TADARIDA BRASILIENSIS	MEXICAN FREE-TAILED BAT
ANIMAL	MAMMALS	THOMOMYS BOTTAE INTERNATUS	A POCKET GOPHER
ANIMAL	MAMMALS	THOMOMYS BOTTAE RUBIDUS	BOTTA'S POCKET GOPHER SUBSP
ANIMAL	MAMMALS	THOMOMYS TALPOIDES AGRESTIS	NORTHERN POCKET GOPHER SUBSP
ANIMAL	MAMMALS,WR	BOS BISON	AMERICAN BISON
ANIMAL	MAMMALS,WR	CANIS LUPUS	GRAY WOLF
ANIMAL	MAMMALS,WR	OVIS CANADENSIS	BIGHORN SHEEP
ANIMAL	MAMMALS,WR	URSUS ARCTOS	BROWN BEAR
ANIMAL	MOLLUSKS	ANODONTOIDES FERUSSACIANUS	CYLINDRICAL PAPERSHELL
ANIMAL	MOLLUSKS	LYMNAEA STAGNALIS	SWAMPY LYMNAEA
ANIMAL	MOLLUSKS	PHYSA SKINNERI	GLASS PHYSA
ANIMAL	MOLLUSKS	PHYSA UTAHENSIS	BANDED PHYSA
ANIMAL	MOLLUSKS	PROMENETUS EXACUOUS	SHARP SPRITE
ANIMAL	MOLLUSKS	PROMENETUS UMBILICATELLUS	UMBILICATE SPRITE
ANIMAL	MOLLUSKS	VALVATA SINCERA	MOSSY VALVATA
COMMUNITY	PLANT COMMUNITIES	ABIES LASIOCARPA/TRAUTVETTERIA CAROLINIENSIS	SUBALPINE FIR/CAROLINA TASSEL-RUE
COMMUNITY	PLANT COMMUNITIES	AMELANCHIER UTAHENSIS/CAREX GEYERI	UTAH SERVICEBERRY/GEYER'S SEDGE
COMMUNITY	PLANT COMMUNITIES	AMELANCHIER UTAHENSIS/CERCOCARPUS MONTANUS	UTAH SERVICEBERRY/MOUNTAIN MAHOGANY
COMMUNITY	PLANT COMMUNITIES	AMELANCHIER UTAHENSIS/PSEUDOROEGNERIA SPICATA	UTAH SERVICEBERRY/BLUEBLUNCH WHEATGRASS
COMMUNITY	PLANT COMMUNITIES	ANDROPOGON GERARDII/SORGHASTRUM NUTANS	BIG BLUESTEM-YELLOW INDIAN GRASS
COMMUNITY	PLANT COMMUNITIES	ANDROPOGON GERARDII/SPOROBOLUS HETEROLEPIS	BIG BLUESTEM-PRAIRIE DROPSEED
COMMUNITY	PLANT COMMUNITIES	ARTEMISIA TRIDENTATA SSP VASEYANA/FESTUCA KINGII	MOUNTAIN BIG SAGEBRUSH/SPIKE FESCUE
COMMUNITY	PLANT COMMUNITIES	ARTEMISIA TRIDENTATA SSP. VASEYANA/CAREX GEYERI	MOUNTAIN BIG SAGEBRUSH/GEYER'S SEDGE
COMMUNITY	PLANT COMMUNITIES	BOUTELOUA GRACILIS/BUCHLOE DACTYLOIDES	BLUE GRAMA/BUFFALO GRASS
COMMUNITY	PLANT COMMUNITIES	CALTHA LEPTOSEPALA-DESCHAMPSIA CESPITOSA	WHITE MARSH MARIGOLD-TUFTED HAIRGRASS

Targets with no documented viable occurrences (ranked A, B, or C) in the portfolio within the last 15 years

APPENDIX 15. CONSERVATION TARGET DATA GAPS

Major Group	Taxon Group	Scientific Name	Common Name
COMMUNITY	PLANT COMMUNITIES	CALTHA LEPTOSEPALA-POLYGONUM BISTORTOIDES	WHITE MARSH MARIGOLD-AMERICAN BISTORT
COMMUNITY	PLANT COMMUNITIES	CAREX AQUATILIS-SPHAGHUM SPP	WATER SEDGE-SPHAGNUM MOSS
COMMUNITY	PLANT COMMUNITIES	CAREX ROSTELLATA	BEAKED SPIKERUSH
COMMUNITY	PLANT COMMUNITIES	CERCOCARPUS MONTANUS/RHUS TRILOBATA/ANDROPOGON GERARDII	MOUNTAIN MAHOGANY/SKUNKBUSH SUMAC/BIG BLUESTEM
COMMUNITY	PLANT COMMUNITIES	FESTUCA IDAHOENSIS-GERANIUM VICCOSISSIMUM	IDAHO FESCUE-STICKY GERANIUM
COMMUNITY	PLANT COMMUNITIES	FESTUCA THURBERI SUBALPINE GRASSLAND	THURBER'S FESCUE SUBALPINE GRASSLAND
COMMUNITY	PLANT COMMUNITIES	JUNIPERUS MONOSPERMA/ANDROPOGON HALLII	ONE-SEED JUNIPER/SAND BLUESTEM
COMMUNITY	PLANT COMMUNITIES	JUNIPERUS OSTEOSPERMA/LEYMUS SALINUS SSP SALMONIS	ONE-SEED JUNIPER/GREAT BASIN WILD RYE
COMMUNITY	PLANT COMMUNITIES	JUNIPERUS SCOPULORUM/ARTEMISIA TRIDENTATA	ROCKY MOUNTAIN JUNIPER/BIG SAGEBRUSH
COMMUNITY	PLANT COMMUNITIES	PICEA ENGELMANNII/TRIFOLIUM DASYPHYLLUM	ENGELMANN'S SPRUCE/UINTA CLOVER
COMMUNITY	PLANT COMMUNITIES	PINUS PONDEROSA/ORYZOPSIS HYMENOIDES	PONDEROSA PINE/INDIAN MOUNTAIN-RICE GRASS
COMMUNITY	PLANT COMMUNITIES	POLIOMINTHA INCANA/BOUTELOUA GRACILIS	HOARY ROSEMARY-MINT/BLUE GRAMA
COMMUNITY	PLANT COMMUNITIES	POPULUS DELTOIDES/SYMPHORICARPOS	EASTERN COTTONWOOD/WESTERN SNOWBERRY
COMMUNITY	PLANT COMMUNITIES	POPULUS TREMULOIDES/RIBES MONTIGENUM	QUAKING ASPEN/WESTERN PRICKLY GOOSEBERRY
COMMUNITY	PLANT COMMUNITIES	POPULUS TREMULOIDES/SENECIO BIGELOVII	QUAKING ASPEN/NODDING RAGWORT
COMMUNITY	PLANT COMMUNITIES	POPULUS TREMULOIDES/VACCINIUM MYRTILLUS	QUAKING ASPEN/WHORTLE-BERRY
COMMUNITY	PLANT COMMUNITIES	PSEUDOROEGNERIA SPICATA	BLUEBUNCH WHEATGRASS
COMMUNITY	PLANT COMMUNITIES	PSEUDOROEGNERIA SPICATA-POA SECUNDA	BLUEBUNCH WHEATGRASS-CURLY BLUEGRASS
COMMUNITY	PLANT COMMUNITIES	PUCCINELLIA NUTTALLIANA	NUTTALL'S ALKALI GRASS
COMMUNITY	PLANT COMMUNITIES	PURSHIA TRIDENTATA/STIPA COMATA	BITTERBRUSH/NEEDLE-AND-THREAD
COMMUNITY	PLANT COMMUNITIES	SALIX AMYGDALOIDEES	PEACH-LEAF WILLOW
COMMUNITY	PLANT COMMUNITIES	SCHIZACHYRIUM SCOPARIUM-BOUTELOUA CURTIPENDULA	LITTLE FALSE BLUESTEM-SIDE OATS GRAMA
PLANT	PLANTS	ALSINANTHE MACRANTHA	UNKNOWN
PLANT	PLANTS	ARABIS CRANDALII	CRANDALL'S ROCKCRESS
PLANT	PLANTS	ARABIS GUNNISONIANA	GUNNISON ROCKCRESS
PLANT	PLANTS	ASCLEPIAS UNCIALIS	DWARF MILKWEED
PLANT	PLANTS	ASTRAGALUS CERUSSATUS	POWDERY MILKVETCH
PLANT	PLANTS	ASTRAGALUS HALLII VAR HALLII	HALL'S MILKVETCH
PLANT	PLANTS	ASTRAGALUS IODOPETALUS	VIOLET MILKVETCH
PLANT	PLANTS	ASTRAGALUS PUNICEUS VAR GERTRUDIS	TAOS MILKVETCH
PLANT	PLANTS	ASTRAGALUS SPARSIFLORUS	FRONT RANGE MILKVETCH
PLANT	PLANTS	BESSEYA RITTERIANA	RITTER'S CORALDROPS
PLANT	PLANTS	CAREX PERGLOBOSA	GLOBE SEDGE
PLANT	PLANTS	CASTILLEJA LINEATA	MARSH MEADOW INDIAN PAINTBRUSH
PLANT	PLANTS	CHONDROPHYLLA NUTANS	SIBERIAN GENTIAN
PLANT	PLANTS	CIRSIUM SCAPANOLEPIS	MOUNTAIN SLOPE THISTLE
PLANT	PLANTS	CRATAEGUS SALIGNA	WILLOW HAWTHORN
PLANT	PLANTS	CRYPTANTHA WEBERI	WEBERS CATS-EYE
PLANT	PLANTS	DELPHINIUM SAPELLONIS	SAPELLO CANYON LARKSPUR
PLANT	PLANTS	DELPHNIUM ROBUSTUM	WAHATOYA CREEK LARKSPUR
PLANT	PLANTS	DESCURAINIA RAMOSISSIMA	VILLA GROVE TANSY-MUSTARD
PLANT	PLANTS	ERIOGONUM COLORADENSE	COLORADO WILD BUCKWHEAT

Targets with no documented viable occurrences (ranked A, B, or C) in the portfolio within the last 15 years

APPENDIX 15. CONSERVATION TARGET DATA GAPS

Major Group	Taxon Group	Scientific Name	Common Name
PLANT	PLANTS	GILIA SEDIFOLIA	STONECROP GILIA
PLANT	PLANTS	GRINDELIA DECUMBENS VAR. SUBINCISA	STEYERMARK RECLINED GUMWEED
PLANT	PLANTS	ILIAMNA CRANDALLII	CRANDALL'S WILD HOLLYHOCK
PLANT	PLANTS	LUZULA SUBCAPITATA	COLORADO WOODRUSH
PLANT	PLANTS	MENTZELIA CONSPICUA	CHAMA BLAZING STAR
PLANT	PLANTS	MENTZELIA MULTICAULIS	MANY STEM STICKLEAF
PLANT	PLANTS	MYRIOPHYLLUM VERTICILLATUM	WATER MILFOIL
PLANT	PLANTS	NEOPARRYA LITHOPHILA	ROCK LOVING ALETES
PLANT	PLANTS	OREOXIS ALPINA SSP PUBERULENTA	ALPINE OREOXIS
PLANT	PLANTS	OREOXIS BAKERI	BAKER OREOXIS
PLANT	PLANTS	PARTHENIUM TETRANEURIS	BARNBEY'S FEVERFEW
PLANT	PLANTS	PEDICULARIS SCOPULORUM	SUDETIC LOUSEWORT
PLANT	PLANTS	PENSTEMON BRANDEGEI	BRANDEGEE BEARDTONGUE
PLANT	PLANTS	PENSTEMON CRANDALLI VAR. GLABRESCENS	CRANDALL'S BEARDTONGUE
PLANT	PLANTS	PENSTEMON HALLII	HALLS BEARDTONGUE
PLANT	PLANTS	PENSTEMON HARBOURII	HARBOUR'S BEARDTONGUE
PLANT	PLANTS	PENSTEMON SAXOSORUM	UPLAND BEARDTONGUE
PLANT	PLANTS	PHACELIA SCOPULINA VAR SUBMUTICA	DEBEQUE PHACELIA
PLANT	PLANTS	PHLOX CONDENSATA	PHLOX
PLANT	PLANTS	PHYSARIA BELLII	BELLS TWINPOD
PLANT	PLANTS	PHYSARIA ROLLINSII	ROLLINS TWINPOD
PLANT	PLANTS	POLEMONIUM CONFERTUM	ROCKY MOUNTAIN JACOB'S LADDER
PLANT	PLANTS	RIBES COLORADENSE	COLORADO CURRANT
PLANT	PLANTS	SALIX CALCICOLA	LIMESTONE WILLOW
PLANT	PLANTS	SCIRPUS ROLLANDII	LITTLE BULRUSH
PLANT	PLANTS	SENECIO CROCATUS	SAFFRON GROUNDSEL
PLANT	PLANTS	SENECIO DIMORPHOPHYLLUS VAR INTERMEDIUS	DIFFERENT GROUNDSEL
PLANT	PLANTS	SENECIO SOLDANELLA	COLORADO RAGWORT
PLANT	PLANTS	SENECIO TARAXACOIDES	GREENE DANDELION RAGWORT
PLANT	PLANTS	THELYPODIUM PANICULATUM	NORTHWESTERN THELYPODY
PLANT	PLANTS	TRIFOLIUM ATTENUATUM	ROCKY MOUNTAIN CLOVER
PLANT	PLANTS	TRIFOLIUM DASYPHYLLUM VAR ANEMOPHILUM	WINDLOVING ALPINE CLOVER
PLANT	PLANTS	TRIFOLIUM DASYPHYLLUM VAR DASYPHYLLUM	ALPINE CLOVER
PLANT	PLANTS	TRIFOLIUM SALICTORUM	PARRYS CLOVER

Targets with no documented viable occurrences (ranked A, B, or C) in the portfolio within the last 15 years

APPENDIX 16

THREATS ASSESSMENT METHODS

The objectives of the preliminary threats assessment of portfolio sites were to:

1. Identify threats to multiple sites, assess and describe patterns among portfolio sites (e.g., fire suppression, water development) in order to develop networks of sites with major threats. This will help inform development of multi-site strategies.
2. Identify critical threats for each site to feed into the action site selection analysis, where actions are needed to abate threats within the next 5-10 years.

The threats assessment is based on site specific knowledge of each of the portfolio sites.

Definitions and steps to accomplish threats assessment:

1. *Severity* = what level of damage to the target(s) at site can be expected within 10 years under current circumstances?
   - H=stress is likely to seriously degrade, destroy, or eliminate the target over some portion of the target's occurrence at the site
   - M=stress is likely to moderately degrade the conservation target over some portion of the target's occurrence at the site
   - L=stress is likely to slightly impair the conservation target over some portion of the target's occurrence at the site
2. *Urgency* = how urgent is the critical threat (is this site or a portion of the site imminently threatened-use HP management and protection urgency ranks where applicable)?
   - H=threat exists now or likely within next 2-4 years;
   - M=threat is likely to exist within 5-10 years;
   - L=threat is not likely to exist within 10 years

Rank these factors as high, medium, or low.

Method:

1. Data acquisition and entry into database

- For each Experts Workshop (EW) and Heritage Program (HP) site in the ecoregion, document the three most critical threats from EW forms or BCD Site Basic Record collected and entered – volunteers/Cherie
- For each site-threat combination above we need Severity, Urgency, Total (see above for definitions and ranks)
- Complete Severity with data in EW forms and SBR
- Complete Urgency for HP sites using BCD fields: protection and management urgency ranks (use the higher of the two ranks)
- Urgency for EW sites uses neighboring HP sites (within the same SRM portfolio site) as surrogate if possible or team will provide during subsequent review
- Calculate Total Scores for each variable (severity, urgency). Roll up to portfolio site level by combining scores for composite sites, using highest rank of all HP/EW sites within the portfolio site (if a portion of a site or a nested site has a higher rank, then use the higher rank for the total).

2. Submit to team for review a table and associated map of portfolio sites. Provide list of conservation targets for each site so team members will be able to assess threats to the targets at the site. Request team to modify individual portfolio site scores as desired with brief rationale for each change. Request team to supply any missing scores.

Portfolio Site	Threat	Severity	Urgency	Total
A	1	H	M	H
A	2	L	H	H
A	3	M	M	M
Total		H	M	H

3. Recalculate totals: Shaded total for each site represents the overall threat score, or "critical threat score" to be used in identifying sites needing immediate conservation attention.

Threats Assessment List, from Site Conservation Planning Handbook (TNC 2000)

1. Channelization of rivers or streams
2. Climate change
3. Commercial/industrial development
4. Conversion to agriculture or silviculture
5. Crop production practices
6. Dam construction or operation of dams or reservoirs
7. Development (for unknown types of development)
8. Ditches, dikes, drainages and diversions
9. Fire management
10. Forestry practices
11. Grazing practices
12. Groundwater manipulation Industrial discharge
13. Invasive species, Invasive species-animals, Invasive species-plants
14. Landfill construction or operation
15. Livestock feedlot
16. Livestock production practices
17. Management of/for certain species
18. Military activities
19. Mining practices
20. Oil or gas drilling
21. Overfishing or overhunting, over-collecting (killing and taking-except poaching)
22. Parasites/pathogens
23. Poaching or commercial collecting
24. Release of toxic materials
25. Residential development
26. Recreational infrastructure development
27. Recreational use
28. Recreational vehicles
29. Road/utility corridors
30. Shoreline stabilization
31. Small population size and distribution
32. Streambank stabilization
33. Trails
34. Wastewater treatment
35. Water quality impairment (source unknown, from 303 d)
36. Research activities

APPENDIX 17A: SOUTHERN ROCKY MOUNTAINS MULTI-AREA THREATS ASSESSMENT

THREAT	# of Sites with Threat	% of Sites with Threat	# of Sites with High Severity	% of Sites with High Severity	# of Sites with High Urgency	% of Sites with High Urgency	Overall # of Sites with High Severity and Urgency	% Overall of Sites with High Severity and Urgency
PARASITES/PATHOGENS	58	31%	56	30%	56	30%	54	29%
DEVELOPMENT-RESIDENTIAL	81	43%	53	28%	55	29%	39	21%
FIRE MANAGEMENT	148	79%	38	20%	40	21%	33	18%
MINING PRACTICES	95	51%	27	14%	24	13%	19	10%
ROAD/UTILITY CORRIDORS	67	36%	13	7%	36	19%	12	6%
INVASIVE/ALIEN SPECIES-PLANTS	71	38%	25	13%	17	9%	11	6%
MGMT OF/FOR CERTAIN SPECIES	40	21%	18	10%	20	11%	10	5%
FORESTRY PRACTICES	43	23%	10	5%	17	9%	8	4%
RECREATIONAL USE	104	55%	12	6%	26	14%	8	4%
DITCH,DIKE,DRAIN,DIVERSION	46	24%	11	6%	18	10%	7	4%
INVASIVE/ALIEN SPECIES-ANIMALS	24	13%	13	7%	11	6%	7	4%
DEVELOPMENT-COMMERCIAL	11	6%	8	4%	8	4%	6	3%
DAM/RESERVOIR OPERATION	67	36%	5	3%	7	4%	3	2%
DEVELOPMENT-RECREATIONAL	13	7%	3	2%	3	2%	3	2%
GRAZING PRACTICES	78	41%	4	2%	19	10%	3	2%
OIL OR GAS DRILLING	8	4%	4	2%	4	2%	3	2%
RECREATIONAL VEHICLES	38	20%	6	3%	12	6%	3	2%
DEVELOPMENT-GENERAL	2	1%	2	1%	2	1%	2	1%
GROUNDWATER MANIPULATION	8	4%	3	2%	2	1%	2	1%
OVERFISHING/OVERHUNTING	9	5%	2	1%	6	3%	2	1%
SMALL POPULATION SIZE AND DISTRIBUTION	10	5%	4	2%	1	1%	1	1%
CHANNELIZATION	1	1%	0	0%	1	1%	0	0%
CONVERSION TO AGRICULTURE	4	2%	0	0%	2	1%	0	0%
CROP PRACTICES	10	5%	0	0%	5	3%	0	0%
POACHING OR COMMERCIAL COLLECTING	2	1%	0	0%	0	0%	0	0%
RELEASE OF TOXIC MATERIAL	3	2%	0	0%	0	0%	0	0%
STREAMBANK STABILIZATION	1	1%	0	0%	0	0%	0	0%
TRAILS	22	12%	0	0%	2	1%	0	0%
UNKNOWN	17	9%	0	0%	0	0%	0	0%
WATER QUALITY IMPAIRMENT	26	14%	0	0%	0	0%	0	0%

Threats ordered by number of sites with high severity and urgency of threat (far right column)

APPENDIX 17B: SOUTHERN ROCKY MOUNTAINS CONSERVATION AREA THREATS

State	Site Name	Threat	ThreatSeverity	ThreatUrgency
NM	AGUA CALIENTE	DEVELOPMENT-RECREATIONAL	2	2
NM	AGUA CALIENTE	INVASIVE/ALIEN SPECIES-ANIMALS	2	2
NM	AGUA CALIENTE	MINING PRACTICES	2	2
NM	AGUA CALIENTE	RECREATIONAL USE	0	0
CO	ANIMAS RIVER	DAM/RESERVOIR OPERATION	2	1
CO	ANIMAS RIVER	DEVELOPMENT-RESIDENTIAL	2	1
CO	ANIMAS RIVER	DITCH,DIKE,DRAIN,DIVERSION	3	3
CO	ANIMAS RIVER	FIRE MANAGEMENT	2	3
CO	ANIMAS RIVER	GRAZING PRACTICES	2	2
CO	ANIMAS RIVER	INVASIVE/ALIEN SPECIES-PLANTS	2	2
CO	ANIMAS RIVER	MINING PRACTICES	2	2
CO	ANIMAS RIVER	RECREATIONAL USE	2	1
CO	ANIMAS RIVER	RECREATIONAL VEHICLES	2	1
CO	ANIMAS RIVER	ROAD/UTILITY CORRIDORS	2	2
CO	ARCHULETA CREEK	FIRE MANAGEMENT	2	2
CO	BALDY CHATO	FIRE MANAGEMENT	3	3
CO	BALDY CHATO	RECREATIONAL USE	3	2
CO	BALDY CINCO	FIRE MANAGEMENT	3	3
CO	BALDY CINCO	RECREATIONAL USE	3	2
CO	BEATON CREEK EAST	DEVELOPMENT-RESIDENTIAL	1	2
CO	BEATON CREEK EAST	FIRE MANAGEMENT	2	2
CO	BEAVER CREEK - LONE CONE	FIRE MANAGEMENT	2	2
CO	BENNETT CREEK - SOUTH	DITCH,DIKE,DRAIN,DIVERSION	2	3
CO	BENNETT CREEK - SOUTH	FIRE MANAGEMENT	2	2
CO	BENNETT CREEK - SOUTH	RECREATIONAL USE	3	3
CO	BENNETT CREEK - SOUTH	ROAD/UTILITY CORRIDORS	2	3
CO	BERTHOUD PASS	DITCH,DIKE,DRAIN,DIVERSION	3	2
CO	BERTHOUD PASS	FIRE MANAGEMENT	1	2
CO	BERTHOUD PASS	GRAZING PRACTICES	3	2
CO	BERTHOUD PASS	MINING PRACTICES	2	1
CO	BERTHOUD PASS	PARASITES/PATHOGENS	1	1
CO	BERTHOUD PASS	RECREATIONAL USE	2	2
CO	BERTHOUD PASS	ROAD/UTILITY CORRIDORS	2	1
CO	BERTHOUD PASS	TRAILS	2	1
CO	BERTHOUD PASS	WATER QUALITY IMPAIRMENT	2	2
CO	BIG DOMINGUEZ RIVER	DAM/RESERVOIR OPERATION	1	2
CO	BIG DOMINGUEZ RIVER	FIRE MANAGEMENT	2	2
CO	BIG DOMINGUEZ RIVER	GRAZING PRACTICES	2	2
CO	BIG DOMINGUEZ RIVER	INVASIVE/ALIEN SPECIES-PLANTS	1	2
CO	BIG DOMINGUEZ RIVER	MINING PRACTICES	2	2
CO	BIG DOMINGUEZ RIVER	RECREATIONAL USE	2	2
CO	BIG DOMINGUEZ RIVER	RECREATIONAL VEHICLES	2	3
CO	BILLY CREEK UPLANDS	DEVELOPMENT-RESIDENTIAL	1	2
CO	BILLY CREEK UPLANDS	FIRE MANAGEMENT	2	2
CO	BILLY CREEK UPLANDS	FORESTRY PRACTICES	2	2
CO	BILLY CREEK UPLANDS	INVASIVE/ALIEN SPECIES-PLANTS	1	1
CO	BILLY CREEK UPLANDS	ROAD/UTILITY CORRIDORS	2	1
CO	BLACK MOUNTAIN	DEVELOPMENT-RESIDENTIAL	2	1
CO	BLACK MOUNTAIN	GRAZING PRACTICES	3	2
WY	BOX ELDER CREEK	DAM/RESERVOIR OPERATION	2	2
WY	BOX ELDER CREEK	DEVELOPMENT-RESIDENTIAL	1	1
WY	BOX ELDER CREEK	WATER QUALITY IMPAIRMENT	2	2
CO	BRUSH CREEK AT CANNIBAL POINT	DAM/RESERVOIR OPERATION	2	2
CO	BRUSH CREEK AT CANNIBAL POINT	FIRE MANAGEMENT	2	2
CO	BRUSH CREEK AT CANNIBAL POINT	RECREATIONAL USE	3	1
CO	BURNING MOUNTAIN	FIRE MANAGEMENT	2	2
CO	BUTLER CREEK	FIRE MANAGEMENT	2	2
CO	BUTLER CREEK	FORESTRY PRACTICES	2	1
CO	BUTLER CREEK	RECREATIONAL USE	2	1
CO	BUTTERFLY HAVEN	DEVELOPMENT-GENERAL	1	1
CO	BUTTERFLY HAVEN	FIRE MANAGEMENT	1	1
CO	BUTTERFLY HAVEN	MINING PRACTICES	1	1
CO	BUTTERFLY HAVEN	RECREATIONAL USE	2	2
CO	BUTTERFLY HAVEN	RECREATIONAL VEHICLES	2	1
NM	CANYON LARGO	GRAZING PRACTICES	1	1
NM	CANYON LARGO	OIL OR GAS DRILLING	2	2
CO	CARNERO CREEK	DEVELOPMENT-RESIDENTIAL	2	2
CO	CARNERO CREEK	DITCH,DIKE,DRAIN,DIVERSION	1	1
CO	CARNERO CREEK	FIRE MANAGEMENT	2	2
CO	CARNERO CREEK	GRAZING PRACTICES	2	3
CO	CARNERO CREEK	INVASIVE/ALIEN SPECIES-ANIMALS	1	1
CO	CARNERO CREEK	INVASIVE/ALIEN SPECIES-PLANTS	2	2
CO	CARNERO CREEK	MINING PRACTICES	2	2
CO	CARNERO CREEK	OVERFISHING/OVERHUNTING	3	3
CO	CARNERO CREEK	PARASITES/PATHOGENS	2	1

1 = High
2 = Medium
3 = Low

APPENDIX 17B: SOUTHERN ROCKY MOUNTAINS CONSERVATION AREA THREATS

State	Site Name	Threat	ThreatSeverity	ThreatUrgency
CO	CARNERO CREEK	RECREATIONAL USE	3	3
CO	CARNERO CREEK	RECREATIONAL VEHICLES	2	1
CO	CARNERO CREEK	ROAD/UTILITY CORRIDORS	2	2
CO	CASTLE PEAK	DEVELOPMENT-RESIDENTIAL	1	2
CO	CASTLE PEAK	DITCH,DIKE,DRAIN,DIVERSION	3	3
CO	CASTLE PEAK	FIRE MANAGEMENT	2	2
CO	CASTLE PEAK	GRAZING PRACTICES	3	3
CO	CASTLE PEAK	INVASIVE/ALIEN SPECIES-PLANTS	2	2
CO	CASTLE PEAK	MINING PRACTICES	2	2
CO	CASTLE PEAK	RECREATIONAL USE	2	2
CO	CASTLE PEAK	RECREATIONAL VEHICLES	2	2
CO	CASTLE PEAK	ROAD/UTILITY CORRIDORS	2	2
CO	CASTLE PEAK	SMALL POPULATION SIZE AND DISTRIBUTION	2	3
CO	CATTLE CREEK	INVASIVE/ALIEN SPECIES-PLANTS	1	2
CO	CATTLE CREEK	MGMT OF/FOR CERTAIN SPECIES	1	2
CO	CATTLE CREEK	PARASITES/PATHOGENS	1	2
CO	CATTLE CREEK	RECREATIONAL USE	2	2
NM	CHACON CANYON	GRAZING PRACTICES	1	1
CO	CHEESMAN	DAM/RESERVOIR OPERATION	2	3
CO	CHEESMAN	DEVELOPMENT-RESIDENTIAL	2	1
CO	CHEESMAN	FIRE MANAGEMENT	1	1
CO	CHEESMAN	FORESTRY PRACTICES	2	1
CO	CHEESMAN	GRAZING PRACTICES	3	3
CO	CHEESMAN	INVASIVE/ALIEN SPECIES-PLANTS	1	1
CO	CHEESMAN	MGMT OF/FOR CERTAIN SPECIES	1	1
CO	CHEESMAN	MINING PRACTICES	2	2
CO	CHEESMAN	RECREATIONAL USE	2	2
CO	CHEESMAN	TRAILS	2	2
CO	CIMARRON RIVER	FIRE MANAGEMENT	2	2
CO	CIMARRON RIVER	INVASIVE/ALIEN SPECIES-PLANTS	2	2
CO	CIMARRON RIVER	ROAD/UTILITY CORRIDORS	2	1
CO	COLONA MOUNTAIN	FIRE MANAGEMENT	2	2
CO , NM	CONEJOS RIVER	DEVELOPMENT-RESIDENTIAL	2	1
CO , NM	CONEJOS RIVER	DITCH,DIKE,DRAIN,DIVERSION	2	1
CO , NM	CONEJOS RIVER	FIRE MANAGEMENT	1	1
CO , NM	CONEJOS RIVER	GRAZING PRACTICES	2	1
CO , NM	CONEJOS RIVER	MGMT OF/FOR CERTAIN SPECIES	1	1
CO , NM	CONEJOS RIVER	MINING PRACTICES	2	2
CO , NM	CONEJOS RIVER	PARASITES/PATHOGENS	1	1
CO , NM	CONEJOS RIVER	RECREATIONAL USE	3	1
CO , NM	CONEJOS RIVER	ROAD/UTILITY CORRIDORS	2	1
CO , NM	CONEJOS RIVER	WATER QUALITY IMPAIRMENT	2	2
CO	CONUNDRUM	DEVELOPMENT-RESIDENTIAL	2	1
CO	CONUNDRUM	FIRE MANAGEMENT	2	3
CO	CONUNDRUM	INVASIVE/ALIEN SPECIES-PLANTS	3	2
CO	CONUNDRUM	MGMT OF/FOR CERTAIN SPECIES	1	2
CO	CONUNDRUM	MINING PRACTICES	2	2
CO	CONUNDRUM	PARASITES/PATHOGENS	1	1
CO	CONUNDRUM	RECREATIONAL USE	2	2
CO	CONUNDRUM	TRAILS	2	3
WY	CORRAL CREEK	DAM/RESERVOIR OPERATION	2	2
WY	CORRAL CREEK	DEVELOPMENT-RESIDENTIAL	2	1
WY	CORRAL CREEK	MINING PRACTICES	2	2
CO	COTTONWOOD CRK S SAN JUANS	DEVELOPMENT-RESIDENTIAL	1	2
CO	COTTONWOOD CRK S SAN JUANS	FIRE MANAGEMENT	2	2
CO	COTTONWOOD CRK S SAN JUANS	FORESTRY PRACTICES	3	2
CO	COTTONWOOD CRK S SAN JUANS	GRAZING PRACTICES	2	2
CO	COTTONWOOD CRK S SAN JUANS	INVASIVE/ALIEN SPECIES-PLANTS	1	2
CO	COTTONWOOD CRK S SAN JUANS	MINING PRACTICES	2	2
CO	COTTONWOOD PASS	DEVELOPMENT-RESIDENTIAL	2	1
CO	COTTONWOOD PASS	FIRE MANAGEMENT	2	3
CO	COTTONWOOD PASS	INVASIVE/ALIEN SPECIES-PLANTS	2	2
CO	COTTONWOOD PASS	MINING PRACTICES	2	2
CO	COTTONWOOD PASS	PARASITES/PATHOGENS	1	1
CO	COTTONWOOD PASS	RECREATIONAL USE	3	3
CO	COTTONWOOD PASS	RECREATIONAL VEHICLES	2	2
CO	COTTONWOOD PASS	ROAD/UTILITY CORRIDORS	2	3
CO	COTTONWOOD PASS	TRAILS	2	3
NM	COYOTE CREEK	DAM/RESERVOIR OPERATION	2	2
NM	COYOTE CREEK	DEVELOPMENT-RESIDENTIAL	1	3
NM	COYOTE CREEK	DITCH,DIKE,DRAIN,DIVERSION	2	1
NM	COYOTE CREEK	FIRE MANAGEMENT	1	1
NM	COYOTE CREEK	FORESTRY PRACTICES	1	2
NM	COYOTE CREEK	GRAZING PRACTICES	2	1

1 = High
2 = Medium
3 = Low

APPENDIX 17B: SOUTHERN ROCKY MOUNTAINS CONSERVATION AREA THREATS

State	Site Name	Threat	ThreatSeverity	ThreatUrgency
NM	COYOTE CREEK	ROAD/UTILITY CORRIDORS	1	1
NM	COYOTE CREEK	WATER QUALITY IMPAIRMENT	2	2
CO	CRESTED BUTTE	DAM/RESERVOIR OPERATION	3	3
CO	CRESTED BUTTE	FIRE MANAGEMENT	1	1
CO	CRESTED BUTTE	FORESTRY PRACTICES	2	2
CO	CRESTED BUTTE	INVASIVE/ALIEN SPECIES-PLANTS	2	1
CO	CRESTED BUTTE	MGMT OF/FOR CERTAIN SPECIES	1	1
CO	CRESTED BUTTE	MINING PRACTICES	2	2
CO	CRESTED BUTTE	RECREATIONAL USE	2	2
CO	CROSS AND FALL CREEKS	DITCH,DIKE,DRAIN,DIVERSION	1	1
CO	CROSS AND FALL CREEKS	FIRE MANAGEMENT	3	3
CO	CROSS AND FALL CREEKS	FORESTRY PRACTICES	3	3
CO	CROSS AND FALL CREEKS	INVASIVE/ALIEN SPECIES-PLANTS	2	2
CO	CROSS AND FALL CREEKS	MINING PRACTICES	2	2
CO	CROSS AND FALL CREEKS	PARASITES/PATHOGENS	1	1
CO	CROSS AND FALL CREEKS	RECREATIONAL USE	3	3
CO	CROWN	DEVELOPMENT-RESIDENTIAL	1	1
CO	CROWN	FIRE MANAGEMENT	1	2
CO	CROWN	GRAZING PRACTICES	2	2
CO	CROWN	INVASIVE/ALIEN SPECIES-PLANTS	1	2
CO	CROWN	MINING PRACTICES	2	2
CO	CROWN	RECREATIONAL USE	2	2
CO	CROWN	RECREATIONAL VEHICLES	1	2
CO	CROWN	ROAD/UTILITY CORRIDORS	2	1
CO	CROWN	TRAILS	3	3
CO	CRYSTAL LAKE CREEK	FIRE MANAGEMENT	2	2
CO	CRYSTAL LAKE CREEK	RECREATIONAL USE	3	2
CO , NM	CULEBRA RANGE	CROP PRACTICES	2	1
CO , NM	CULEBRA RANGE	DAM/RESERVOIR OPERATION	2	2
CO , NM	CULEBRA RANGE	DEVELOPMENT-RESIDENTIAL	2	1
CO , NM	CULEBRA RANGE	FIRE MANAGEMENT	1	1
CO , NM	CULEBRA RANGE	FORESTRY PRACTICES	2	2
CO , NM	CULEBRA RANGE	GRAZING PRACTICES	2	2
CO , NM	CULEBRA RANGE	GROUNDWATER MANIPULATION	2	2
CO , NM	CULEBRA RANGE	INVASIVE/ALIEN SPECIES-PLANTS	2	2
CO , NM	CULEBRA RANGE	MINING PRACTICES	2	2
CO , NM	CULEBRA RANGE	PARASITES/PATHOGENS	1	1
CO , NM	CULEBRA RANGE	RECREATIONAL USE	2	2
CO , NM	CULEBRA RANGE	RECREATIONAL VEHICLES	1	2
CO	CUMBRES PASS LINK	DEVELOPMENT-RESIDENTIAL	2	1
CO	CUMBRES PASS LINK	FIRE MANAGEMENT	2	2
CO	CUMBRES PASS LINK	FORESTRY PRACTICES	2	1
CO	CUMBRES PASS LINK	RECREATIONAL USE	3	1
CO	DARK CANYON	DEVELOPMENT-RESIDENTIAL	2	2
CO	DARK CANYON	FIRE MANAGEMENT	2	2
CO	DARK CANYON	MINING PRACTICES	1	1
CO	DARK CANYON	RECREATIONAL USE	2	2
CO	DARK CANYON	SMALL POPULATION SIZE AND DISTRIBUTION	2	3
CO	DAWSON DRAW CANYON EAST	FIRE MANAGEMENT	2	2
CO	DEATH VALLEY CREEK	FIRE MANAGEMENT	3	3
CO	DEBEQUE CANYON	DITCH,DIKE,DRAIN,DIVERSION	2	2
CO	DEBEQUE CANYON	FIRE MANAGEMENT	2	2
CO	DEBEQUE CANYON	INVASIVE/ALIEN SPECIES-PLANTS	1	2
CO	DEBEQUE CANYON	OIL OR GAS DRILLING	2	2
CO	DEBEQUE SOUTH	DAM/RESERVOIR OPERATION	2	2
CO	DEBEQUE SOUTH	DEVELOPMENT-RESIDENTIAL	2	2
CO	DEBEQUE SOUTH	FIRE MANAGEMENT	2	2
CO	DEBEQUE SOUTH	GRAZING PRACTICES	3	3
CO	DEBEQUE SOUTH	MINING PRACTICES	3	3
CO	DEBEQUE SOUTH	OIL OR GAS DRILLING	1	1
CO	DEBEQUE SOUTH	RECREATIONAL VEHICLES	2	3
WY	DRY LARAMIE RIVER	DAM/RESERVOIR OPERATION	2	2
WY	DRY LARAMIE RIVER	DEVELOPMENT-RESIDENTIAL	1	2
CO	EAGLE RIVER AT GYPSUM	DEVELOPMENT-COMMERCIAL	1	1
CO	EAGLE RIVER AT GYPSUM	DEVELOPMENT-RESIDENTIAL	1	1
CO	EAGLE RIVER AT GYPSUM	DITCH,DIKE,DRAIN,DIVERSION	1	2
CO	EAGLE RIVER AT GYPSUM	FIRE MANAGEMENT	2	2
CO	EAGLE RIVER AT GYPSUM	GRAZING PRACTICES	2	3
CO	EAGLE RIVER AT GYPSUM	INVASIVE/ALIEN SPECIES-PLANTS	2	2
CO	EAGLE RIVER AT GYPSUM	MGMT OF/FOR CERTAIN SPECIES	2	2
CO	EAGLE RIVER AT GYPSUM	MINING PRACTICES	2	2
CO	EAGLE RIVER AT GYPSUM	PARASITES/PATHOGENS	1	2
CO	EAGLE RIVER AT GYPSUM	RECREATIONAL USE	2	2
CO	EAGLE RIVER AT GYPSUM	RECREATIONAL VEHICLES	2	2

1 = High
2 = Medium
3 = Low

APPENDIX 17B: SOUTHERN ROCKY MOUNTAINS CONSERVATION AREA THREATS

State	Site Name	Threat	ThreatSeverity	ThreatUrgency
CO	EAGLE RIVER AT GYPSUM	ROAD/UTILITY CORRIDORS	1	1
CO	EAST DIVIDE CREEK	UNKNOWN	0	0
CO	EAST MANCOS RIVER	FIRE MANAGEMENT	3	3
CO	EAST MANCOS RIVER	MINING PRACTICES	1	3
CO	EAST RIFLE CREEK	DITCH,DIKE,DRAIN,DIVERSION	2	2
CO	ELK RIDGE	FIRE MANAGEMENT	3	3
CO	ELK RIDGE	MINING PRACTICES	2	2
CO	ELK RIDGE	ROAD/UTILITY CORRIDORS	2	2
CO	ENDLICH MESA BASIN	FIRE MANAGEMENT	2	2
CO	ENDLICH MESA BASIN	RECREATIONAL USE	3	2
CO	ESCALANTE RIVER	DAM/RESERVOIR OPERATION	3	3
CO	ESCALANTE RIVER	FIRE MANAGEMENT	2	3
CO	ESCALANTE RIVER	GRAZING PRACTICES	2	2
CO	ESCALANTE RIVER	INVASIVE/ALIEN SPECIES-PLANTS	1	2
CO	ESCALANTE RIVER	RECREATIONAL VEHICLES	2	3
CO	ESCALANTE RIVER	ROAD/UTILITY CORRIDORS	2	2
CO	ESCALANTE RIVER	TRAILS	2	3
CO	ESCALANTE RIVER	WATER QUALITY IMPAIRMENT	2	2
CO	ESTES PARK	DAM/RESERVOIR OPERATION	2	1
CO	ESTES PARK	DEVELOPMENT-RESIDENTIAL	1	1
CO	ESTES PARK	FIRE MANAGEMENT	1	1
CO	ESTES PARK	GRAZING PRACTICES	3	2
CO	ESTES PARK	MGMT OF/FOR CERTAIN SPECIES	2	2
CO	ESTES PARK	MINING PRACTICES	2	2
CO	ESTES PARK	PARASITES/PATHOGENS	1	1
CO	ESTES PARK	RECREATIONAL USE	2	1
CO	FALL CREEK	FIRE MANAGEMENT	1	1
CO	FALL CREEK	RECREATIONAL USE	3	1
CO	FLAT TOPS	DAM/RESERVOIR OPERATION	2	2
CO	FLAT TOPS	FIRE MANAGEMENT	2	2
CO	FLAT TOPS	FORESTRY PRACTICES	2	2
CO	FLAT TOPS	GRAZING PRACTICES	2	2
CO	FLAT TOPS	INVASIVE/ALIEN SPECIES-ANIMALS	1	2
CO	FLAT TOPS	INVASIVE/ALIEN SPECIES-PLANTS	2	2
CO	FLAT TOPS	MGMT OF/FOR CERTAIN SPECIES	1	1
CO	FLAT TOPS	PARASITES/PATHOGENS	1	1
CO	FLAT TOPS	RECREATIONAL USE	1	3
CO	FLAT TOPS	ROAD/UTILITY CORRIDORS	2	2
CO	FLAT TOPS	TRAILS	3	3
CO	FLORIDA CREEK	FIRE MANAGEMENT	2	2
CO	FLORIDA CREEK	MINING PRACTICES	2	2
WY	FORBES/SHEEP MOUNTAIN	DAM/RESERVOIR OPERATION	2	2
WY	FORBES/SHEEP MOUNTAIN	DEVELOPMENT-RESIDENTIAL	2	1
CO	FOSSIL RIDGE	FIRE MANAGEMENT	2	2
CO	FOSSIL RIDGE	RECREATIONAL USE	3	1
CO	FRYINGPAN RIVER	FIRE MANAGEMENT	2	2
CO	FRYINGPAN RIVER	INVASIVE/ALIEN SPECIES-PLANTS	2	2
CO	FRYINGPAN RIVER	MINING PRACTICES	2	3
CO	FRYINGPAN RIVER	PARASITES/PATHOGENS	1	1
CO	FRYINGPAN RIVER	RECREATIONAL USE	2	2
CO	GARDEN PARK	FIRE MANAGEMENT	2	2
CO	GARDEN PARK	FORESTRY PRACTICES	2	3
CO	GARDEN PARK	GRAZING PRACTICES	2	3
CO	GARDEN PARK	MINING PRACTICES	2	2
CO	GARDEN PARK	RECREATIONAL USE	1	1
CO	GLENWOOD CANYON	DAM/RESERVOIR OPERATION	2	2
CO	GLENWOOD CANYON	DEVELOPMENT-COMMERCIAL	1	1
CO	GLENWOOD CANYON	DEVELOPMENT-RESIDENTIAL	1	1
CO	GLENWOOD CANYON	FIRE MANAGEMENT	2	2
CO	GLENWOOD CANYON	GRAZING PRACTICES	2	3
CO	GLENWOOD CANYON	INVASIVE/ALIEN SPECIES-PLANTS	2	2
CO	GLENWOOD CANYON	MGMT OF/FOR CERTAIN SPECIES	1	1
CO	GLENWOOD CANYON	MINING PRACTICES	2	2
CO	GLENWOOD CANYON	PARASITES/PATHOGENS	1	1
CO	GLENWOOD CANYON	RECREATIONAL USE	2	2
CO	GLENWOOD CANYON	RECREATIONAL VEHICLES	2	1
CO	GOLDEN GATE CANYON	DAM/RESERVOIR OPERATION	3	3
CO	GOLDEN GATE CANYON	DEVELOPMENT-GENERAL	1	1
CO	GOLDEN GATE CANYON	DEVELOPMENT-RESIDENTIAL	1	1
CO	GOLDEN GATE CANYON	DITCH,DIKE,DRAIN,DIVERSION	3	3
CO	GOLDEN GATE CANYON	FIRE MANAGEMENT	1	1
CO	GOLDEN GATE CANYON	FORESTRY PRACTICES	1	1
CO	GOLDEN GATE CANYON	INVASIVE/ALIEN SPECIES-PLANTS	1	1
CO	GOLDEN GATE CANYON	MINING PRACTICES	1	1
CO	GOLDEN GATE CANYON	RECREATIONAL USE	2	2

1 = High
2 = Medium
3 = Low

APPENDIX 17B: SOUTHERN ROCKY MOUNTAINS CONSERVATION AREA THREATS

State	Site Name	Threat	ThreatSeverity	ThreatUrgency
CO	GOLDEN GATE CANYON	RECREATIONAL VEHICLES	2	1
CO	GOLDEN GATE CANYON	RELEASE OF TOXIC MATERIAL	2	2
CO	GOLDEN GATE CANYON	ROAD/UTILITY CORRIDORS	1	1
CO	GORE RANGE	CROP PRACTICES	3	3
CO	GORE RANGE	DAM/RESERVOIR OPERATION	3	3
CO	GORE RANGE	DEVELOPMENT-RECREATIONAL	3	3
CO	GORE RANGE	DEVELOPMENT-RESIDENTIAL	1	1
CO	GORE RANGE	DITCH,DIKE,DRAIN,DIVERSION	2	3
CO	GORE RANGE	FIRE MANAGEMENT	2	2
CO	GORE RANGE	FORESTRY PRACTICES	1	1
CO	GORE RANGE	GRAZING PRACTICES	2	2
CO	GORE RANGE	INVASIVE/ALIEN SPECIES-ANIMALS	2	2
CO	GORE RANGE	INVASIVE/ALIEN SPECIES-PLANTS	2	2
CO	GORE RANGE	MGMT OF/FOR CERTAIN SPECIES	1	1
CO	GORE RANGE	PARASITES/PATHOGENS	1	1
CO	GORE RANGE	RECREATIONAL USE	3	3
CO	GORE RANGE	ROAD/UTILITY CORRIDORS	3	2
CO	GORE RANGE	WATER QUALITY IMPAIRMENT	2	2
CO	GRAY MOUNTAIN	FIRE MANAGEMENT	3	3
CO	GRAY MOUNTAIN	MINING PRACTICES	1	3
CO	GRAY MOUNTAIN	RECREATIONAL USE	3	2
CO	GRAY MOUNTAIN	ROAD/UTILITY CORRIDORS	3	2
CO	GRAYS/TORREY	DAM/RESERVOIR OPERATION	3	3
CO	GRAYS/TORREY	DEVELOPMENT-COMMERCIAL	1	1
CO	GRAYS/TORREY	DEVELOPMENT-RECREATIONAL	1	1
CO	GRAYS/TORREY	DEVELOPMENT-RESIDENTIAL	1	1
CO	GRAYS/TORREY	DITCH,DIKE,DRAIN,DIVERSION	2	1
CO	GRAYS/TORREY	FIRE MANAGEMENT	2	2
CO	GRAYS/TORREY	FORESTRY PRACTICES	2	2
CO	GRAYS/TORREY	GRAZING PRACTICES	2	2
CO	GRAYS/TORREY	INVASIVE/ALIEN SPECIES-ANIMALS	1	1
CO	GRAYS/TORREY	INVASIVE/ALIEN SPECIES-PLANTS	2	1
CO	GRAYS/TORREY	MINING PRACTICES	1	1
CO	GRAYS/TORREY	PARASITES/PATHOGENS	1	1
CO	GRAYS/TORREY	RECREATIONAL USE	2	1
CO	GRAYS/TORREY	RECREATIONAL VEHICLES	2	2
CO	GRAYS/TORREY	ROAD/UTILITY CORRIDORS	1	1
CO	GRAYS/TORREY	TRAILS	2	2
CO	GRAYS/TORREY	WATER QUALITY IMPAIRMENT	2	2
CO	GRAYS/TORREY	MGMT OF/FOR CERTAIN SPECIES	2	3
CO	GREAT SAND DUNES/SAN LUIS LAKES	CROP PRACTICES	3	3
CO	GREAT SAND DUNES/SAN LUIS LAKES	DAM/RESERVOIR OPERATION	3	3
CO	GREAT SAND DUNES/SAN LUIS LAKES	DEVELOPMENT-RESIDENTIAL	2	2
CO	GREAT SAND DUNES/SAN LUIS LAKES	DITCH,DIKE,DRAIN,DIVERSION	1	1
CO	GREAT SAND DUNES/SAN LUIS LAKES	FIRE MANAGEMENT	2	2
CO	GREAT SAND DUNES/SAN LUIS LAKES	GRAZING PRACTICES	2	2
CO	GREAT SAND DUNES/SAN LUIS LAKES	GROUNDWATER MANIPULATION	1	1
CO	GREAT SAND DUNES/SAN LUIS LAKES	INVASIVE/ALIEN SPECIES-ANIMALS	1	1
CO	GREAT SAND DUNES/SAN LUIS LAKES	MGMT OF/FOR CERTAIN SPECIES	2	2
CO	GREAT SAND DUNES/SAN LUIS LAKES	MINING PRACTICES	1	3
CO	GREAT SAND DUNES/SAN LUIS LAKES	RECREATIONAL USE	2	2
CO	GREAT SAND DUNES/SAN LUIS LAKES	PARASITES/PATHOGENS	1	1
CO	GREAT SAND DUNES/SAN LUIS LAKES	OIL OR GAS DRILLING	2	2
CO	GREAT SAND DUNES/SAN LUIS LAKES	DEVELOPMENT-RECREATIONAL	2	2
CO	GREAT SAND DUNES/SAN LUIS LAKES	DEVELOPMENT-COMMERCIAL	2	2
CO	GREEN MOUNTAIN	DITCH,DIKE,DRAIN,DIVERSION	3	2
CO	GREEN MOUNTAIN	FIRE MANAGEMENT	2	3
CO	GREEN MOUNTAIN	GRAZING PRACTICES	3	2
CO	GREEN MOUNTAIN	INVASIVE/ALIEN SPECIES-PLANTS	2	1
CO	GREEN MOUNTAIN	RECREATIONAL USE	3	2
CO	GREEN MOUNTAIN	ROAD/UTILITY CORRIDORS	1	1
CO	GREEN MOUNTAIN	PARASITES/PATHOGENS	1	1
CO	GREEN MOUNTAIN	MGMT OF/FOR CERTAIN SPECIES	2	2
CO	GREENHORN MOUNTAIN	DEVELOPMENT-COMMERCIAL	1	1
CO	GREENHORN MOUNTAIN	DEVELOPMENT-RESIDENTIAL	1	1
CO	GREENHORN MOUNTAIN	FIRE MANAGEMENT	1	1
CO	GREENHORN MOUNTAIN	FORESTRY PRACTICES	1	1
CO	GREENHORN MOUNTAIN	GRAZING PRACTICES	2	2
CO	GREENHORN MOUNTAIN	MINING PRACTICES	2	2
CO	GREENHORN MOUNTAIN	RECREATIONAL USE	1	1
CO	GREENHORN MOUNTAIN	RECREATIONAL VEHICLES	2	2
CO	GREENIE MOUNTAIN	DEVELOPMENT-RESIDENTIAL	1	1
CO	GREENIE MOUNTAIN	DITCH,DIKE,DRAIN,DIVERSION	1	1
CO	GREENIE MOUNTAIN	FIRE MANAGEMENT	2	2
CO	GREENIE MOUNTAIN	GRAZING PRACTICES	2	2

1 = High
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3 = Low

APPENDIX 17B: SOUTHERN ROCKY MOUNTAINS CONSERVATION AREA THREATS

State	Site Name	Threat	ThreatSeverity	ThreatUrgency
CO	GREENIE MOUNTAIN	GROUNDWATER MANIPULATION	1	2
CO	GREENIE MOUNTAIN	INVASIVE/ALIEN SPECIES-PLANTS	1	2
CO	GREENIE MOUNTAIN	OVERFISHING/OVERHUNTING	2	1
CO	GREENIE MOUNTAIN	PARASITES/PATHOGENS	1	1
CO	GREENIE MOUNTAIN	RECREATIONAL USE	2	3
CO	GREENIE MOUNTAIN	ROAD/UTILITY CORRIDORS	1	1
CO	GRIZZLY PEAK	FIRE MANAGEMENT	3	3
CO	GRIZZLY PEAK	RECREATIONAL USE	3	1
CO	GUANELLA	DAM/RESERVOIR OPERATION	2	2
CO	GUANELLA	FIRE MANAGEMENT	2	3
CO	GUANELLA	GRAZING PRACTICES	3	2
CO	GUANELLA	MGMT OF/FOR CERTAIN SPECIES	2	2
CO	GUANELLA	MINING PRACTICES	2	1
CO	GUANELLA	PARASITES/PATHOGENS	1	1
CO	GUANELLA	RECREATIONAL USE	2	2
CO	GUANELLA	ROAD/UTILITY CORRIDORS	2	2
CO	GUANELLA	TRAILS	2	2
CO	GUNNISON BASIN	CROP PRACTICES	2	2
CO	GUNNISON BASIN	DAM/RESERVOIR OPERATION	3	3
CO	GUNNISON BASIN	FIRE MANAGEMENT	1	2
CO	GUNNISON BASIN	FORESTRY PRACTICES	2	3
CO	GUNNISON BASIN	GRAZING PRACTICES	1	2
CO	GUNNISON BASIN	RECREATIONAL USE	3	2
CO	GUNNISON BASIN	RECREATIONAL VEHICLES	2	1
CO	GUNNISON BASIN	ROAD/UTILITY CORRIDORS	1	1
CO	GUNNISON BASIN	DEVELOPMENT-RESIDENTIAL	1	1
CO	GUNNISON BASIN	MINING PRACTICES	2	2
WY	HARDEN CREEK	PARASITES/PATHOGENS	1	1
CO	HARDSCRABBLE	FIRE MANAGEMENT	3	3
CO	HARDSCRABBLE	FORESTRY PRACTICES	2	2
CO	HARDSCRABBLE	INVASIVE/ALIEN SPECIES-PLANTS	3	3
CO	HARDSCRABBLE	MGMT OF/FOR CERTAIN SPECIES	2	2
CO	HARDSCRABBLE	RECREATIONAL USE	2	2
CO	HERMIT PARK	FIRE MANAGEMENT	2	1
CO	HIGHWAY SPRING	FIRE MANAGEMENT	3	3
CO	HIGHWAY SPRING	INVASIVE/ALIEN SPECIES-PLANTS	3	2
CO	HIGHWAY SPRING	RECREATIONAL USE	2	2
CO	HONDO CREEK, RITO	UNKNOWN	0	0
WY	HORSESHOE CREEK	FIRE MANAGEMENT	1	1
WY	HORSESHOE CREEK	PARASITES/PATHOGENS	1	1
CO	HUERFANO GRASSLANDS	DAM/RESERVOIR OPERATION	2	2
CO	HUERFANO GRASSLANDS	FIRE MANAGEMENT	2	2
CO	HUERFANO GRASSLANDS	FORESTRY PRACTICES	3	3
CO	HUERFANO GRASSLANDS	MINING PRACTICES	2	2
CO	HUNTER	FIRE MANAGEMENT	2	2
CO	HUNTER	RECREATIONAL USE	1	2
CO	HUNTER	TRAILS	3	3
WY	HUSTON PARK	DAM/RESERVOIR OPERATION	2	2
WY	HUSTON PARK	FIRE MANAGEMENT	1	1
WY	HUSTON PARK	FORESTRY PRACTICES	2	1
WY	HUSTON PARK	GRAZING PRACTICES	3	1
WY	HUSTON PARK	MINING PRACTICES	2	2
WY	HUSTON PARK	RECREATIONAL USE	2	1
WY	HUSTON PARK	WATER QUALITY IMPAIRMENT	2	2
WY	IRON CREEK	UNKNOWN	0	0
NM	JEMEZ CANYON RESERVOIR	DAM/RESERVOIR OPERATION	2	1
NM	JEMEZ CANYON RESERVOIR	GRAZING PRACTICES	2	1
NM	JEMEZ CANYON RESERVOIR	INVASIVE/ALIEN SPECIES-ANIMALS	2	1
NM	JEMEZ CANYON RESERVOIR	INVASIVE/ALIEN SPECIES-PLANTS	1	1
NM	JEMEZ CANYON RESERVOIR	MINING PRACTICES	2	2
NM	JEMEZ MOUNTAINS	DAM/RESERVOIR OPERATION	2	2
NM	JEMEZ MOUNTAINS	DEVELOPMENT-COMMERCIAL	1	3
NM	JEMEZ MOUNTAINS	DEVELOPMENT-RECREATIONAL	2	2
NM	JEMEZ MOUNTAINS	DEVELOPMENT-RESIDENTIAL	1	2
NM	JEMEZ MOUNTAINS	FIRE MANAGEMENT	1	1
NM	JEMEZ MOUNTAINS	GRAZING PRACTICES	2	1
NM	JEMEZ MOUNTAINS	INVASIVE/ALIEN SPECIES-ANIMALS	1	1
NM	JEMEZ MOUNTAINS	INVASIVE/ALIEN SPECIES-PLANTS	1	1
NM	JEMEZ MOUNTAINS	MGMT OF/FOR CERTAIN SPECIES	3	1
NM	JEMEZ MOUNTAINS	MINING PRACTICES	2	2
NM	JEMEZ MOUNTAINS	RECREATIONAL USE	2	1
NM	JEMEZ MOUNTAINS	RECREATIONAL VEHICLES	2	1
NM	JEMEZ MOUNTAINS	ROAD/UTILITY CORRIDORS	2	1
NM	JEMEZ MOUNTAINS	WATER QUALITY IMPAIRMENT	2	2
CO	KENOSHA	DEVELOPMENT-RESIDENTIAL	2	1

1 = High
2 = Medium
3 = Low

APPENDIX 17B: SOUTHERN ROCKY MOUNTAINS CONSERVATION AREA THREATS

State	Site Name	Threat	ThreatSeverity	ThreatUrgency
CO	KENOSHA	DITCH,DIKE,DRAIN,DIVERSION	3	3
CO	KENOSHA	FIRE MANAGEMENT	2	2
CO	KENOSHA	FORESTRY PRACTICES	2	2
CO	KENOSHA	GRAZING PRACTICES	2	3
CO	KENOSHA	MINING PRACTICES	2	1
CO	KENOSHA	RECREATIONAL USE	3	3
CO	KENOSHA	WATER QUALITY IMPAIRMENT	2	2
WY	LA BONTE CREEK	DAM/RESERVOIR OPERATION	2	2
WY	LA BONTE CREEK	DEVELOPMENT-RESIDENTIAL	1	1
CO	LA GARITA	DAM/RESERVOIR OPERATION	2	2
CO	LA GARITA	DEVELOPMENT-RESIDENTIAL	1	1
CO	LA GARITA	FIRE MANAGEMENT	2	2
CO	LA GARITA	FORESTRY PRACTICES	2	3
CO	LA GARITA	GRAZING PRACTICES	2	2
CO	LA GARITA	INVASIVE/ALIEN SPECIES-PLANTS	2	2
CO	LA GARITA	MINING PRACTICES	3	2
CO	LA GARITA	MINING PRACTICES	2	2
CO	LA GARITA	PARASITES/PATHOGENS	1	1
CO	LA GARITA	RECREATIONAL USE	2	2
CO	LA GARITA	ROAD/UTILITY CORRIDORS	2	1
CO	LA GARITA	SMALL POPULATION SIZE AND DISTRIBUTION	2	3
CO	LA VETA PASS LINK	DEVELOPMENT-RESIDENTIAL	2	2
CO	LA VETA PASS LINK	MINING PRACTICES	2	2
CO , WY	LARAMIE FOOTHILLS	DEVELOPMENT-RESIDENTIAL	1	1
CO , WY	LARAMIE FOOTHILLS	FIRE MANAGEMENT	1	1
CO , WY	LARAMIE FOOTHILLS	ROAD/UTILITY CORRIDORS	2	1
CO, WY	LARAMIE FOOTHILLS	DAM/RESERVOIR OPERATION	2	3
CO, WY	LARAMIE FOOTHILLS	DITCH,DIKE,DRAIN,DIVERSION	2	1
CO, WY	LARAMIE FOOTHILLS	INVASIVE/ALIEN SPECIES-ANIMALS	2	2
CO, WY	LARAMIE FOOTHILLS	INVASIVE/ALIEN SPECIES-PLANTS	1	1
CO, WY	LARAMIE FOOTHILLS	MGMT OF/FOR CERTAIN SPECIES	2	1
CO, WY	LARAMIE FOOTHILLS	MINING PRACTICES	2	2
CO, WY	LARAMIE FOOTHILLS	PARASITES/PATHOGENS	1	1
CO , WY	LARAMIE RIVER	DITCH,DIKE,DRAIN,DIVERSION	2	1
CO , WY	LARAMIE RIVER	FIRE MANAGEMENT	2	1
CO , WY	LARAMIE RIVER	GRAZING PRACTICES	2	1
CO, WY	LARAMIE RIVER	MGMT OF/FOR CERTAIN SPECIES	2	2
CO	LAWHEAD GULCH	DAM/RESERVOIR OPERATION	2	2
CO	LAWHEAD GULCH	DEVELOPMENT-RESIDENTIAL	1	1
CO	LAWHEAD GULCH	FIRE MANAGEMENT	2	2
CO	LAWHEAD GULCH	INVASIVE/ALIEN SPECIES-PLANTS	1	2
CO	LAWHEAD GULCH	MINING PRACTICES	2	2
CO	LAWHEAD GULCH	RECREATIONAL VEHICLES	2	2
CO	LAWHEAD GULCH	ROAD/UTILITY CORRIDORS	2	1
CO	LAWHEAD GULCH	TRAILS	3	2
CO	LION CREEK	UNKNOWN	0	0
CO	LITTLE COAL CREEK	FIRE MANAGEMENT	2	1
CO	LITTLE COAL CREEK	GRAZING PRACTICES	3	2
CO	LITTLE COAL CREEK	INVASIVE/ALIEN SPECIES-PLANTS	2	2
CO	LITTLE COAL CREEK	MGMT OF/FOR CERTAIN SPECIES	1	1
CO	LITTLE COAL CREEK	PARASITES/PATHOGENS	1	1
CO	LIZARD HEAD	DEVELOPMENT-RESIDENTIAL	2	1
CO	LIZARD HEAD	FIRE MANAGEMENT	3	3
CO	LIZARD HEAD	GRAZING PRACTICES	2	2
CO	LIZARD HEAD	MINING PRACTICES	2	2
CO	LIZARD HEAD	RECREATIONAL USE	3	2
CO	LIZARD HEAD	ROAD/UTILITY CORRIDORS	2	1
CO	LONG GULCH	FIRE MANAGEMENT	3	3
CO	LONG GULCH	GRAZING PRACTICES	2	2
CO	LONG GULCH	RECREATIONAL USE	2	1
CO	LONG GULCH	ROAD/UTILITY CORRIDORS	2	3
CO	LOWER DOLORES RIVER	FIRE MANAGEMENT	3	3
CO	LOWER DOLORES RIVER	MINING PRACTICES	2	2
CO	LOWER POUDRE	DAM/RESERVOIR OPERATION	2	2
CO	LOWER POUDRE	DEVELOPMENT-RESIDENTIAL	1	1
CO	LOWER POUDRE	DITCH,DIKE,DRAIN,DIVERSION	2	2
CO	LOWER POUDRE	FIRE MANAGEMENT	1	1
CO	LOWER POUDRE	FIRE MANAGEMENT	1	1
CO	LOWER POUDRE	FORESTRY PRACTICES	1	1
CO	LOWER POUDRE	GRAZING PRACTICES	2	3
CO	LOWER POUDRE	INVASIVE/ALIEN SPECIES-ANIMALS	2	3
CO	LOWER POUDRE	INVASIVE/ALIEN SPECIES-PLANTS	1	1
CO	LOWER POUDRE	MINING PRACTICES	2	2
CO	LOWER POUDRE	RECREATIONAL USE	2	2

1 = High
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3 = Low

APPENDIX 17B: SOUTHERN ROCKY MOUNTAINS CONSERVATION AREA THREATS

State	Site Name	Threat	ThreatSeverity	ThreatUrgency
CO	LOWER POUDRE	ROAD/UTILITY CORRIDORS	2	2
CO	LOWER POUDRE	TRAILS	2	2
CO , WY	LYNX LINK B	FIRE MANAGEMENT	1	1
CO	LYNX LINKS 3	FIRE MANAGEMENT	2	3
CO	LYNX LINKS 3	GRAZING PRACTICES	3	2
CO	LYNX LINKS 3	PARASITES/PATHOGENS	1	1
CO	MARTEN LINK A	FIRE MANAGEMENT	3	3
CO	MARTEN LINK A	GRAZING PRACTICES	3	3
CO	MARTEN LINK A	INVASIVE/ALIEN SPECIES-PLANTS	2	3
CO	MARTEN LINK A	MINING PRACTICES	2	2
CO	MARTEN LINK A	RECREATIONAL VEHICLES	2	2
CO	MARTEN LINK A	ROAD/UTILITY CORRIDORS	2	2
CO	MCCLURE PASS	DAM/RESERVOIR OPERATION	2	2
CO	MCCLURE PASS	DEVELOPMENT-RECREATIONAL	2	2
CO	MCCLURE PASS	DEVELOPMENT-RESIDENTIAL	1	1
CO	MCCLURE PASS	FIRE MANAGEMENT	2	2
CO	MCCLURE PASS	FORESTRY PRACTICES	2	2
CO	MCCLURE PASS	GRAZING PRACTICES	2	2
CO	MCCLURE PASS	INVASIVE/ALIEN SPECIES-PLANTS	2	2
CO	MCCLURE PASS	MINING PRACTICES	2	2
CO	MCCLURE PASS	RECREATIONAL USE	2	2
CO	MCCLURE PASS	ROAD/UTILITY CORRIDORS	2	2
CO	MCCLURE PASS	TRAILS	3	2
CO	MCCLURE PASS	WATER QUALITY IMPAIRMENT	2	2
CO	MIDDLE ARKANSAS RIVER	DEVELOPMENT-COMMERCIAL	1	1
CO	MIDDLE ARKANSAS RIVER	DEVELOPMENT-RECREATIONAL	2	2
CO	MIDDLE ARKANSAS RIVER	DEVELOPMENT-RESIDENTIAL	1	1
CO	MIDDLE ARKANSAS RIVER	FIRE MANAGEMENT	2	1
CO	MIDDLE ARKANSAS RIVER	GRAZING PRACTICES	2	2
CO	MIDDLE ARKANSAS RIVER	INVASIVE/ALIEN SPECIES-PLANTS	2	2
CO	MIDDLE ARKANSAS RIVER	MINING PRACTICES	1	1
CO	MIDDLE ARKANSAS RIVER	RECREATIONAL USE	2	3
CO	MIDDLE ARKANSAS RIVER	RECREATIONAL VEHICLES	2	2
CO	MIDDLE ARKANSAS RIVER	ROAD/UTILITY CORRIDORS	2	2
CO	MIDDLE FORK POWDERHORN CREEK	UNKNOWN	0	0
WY	MILL CREEK	PARASITES/PATHOGENS	1	1
CO	MONTEZUMA CREEK	FIRE MANAGEMENT	2	3
CO	MONTEZUMA CREEK	OVERFISHING/OVERHUNTING	2	2
CO	MONTEZUMA CREEK	WATER QUALITY IMPAIRMENT	2	2
CO	MORRISON CREEK	DEVELOPMENT-RESIDENTIAL	1	1
CO	MORRISON CREEK	FIRE MANAGEMENT	2	2
CO	MORRISON CREEK	PARASITES/PATHOGENS	1	1
CO	MORRISON CREEK	ROAD/UTILITY CORRIDORS	1	1
CO	MOSQUITO RANGE	DAM/RESERVOIR OPERATION	1	1
CO	MOSQUITO RANGE	DEVELOPMENT-RESIDENTIAL	1	1
CO	MOSQUITO RANGE	FIRE MANAGEMENT	3	3
CO	MOSQUITO RANGE	FORESTRY PRACTICES	3	3
CO	MOSQUITO RANGE	GRAZING PRACTICES	3	2
CO	MOSQUITO RANGE	MINING PRACTICES	1	1
CO	MOSQUITO RANGE	PARASITES/PATHOGENS	1	1
CO	MOSQUITO RANGE	RECREATIONAL USE	2	2
CO	MOSQUITO RANGE	RECREATIONAL VEHICLES	1	1
CO	MOSQUITO RANGE	ROAD/UTILITY CORRIDORS	2	2
CO	MOSQUITO RANGE	TRAILS	2	2
CO	MOSQUITO RANGE	WATER QUALITY IMPAIRMENT	2	2
CO	MOUNT CALLAHAN	FIRE MANAGEMENT	3	3
CO	MOUNT CALLAHAN	INVASIVE/ALIEN SPECIES-PLANTS	3	3
CO	MOUNT CALLAHAN	MINING PRACTICES	1	1
CO	MOUNT CALLAHAN	OIL OR GAS DRILLING	1	1
CO	MOUNT CALLAHAN	SMALL POPULATION SIZE AND DISTRIBUTION	1	3
CO	MOUNT FALCON NORTH	FIRE MANAGEMENT	2	1
CO	MOUNT FALCON NORTH	FORESTRY PRACTICES	2	2
CO	MOUNT FALCON NORTH	INVASIVE/ALIEN SPECIES-PLANTS	2	2
CO	MOUNT FALCON NORTH	RECREATIONAL USE	3	2
CO	MOUNT MASSIVE	FIRE MANAGEMENT	3	3
CO	MOUNT MASSIVE	RECREATIONAL USE	2	2
CO , WY	MOUNT ZIRKEL	DEVELOPMENT-RECREATIONAL	1	1
CO , WY	MOUNT ZIRKEL	DITCH,DIKE,DRAIN,DIVERSION	2	1
CO , WY	MOUNT ZIRKEL	FIRE MANAGEMENT	1	1
CO , WY	MOUNT ZIRKEL	FORESTRY PRACTICES	2	1
CO , WY	MOUNT ZIRKEL	GRAZING PRACTICES	2	2
CO , WY	MOUNT ZIRKEL	INVASIVE/ALIEN SPECIES-PLANTS	1	1
CO , WY	MOUNT ZIRKEL	MINING PRACTICES	3	3
CO , WY	MOUNT ZIRKEL	PARASITES/PATHOGENS	2	1

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2 = Medium
3 = Low

APPENDIX 17B: SOUTHERN ROCKY MOUNTAINS CONSERVATION AREA THREATS

State	Site Name	Threat	ThreatSeverity	ThreatUrgency
CO , WY	MOUNT ZIRKEL	RECREATIONAL USE	1	1
CO , WY	MOUNT ZIRKEL	RECREATIONAL VEHICLES	1	2
CO , WY	MOUNT ZIRKEL	ROAD/UTILITY CORRIDORS	2	1
CO	MUDDY CREEK	DAM/RESERVOIR OPERATION	2	2
CO	MUDDY CREEK	DEVELOPMENT-RESIDENTIAL	1	2
CO	MUDDY CREEK	FIRE MANAGEMENT	2	3
CO	MUDDY CREEK	INVASIVE/ALIEN SPECIES-PLANTS	2	2
CO	MUDDY CREEK	RECREATIONAL USE	2	2
CO	MUDDY CREEK	ROAD/UTILITY CORRIDORS	2	2
WY	MULE CREEK	UNKNOWN	0	0
CO	NATURITA CREEK	MGMT OF/FOR CERTAIN SPECIES	2	2
CO	NORTH BOULDER CREEK	DAM/RESERVOIR OPERATION	2	2
CO	NORTH BOULDER CREEK	DEVELOPMENT-RESIDENTIAL	1	1
CO	NORTH BOULDER CREEK	FIRE MANAGEMENT	1	1
CO	NORTH BOULDER CREEK	GRAZING PRACTICES	3	3
CO	NORTH BOULDER CREEK	MINING PRACTICES	1	1
CO	NORTH BOULDER CREEK	PARASITES/PATHOGENS	1	1
CO	NORTH BOULDER CREEK	RECREATIONAL USE	1	1
CO	NORTH BOULDER CREEK	RECREATIONAL VEHICLES	2	3
CO	NORTH BOULDER CREEK	ROAD/UTILITY CORRIDORS	1	1
CO	NORTH BOULDER CREEK	TRAILS	2	2
CO	NORTH CAMERON PASS	DAM/RESERVOIR OPERATION	2	2
CO	NORTH CAMERON PASS	FIRE MANAGEMENT	2	1
CO	NORTH CAMERON PASS	FORESTRY PRACTICES	1	2
CO	NORTH CAMERON PASS	GRAZING PRACTICES	2	2
CO	NORTH CAMERON PASS	INVASIVE/ALIEN SPECIES-PLANTS	1	2
CO	NORTH CAMERON PASS	PARASITES/PATHOGENS	1	1
CO	NORTH CAMERON PASS	RECREATIONAL USE	2	2
CO	NORTH CAMERON PASS	ROAD/UTILITY CORRIDORS	2	2
CO	NORTH CAMERON PASS	TRAILS	2	3
WY	NORTH LARAMIE RIVER	DAM/RESERVOIR OPERATION	2	2
WY	NORTH LARAMIE RIVER	MINING PRACTICES	2	2
CO	NORTH PARK	DAM/RESERVOIR OPERATION	2	2
CO	NORTH PARK	DITCH,DIKE,DRAIN,DIVERSION	2	2
CO	NORTH PARK	FIRE MANAGEMENT	2	2
CO	NORTH PARK	FORESTRY PRACTICES	2	1
CO	NORTH PARK	GRAZING PRACTICES	2	2
CO	NORTH PARK	MINING PRACTICES	2	2
CO	NORTH PARK	RECREATIONAL USE	2	2
CO	NORTH PARK	RECREATIONAL VEHICLES	2	2
CO	NORTH PARK SAND DUNES	RECREATIONAL USE	1	1
CO	NORTH PARK SAND DUNES	RECREATIONAL VEHICLES	1	1
WY	NORTH PLATTE RIVER	DAM/RESERVOIR OPERATION	2	2
WY	NORTH PLATTE RIVER	DEVELOPMENT-RESIDENTIAL	1	1
CO	NORTH ST VRAIN	DAM/RESERVOIR OPERATION	2	3
CO	NORTH ST VRAIN	DEVELOPMENT-RESIDENTIAL	1	1
CO	NORTH ST VRAIN	FIRE MANAGEMENT	1	1
CO	NORTH ST VRAIN	GRAZING PRACTICES	2	2
CO	NORTH ST VRAIN	INVASIVE/ALIEN SPECIES-PLANTS	2	1
CO	NORTH ST VRAIN	MINING PRACTICES	1	1
CO	NORTH ST VRAIN	RECREATIONAL USE	2	2
CO	NORTH ST VRAIN	RECREATIONAL VEHICLES	2	3
CO	OAK RIDGE	UNKNOWN	0	0
NM	OJO CALIENTE	CROP PRACTICES	2	1
NM	OJO CALIENTE	DAM/RESERVOIR OPERATION	2	2
NM	OJO CALIENTE	DEVELOPMENT-RESIDENTIAL	2	1
NM	OJO CALIENTE	DITCH,DIKE,DRAIN,DIVERSION	1	1
NM	OJO CALIENTE	FIRE MANAGEMENT	1	1
NM	OJO CALIENTE	GRAZING PRACTICES	2	1
NM	OJO CALIENTE	INVASIVE/ALIEN SPECIES-ANIMALS	1	2
NM	OJO CALIENTE	INVASIVE/ALIEN SPECIES-PLANTS	2	2
NM	OJO CALIENTE	MINING PRACTICES	2	2
NM	OJO CALIENTE	RECREATIONAL USE	1	1
NM	OJO CALIENTE	ROAD/UTILITY CORRIDORS	2	1
CO	OURAY	DAM/RESERVOIR OPERATION	3	3
CO	OURAY	DEVELOPMENT-RESIDENTIAL	1	1
CO	OURAY	FIRE MANAGEMENT	2	3
CO	OURAY	FORESTRY PRACTICES	3	3
CO	OURAY	INVASIVE/ALIEN SPECIES-PLANTS	2	2
CO	OURAY	MINING PRACTICES	1	1
CO	OURAY	RECREATIONAL USE	2	1
CO	OURAY	ROAD/UTILITY CORRIDORS	2	1
CO	PAGOSA SPRINGS	DEVELOPMENT-RESIDENTIAL	1	1
CO	PAGOSA SPRINGS	FIRE MANAGEMENT	2	2
CO	PAGOSA SPRINGS	GRAZING PRACTICES	2	2

1 = High
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3 = Low

APPENDIX 17B: SOUTHERN ROCKY MOUNTAINS CONSERVATION AREA THREATS

State	Site Name	Threat	ThreatSeverity	ThreatUrgency
CO	PAGOSA SPRINGS	MINING PRACTICES	2	2
CO	PAGOSA SPRINGS	RECREATIONAL USE	2	2
CO	PAGOSA SPRINGS	ROAD/UTILITY CORRIDORS	2	1
CO	DISAPPOINTMENT VALLEY	DEVELOPMENT-RESIDENTIAL	1	2
CO	DISAPPOINTMENT VALLEY	FIRE MANAGEMENT	2	2
CO	DISAPPOINTMENT VALLEY	GRAZING PRACTICES	2	2
CO	DISAPPOINTMENT VALLEY	MINING PRACTICES	2	2
CO	DISAPPOINTMENT VALLEY	ROAD/UTILITY CORRIDORS	2	2
WY	PASS CREEK	UNKNOWN	0	0
WY	PENNOCK MOUNTAIN	UNKNOWN	0	0
CO	PIEDRA RIVER	DAM/RESERVOIR OPERATION	2	2
CO	PIEDRA RIVER	FIRE MANAGEMENT	2	2
CO	PIEDRA RIVER	FORESTRY PRACTICES	2	3
CO	PIEDRA RIVER	GRAZING PRACTICES	3	2
CO	PIEDRA RIVER	MGMT OF/FOR CERTAIN SPECIES	1	1
CO	PIEDRA RIVER	PARASITES/PATHOGENS	1	1
CO	PIEDRA RIVER	RECREATIONAL USE	3	2
CO	PIEDRA RIVER	SMALL POPULATION SIZE AND DISTRIBUTION	2	3
CO	PIKES PEAK	DAM/RESERVOIR OPERATION	1	1
CO	PIKES PEAK	DAM/RESERVOIR OPERATION	2	2
CO	PIKES PEAK	DEVELOPMENT-RESIDENTIAL	1	1
CO	PIKES PEAK	DITCH,DIKE,DRAIN,DIVERSION	2	1
CO	PIKES PEAK	FIRE MANAGEMENT	1	1
CO	PIKES PEAK	FORESTRY PRACTICES	2	1
CO	PIKES PEAK	GROUNDWATER MANIPULATION	3	3
CO	PIKES PEAK	INVASIVE/ALIEN SPECIES-PLANTS	2	2
CO	PIKES PEAK	MINING PRACTICES	2	2
CO	PIKES PEAK	OVERFISHING/OVERHUNTING	3	3
CO	PIKES PEAK	PARASITES/PATHOGENS	1	1
CO	PIKES PEAK	RECREATIONAL USE	1	1
CO	PIKES PEAK	RECREATIONAL VEHICLES	2	2
CO	PIKES PEAK	RELEASE OF TOXIC MATERIAL	2	2
CO	PIKES PEAK	ROAD/UTILITY CORRIDORS	1	1
CO, WY	PLATTE RIVER	MGMT OF/FOR CERTAIN SPECIES	2	1
CO, WY	PLATTE RIVER	OVERFISHING/OVERHUNTING	2	1
CO, WY	PLATTE RIVER	PARASITES/PATHOGENS	1	1
CO, WY	PLATTE RIVER	WATER QUALITY IMPAIRMENT	2	2
CO	PLEASANT VALLEY CREEK	DEVELOPMENT-RESIDENTIAL	1	2
CO	PLEASANT VALLEY CREEK	FIRE MANAGEMENT	2	2
CO	PLEASANT VALLEY CREEK	GRAZING PRACTICES	3	2
CO	PRYOR CREEK	DITCH,DIKE,DRAIN,DIVERSION	2	2
CO	PRYOR CREEK	FIRE MANAGEMENT	2	2
CO	PRYOR CREEK	GRAZING PRACTICES	2	2
CO	PRYOR CREEK	INVASIVE/ALIEN SPECIES-PLANTS	1	2
CO	PRYOR CREEK	MGMT OF/FOR CERTAIN SPECIES	1	1
CO	PRYOR CREEK	PARASITES/PATHOGENS	1	1
CO	PRYOR CREEK	RECREATIONAL VEHICLES	2	2
CO , NM	PUNCHE VALLEY	CONVERSION TO AGRICULTURE	2	1
CO , NM	PUNCHE VALLEY	CROP PRACTICES	2	1
CO , NM	PUNCHE VALLEY	DEVELOPMENT-RESIDENTIAL	2	1
CO , NM	PUNCHE VALLEY	DITCH,DIKE,DRAIN,DIVERSION	2	1
CO , NM	PUNCHE VALLEY	FIRE MANAGEMENT	1	1
CO , NM	PUNCHE VALLEY	GRAZING PRACTICES	2	2
CO , NM	PUNCHE VALLEY	INVASIVE/ALIEN SPECIES-ANIMALS	3	2
CO , NM	PUNCHE VALLEY	INVASIVE/ALIEN SPECIES-PLANTS	1	2
CO , NM	PUNCHE VALLEY	MGMT OF/FOR CERTAIN SPECIES	1	2
CO , NM	PUNCHE VALLEY	MINING PRACTICES	2	2
CO , NM	PUNCHE VALLEY	OVERFISHING/OVERHUNTING	1	1
CO , NM	PUNCHE VALLEY	PARASITES/PATHOGENS	1	1
CO , NM	PUNCHE VALLEY	ROAD/UTILITY CORRIDORS	2	1
CO , NM	PUNCHE VALLEY	WATER QUALITY IMPAIRMENT	2	2
NM	QUESTA	FIRE MANAGEMENT	1	1
NM	QUESTA	MINING PRACTICES	2	3
NM	QUESTA	WATER QUALITY IMPAIRMENT	2	2
CO	RAJADERO CANYON	DEVELOPMENT-RESIDENTIAL	2	1
CO	RAJADERO CANYON	DITCH,DIKE,DRAIN,DIVERSION	2	2
CO	RAJADERO CANYON	FIRE MANAGEMENT	2	2
CO	RAJADERO CANYON	GRAZING PRACTICES	2	1
CO	RAJADERO CANYON	INVASIVE/ALIEN SPECIES-ANIMALS	2	1
CO	RAJADERO CANYON	INVASIVE/ALIEN SPECIES-PLANTS	2	2
CO	RAJADERO CANYON	MGMT OF/FOR CERTAIN SPECIES	2	2
CO	RAJADERO CANYON	MINING PRACTICES	3	3
CO	RAJADERO CANYON	PARASITES/PATHOGENS	1	1
CO	RAJADERO CANYON	RECREATIONAL USE	2	3

1 = High
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APPENDIX 17B: SOUTHERN ROCKY MOUNTAINS CONSERVATION AREA THREATS

State	Site Name	Threat	ThreatSeverity	ThreatUrgency
CO	RAJADERO CANYON	ROAD/UTILITY CORRIDORS	2	1
CO	RAJADERO CANYON	TRAILS	2	2
CO	RED & WHITE MTN	DAM/RESERVOIR OPERATION	2	2
CO	RED & WHITE MTN	DEVELOPMENT-RECREATIONAL	2	2
CO	RED & WHITE MTN	DEVELOPMENT-RESIDENTIAL	1	1
CO	RED & WHITE MTN	FIRE MANAGEMENT	2	3
CO	RED & WHITE MTN	FORESTRY PRACTICES	2	2
CO	RED & WHITE MTN	GRAZING PRACTICES	3	2
CO	RED & WHITE MTN	INVASIVE/ALIEN SPECIES-ANIMALS	2	2
CO	RED & WHITE MTN	PARASITES/PATHOGENS	1	1
CO	RED & WHITE MTN	RECREATIONAL USE	2	2
CO	RED & WHITE MTN	RECREATIONAL VEHICLES	2	2
CO	RED & WHITE MTN	ROAD/UTILITY CORRIDORS	1	1
CO	RED & WHITE MTN	TRAILS	2	2
WY	RED BUTTES	UNKNOWN	0	0
CO	RIFLE HOGBACK	FIRE MANAGEMENT	2	3
CO	RIFLE REACH/COLORADO RIVER	DAM/RESERVOIR OPERATION	1	1
CO	RIFLE REACH/COLORADO RIVER	DEVELOPMENT-RESIDENTIAL	1	2
CO	RIFLE REACH/COLORADO RIVER	DITCH,DIKE,DRAIN,DIVERSION	2	2
CO	RIFLE REACH/COLORADO RIVER	FIRE MANAGEMENT	3	3
CO	RIFLE REACH/COLORADO RIVER	INVASIVE/ALIEN SPECIES-PLANTS	1	1
CO	RIFLE REACH/COLORADO RIVER	MINING PRACTICES	2	1
CO	RIFLE REACH/COLORADO RIVER	OIL OR GAS DRILLING	2	1
CO	RIFLE REACH/COLORADO RIVER	RELEASE OF TOXIC MATERIAL	2	2
CO	RIFLE REACH/COLORADO RIVER	ROAD/UTILITY CORRIDORS	2	2
CO , NM	RIO CHAMA	CROP PRACTICES	2	1
CO , NM	RIO CHAMA	DAM/RESERVOIR OPERATION	2	2
CO , NM	RIO CHAMA	DEVELOPMENT-RESIDENTIAL	2	2
CO , NM	RIO CHAMA	DITCH,DIKE,DRAIN,DIVERSION	2	1
CO , NM	RIO CHAMA	FIRE MANAGEMENT	1	1
CO , NM	RIO CHAMA	FORESTRY PRACTICES	1	1
CO , NM	RIO CHAMA	GRAZING PRACTICES	2	1
CO , NM	RIO CHAMA	INVASIVE/ALIEN SPECIES-ANIMALS	2	1
CO , NM	RIO CHAMA	INVASIVE/ALIEN SPECIES-PLANTS	2	2
CO , NM	RIO CHAMA	MINING PRACTICES	2	2
CO , NM	RIO CHAMA	RECREATIONAL USE	1	1
CO , NM	RIO CHAMA	RECREATIONAL VEHICLES	1	1
CO , NM	RIO CHAMA	ROAD/UTILITY CORRIDORS	2	1
CO , NM	RIO CHAMA	WATER QUALITY IMPAIRMENT	2	2
CO	RIO GRANDE	CROP PRACTICES	2	3
CO	RIO GRANDE	DEVELOPMENT-RESIDENTIAL	2	2
CO	RIO GRANDE	DITCH,DIKE,DRAIN,DIVERSION	2	2
CO	RIO GRANDE	FIRE MANAGEMENT	3	3
CO	RIO GRANDE	GRAZING PRACTICES	2	2
CO	RIO GRANDE	INVASIVE/ALIEN SPECIES-PLANTS	1	2
CO	RIO GRANDE	RECREATIONAL USE	2	3
NM	RIO GRANDE GORGE	WATER QUALITY IMPAIRMENT	2	2
CO	RIO GRANDE PYRAMID	FIRE MANAGEMENT	3	3
CO	RIO GRANDE PYRAMID	POACHING OR COMMERCIAL COLLECTING	2	2
CO	RIO GRANDE PYRAMID	RECREATIONAL USE	3	2
NM	RIO HONDO	DEVELOPMENT-RECREATIONAL	1	1
NM	RIO HONDO	DEVELOPMENT-RESIDENTIAL	1	1
NM	RIO HONDO	FIRE MANAGEMENT	1	1
NM	RIO HONDO	GRAZING PRACTICES	2	1
NM	RIO HONDO	MINING PRACTICES	2	2
NM	RIO HONDO	PARASITES/PATHOGENS	1	1
NM	RIO HONDO	RECREATIONAL USE	2	1
NM	RIO HONDO	RECREATIONAL VEHICLES	2	2
NM	RIO HONDO	ROAD/UTILITY CORRIDORS	2	1
CO	ROAN CLIFFS	FIRE MANAGEMENT	3	3
CO	ROAN CLIFFS	GRAZING PRACTICES	1	1
CO	ROAN CLIFFS	INVASIVE/ALIEN SPECIES-PLANTS	1	2
CO	ROAN CLIFFS	INVASIVE/ALIEN SPECIES-PLANTS	3	3
CO	ROAN CLIFFS	MINING PRACTICES	1	1
CO	ROAN CLIFFS	OIL OR GAS DRILLING	1	1
CO	ROAN CLIFFS	PARASITES/PATHOGENS	1	1
CO	ROAN CLIFFS	RECREATIONAL USE	2	2
CO	ROAN CLIFFS	RECREATIONAL VEHICLES	2	2
CO	ROAN CLIFFS	SMALL POPULATION SIZE AND DISTRIBUTION	2	3
CO	ROAN CLIFFS	ROAD/UTILITY CORRIDORS	2	2
WY	ROCK MOUNTAIN	UNKNOWN	0	0
CO	ROCKY FORK CREEK	FIRE MANAGEMENT	1	1
CO	ROCKY FORK CREEK	INVASIVE/ALIEN SPECIES-PLANTS	2	2

1 = High
2 = Medium
3 = Low

APPENDIX 17B: SOUTHERN ROCKY MOUNTAINS CONSERVATION AREA THREATS

State	Site Name	Threat	ThreatSeverity	ThreatUrgency
CO	ROCKY FORK CREEK	MINING PRACTICES	2	3
CO	ROCKY FORK CREEK	PARASITES/PATHOGENS	1	1
CO	ROCKY FORK CREEK	RECREATIONAL USE	2	2
CO	ROGERS UNIT	UNKNOWN		
CO	ROMLEY	FIRE MANAGEMENT	2	2
CO	ROMLEY	MINING PRACTICES	1	2
CO	ROMLEY	RECREATIONAL USE	2	2
CO	ROMLEY	WATER QUALITY IMPAIRMENT	2	2
CO	ROUBIDEAU	DAM/RESERVOIR OPERATION	3	3
CO	ROUBIDEAU	DEVELOPMENT-RESIDENTIAL	2	2
CO	ROUBIDEAU	DITCH,DIKE,DRAIN,DIVERSION	2	2
CO	ROUBIDEAU	FIRE MANAGEMENT	2	2
CO	ROUBIDEAU	GRAZING PRACTICES	2	2
CO	ROUBIDEAU	INVASIVE/ALIEN SPECIES-PLANTS	1	2
CO	ROUBIDEAU	MINING PRACTICES	2	2
CO	ROUBIDEAU	RECREATIONAL USE	2	2
CO	ROUBIDEAU	WATER QUALITY IMPAIRMENT	2	2
CO	SAGE CREEK	CONVERSION TO AGRICULTURE	2	1
CO	SAGE CREEK	DAM/RESERVOIR OPERATION	2	2
CO	SAGE CREEK	DITCH,DIKE,DRAIN,DIVERSION	2	2
CO	SAGE CREEK	FIRE MANAGEMENT	1	2
CO	SAGE CREEK	GRAZING PRACTICES	2	2
CO	SAGE CREEK	INVASIVE/ALIEN SPECIES-ANIMALS	1	2
CO	SAGE CREEK	MGMT OF/FOR CERTAIN SPECIES	1	2
CO	SAGE CREEK	MINING PRACTICES	2	1
CO	SAGE CREEK	PARASITES/PATHOGENS	1	1
CO	SAN JUAN RIVER	DITCH,DIKE,DRAIN,DIVERSION	2	2
CO	SAN JUAN RIVER	FIRE MANAGEMENT	3	3
CO	SAN JUAN RIVER	WATER QUALITY IMPAIRMENT	2	2
CO	SAN MIGUEL RIVER	DAM/RESERVOIR OPERATION	3	2
CO	SAN MIGUEL RIVER	DEVELOPMENT-COMMERCIAL	2	1
CO	SAN MIGUEL RIVER	DEVELOPMENT-RESIDENTIAL	1	1
CO	SAN MIGUEL RIVER	DITCH,DIKE,DRAIN,DIVERSION	2	2
CO	SAN MIGUEL RIVER	FIRE MANAGEMENT	2	2
CO	SAN MIGUEL RIVER	INVASIVE/ALIEN SPECIES-PLANTS	1	1
CO	SAN MIGUEL RIVER	MINING PRACTICES	1	1
CO	SAN MIGUEL RIVER	OVERFISHING/OVERHUNTING	1	1
CO	SAN MIGUEL RIVER	PARASITES/PATHOGENS	1	1
CO	SAN MIGUEL RIVER	RECREATIONAL USE	2	2
CO	SAN MIGUEL RIVER	ROAD/UTILITY CORRIDORS	1	1
CO	SANGRE DE CRISTO MTNS	DEVELOPMENT-COMMERCIAL	2	1
CO	SANGRE DE CRISTO MTNS	DEVELOPMENT-RESIDENTIAL	1	1
CO	SANGRE DE CRISTO MTNS	FIRE MANAGEMENT	2	3
CO	SANGRE DE CRISTO MTNS	GRAZING PRACTICES	2	2
CO	SANGRE DE CRISTO MTNS	GROUNDWATER MANIPULATION	3	3
CO	SANGRE DE CRISTO MTNS	INVASIVE/ALIEN SPECIES-ANIMALS	1	2
CO	SANGRE DE CRISTO MTNS	INVASIVE/ALIEN SPECIES-PLANTS	3	3
CO	SANGRE DE CRISTO MTNS	MGMT OF/FOR CERTAIN SPECIES	2	1
CO	SANGRE DE CRISTO MTNS	MINING PRACTICES	1	1
CO	SANGRE DE CRISTO MTNS	PARASITES/PATHOGENS	1	1
CO	SANGRE DE CRISTO MTNS	RECREATIONAL USE	1	3
CO	SANGRE DE CRISTO MTNS	ROAD/UTILITY CORRIDORS	2	2
CO	SANGRE DE CRISTO MTNS	SMALL POPULATION SIZE AND DISTRIBUTION	1	3
NM	SAPELLO/MORA VALLEYS	DEVELOPMENT-RESIDENTIAL	2	2
NM	SAPELLO/MORA VALLEYS	DITCH,DIKE,DRAIN,DIVERSION	2	1
NM	SAPELLO/MORA VALLEYS	FIRE MANAGEMENT	1	1
NM	SAPELLO/MORA VALLEYS	FORESTRY PRACTICES	1	1
NM	SAPELLO/MORA VALLEYS	GRAZING PRACTICES	2	1
NM	SAPELLO/MORA VALLEYS	ROAD/UTILITY CORRIDORS	2	1
NM	SAPELLO/MORA VALLEYS	WATER QUALITY IMPAIRMENT	2	2
CO	SHARKSTOOTH TRAIL	FIRE MANAGEMENT	3	3
CO	SHARKSTOOTH TRAIL	MINING PRACTICES	1	3
CO , WY	SHELL CREEK	UNKNOWN	0	0
CO , WY	SLATER PARK	FIRE MANAGEMENT	1	1
CO , WY	SLATER PARK	FORESTRY PRACTICES	1	1
CO , WY	SLATER PARK	GRAZING PRACTICES	2	1
CO , WY	SLATER PARK	MGMT OF/FOR CERTAIN SPECIES	1	1
CO , WY	SLATER PARK	RECREATIONAL USE	2	1
CO, WY	SLATER PARK	DAM/RESERVOIR OPERATION	2	2
CO, WY	SLATER PARK	MINING PRACTICES	2	2
CO, WY	SLATER PARK	PARASITES/PATHOGENS	1	1
CO	SLV GREASEWOOD	DAM/RESERVOIR OPERATION	1	2
CO	SLV GREASEWOOD	DEVELOPMENT-RESIDENTIAL	1	2
CO	SLV GREASEWOOD	DITCH,DIKE,DRAIN,DIVERSION	1	1

1 = High
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3 = Low

APPENDIX 17B: SOUTHERN ROCKY MOUNTAINS CONSERVATION AREA THREATS

State	Site Name	Threat	ThreatSeverity	ThreatUrgency
CO	SLV GREASEWOOD	FIRE MANAGEMENT	3	3
CO	SLV GREASEWOOD	GRAZING PRACTICES	2	2
CO	SLV GREASEWOOD	GROUNDWATER MANIPULATION	1	1
CO	SLV GREASEWOOD	INVASIVE/ALIEN SPECIES-ANIMALS	2	2
CO	SLV GREASEWOOD	INVASIVE/ALIEN SPECIES-PLANTS	2	1
CO	SLV GREASEWOOD	MGMT OF/FOR CERTAIN SPECIES	2	2
CO	SLV GREASEWOOD	MINING PRACTICES	2	2
CO	SLV GREASEWOOD	RECREATIONAL USE	2	2
CO	SLV GREASEWOOD	ROAD/UTILITY CORRIDORS	2	2
CO	SNOWMASS CREEK	DEVELOPMENT-RECREATIONAL	2	2
CO	SNOWMASS CREEK	DITCH,DIKE,DRAIN,DIVERSION	2	2
CO	SNOWMASS CREEK	FIRE MANAGEMENT	2	3
CO	SNOWMASS CREEK	INVASIVE/ALIEN SPECIES-ANIMALS	1	2
CO	SNOWMASS CREEK	MGMT OF/FOR CERTAIN SPECIES	1	2
CO	SNOWMASS CREEK	MINING PRACTICES	2	3
CO	SNOWMASS CREEK	PARASITES/PATHOGENS	1	1
CO	SNOWMASS CREEK	RECREATIONAL USE	2	2
CO	SNOWMASS CREEK	TRAILS	2	2
WY	SNOWY RANGE	PARASITES/PATHOGENS	1	1
CO	SOUTH ARKANSAS RIVER	DAM/RESERVOIR OPERATION	2	2
CO	SOUTH ARKANSAS RIVER	FIRE MANAGEMENT	2	2
CO	SOUTH ARKANSAS RIVER	FORESTRY PRACTICES	2	2
CO	SOUTH ARKANSAS RIVER	MGMT OF/FOR CERTAIN SPECIES	1	2
CO	SOUTH ARKANSAS RIVER	MINING PRACTICES	2	2
CO	SOUTH ARKANSAS RIVER	PARASITES/PATHOGENS	1	1
CO	SOUTH ARKANSAS RIVER	RECREATIONAL USE	3	2
CO	SOUTH ARKANSAS RIVER	RECREATIONAL VEHICLES	2	1
CO	SOUTH CAMERON PASS	DEVELOPMENT-RESIDENTIAL	1	1
CO	SOUTH CAMERON PASS	DITCH,DIKE,DRAIN,DIVERSION	2	3
CO	SOUTH CAMERON PASS	FIRE MANAGEMENT	2	2
CO	SOUTH CAMERON PASS	GRAZING PRACTICES	3	2
CO	SOUTH CAMERON PASS	PARASITES/PATHOGENS	1	1
CO	SOUTH CAMERON PASS	RECREATIONAL USE	2	2
CO	SOUTH CAMERON PASS	ROAD/UTILITY CORRIDORS	2	2
CO	SOUTH CAMERON PASS	TRAILS	2	2
WY	SOUTH COTTONWOOD CREEK	UNKNOWN	0	0
WY	SOUTH FORK BEAR CREEK	DAM/RESERVOIR OPERATION	2	2
WY	SOUTH FORK BEAR CREEK	UNKNOWN	0	0
CO	SOUTH PARK	DAM/RESERVOIR OPERATION	2	2
CO	SOUTH PARK	DEVELOPMENT-RESIDENTIAL	1	1
CO	SOUTH PARK	DITCH,DIKE,DRAIN,DIVERSION	1	2
CO	SOUTH PARK	FIRE MANAGEMENT	3	3
CO	SOUTH PARK	GRAZING PRACTICES	2	2
CO	SOUTH PARK	GROUNDWATER MANIPULATION	2	3
CO	SOUTH PARK	MINING PRACTICES	1	1
CO	SOUTH PARK	RECREATIONAL USE	2	3
CO	SOUTH SAN JUAN	DEVELOPMENT-RESIDENTIAL	2	2
CO	SOUTH SAN JUAN	FIRE MANAGEMENT	2	3
CO	SOUTH SAN JUAN	FORESTRY PRACTICES	2	2
CO	SOUTH SAN JUAN	GRAZING PRACTICES	2	2
CO	SOUTH SAN JUAN	INVASIVE/ALIEN SPECIES-ANIMALS	1	1
CO	SOUTH SAN JUAN	INVASIVE/ALIEN SPECIES-PLANTS	2	2
CO	SOUTH SAN JUAN	MGMT OF/FOR CERTAIN SPECIES	2	2
CO	SOUTH SAN JUAN	MINING PRACTICES	2	3
CO	SOUTH SAN JUAN	PARASITES/PATHOGENS	1	1
CO	SOUTH SAN JUAN	RECREATIONAL USE	2	2
CO	SOUTH SAN JUAN	ROAD/UTILITY CORRIDORS	2	2
NM	SOUTHERN SANGRE DE CRISTO MOUNTAINS	CHANNELIZATION	2	1
NM	SOUTHERN SANGRE DE CRISTO MOUNTAINS	DAM/RESERVOIR OPERATION	2	1
NM	SOUTHERN SANGRE DE CRISTO MOUNTAINS	DEVELOPMENT-RECREATIONAL	2	2
NM	SOUTHERN SANGRE DE CRISTO MOUNTAINS	DEVELOPMENT-RESIDENTIAL	1	1
NM	SOUTHERN SANGRE DE CRISTO MOUNTAINS	DITCH,DIKE,DRAIN,DIVERSION	1	1
NM	SOUTHERN SANGRE DE CRISTO MOUNTAINS	FIRE MANAGEMENT	1	1
NM	SOUTHERN SANGRE DE CRISTO MOUNTAINS	FORESTRY PRACTICES	1	1
NM	SOUTHERN SANGRE DE CRISTO MOUNTAINS	GRAZING PRACTICES	2	1
NM	SOUTHERN SANGRE DE CRISTO MOUNTAINS	INVASIVE/ALIEN SPECIES-ANIMALS	2	1

1 = High
2 = Medium
3 = Low

APPENDIX 17B: SOUTHERN ROCKY MOUNTAINS CONSERVATION AREA THREATS

State	Site Name	Threat	ThreatSeverity	ThreatUrgency
NM	SOUTHERN SANGRE DE CRISTO MOUNTAINS	INVASIVE/ALIEN SPECIES-PLANTS	2	1
NM	SOUTHERN SANGRE DE CRISTO MOUNTAINS	MINING PRACTICES	1	1
NM	SOUTHERN SANGRE DE CRISTO MOUNTAINS	RECREATIONAL USE	3	1
NM	SOUTHERN SANGRE DE CRISTO MOUNTAINS	ROAD/UTILITY CORRIDORS	2	1
NM	SOUTHERN SANGRE DE CRISTO MOUNTAINS	SMALL POPULATION SIZE AND DISTRIBUTION	1	1
NM	SOUTHERN SANGRE DE CRISTO MOUNTAINS	TRAILS	3	1
NM	SOUTHERN SANGRE DE CRISTO MOUNTAINS	WATER QUALITY IMPAIRMENT	2	2
CO	SQUAW CREEK	DAM/RESERVOIR OPERATION	2	2
CO	SQUAW CREEK	FIRE MANAGEMENT	3	3
CO	SQUAW CREEK	RECREATIONAL USE	3	2
CO , WY	SQUIRREL CREEK	PARASITES/PATHOGENS	1	1
CO, WY	SQUIRREL CREEK	DAM/RESERVOIR OPERATION	2	2
CO	ST CHARLES RIVER	DEVELOPMENT-COMMERCIAL	1	1
CO	ST CHARLES RIVER	DEVELOPMENT-RESIDENTIAL	1	1
CO	ST CHARLES RIVER	FIRE MANAGEMENT	1	2
CO	ST CHARLES RIVER	FORESTRY PRACTICES	2	1
CO	ST CHARLES RIVER	RECREATIONAL USE	1	2
NM	TAOS PUEBLO	CONVERSION TO AGRICULTURE	2	2
NM	TAOS PUEBLO	DEVELOPMENT-RESIDENTIAL	2	2
NM	TAOS PUEBLO	FIRE MANAGEMENT	1	1
CO	TIPPERARY CREEK	UNKNOWN	0	0
CO	TOMICHI CREEK	UNKNOWN	0	0
CO	TRICKLE MOUNTAIN	DEVELOPMENT-RESIDENTIAL	1	2
CO	TRICKLE MOUNTAIN	DITCH,DIKE,DRAIN,DIVERSION	2	2
CO	TRICKLE MOUNTAIN	FIRE MANAGEMENT	2	3
CO	TRICKLE MOUNTAIN	FORESTRY PRACTICES	2	3
CO	TRICKLE MOUNTAIN	GRAZING PRACTICES	2	1
CO	TRICKLE MOUNTAIN	INVASIVE/ALIEN SPECIES-ANIMALS	1	1
CO	TRICKLE MOUNTAIN	INVASIVE/ALIEN SPECIES-PLANTS	2	3
CO	TRICKLE MOUNTAIN	MGMT OF/FOR CERTAIN SPECIES	1	2
CO	TRICKLE MOUNTAIN	MINING PRACTICES	1	3
CO	TRICKLE MOUNTAIN	PARASITES/PATHOGENS	1	1
CO	TRICKLE MOUNTAIN	RECREATIONAL USE	2	2
CO	TRICKLE MOUNTAIN	RECREATIONAL VEHICLES	2	1
CO	TRICKLE MOUNTAIN	ROAD/UTILITY CORRIDORS	2	2
CO	TRICKLE MOUNTAIN	WATER QUALITY IMPAIRMENT	2	2
CO	TROUBLESOME CREEK	DAM/RESERVOIR OPERATION	2	2
CO	TROUBLESOME CREEK	FIRE MANAGEMENT	2	2
CO	TROUBLESOME CREEK	FORESTRY PRACTICES	2	3
CO	TROUBLESOME CREEK	MINING PRACTICES	2	2
CO	TROUBLESOME CREEK	ROAD/UTILITY CORRIDORS	1	2
CO	TROUBLESOME HEADWATERS	DAM/RESERVOIR OPERATION	2	2
CO	TROUBLESOME HEADWATERS	FIRE MANAGEMENT	3	3
CO	TROUBLESOME HEADWATERS	FORESTRY PRACTICES	2	2
CO	TROUBLESOME HEADWATERS	MGMT OF/FOR CERTAIN SPECIES	1	2
CO	TROUBLESOME HEADWATERS	MINING PRACTICES	2	2
CO	TROUBLESOME HEADWATERS	PARASITES/PATHOGENS	1	1
CO	TROUBLESOME HEADWATERS	RECREATIONAL VEHICLES	2	2
CO	TROUBLESOME HEADWATERS	ROAD/UTILITY CORRIDORS	2	2
WY	TURTLE ROCK	DAM/RESERVOIR OPERATION	2	2
WY	TURTLE ROCK	DEVELOPMENT-RESIDENTIAL	1	1
WY	TURTLE ROCK	FIRE MANAGEMENT	2	1
WY	TURTLE ROCK	GRAZING PRACTICES	2	2
WY	TURTLE ROCK	GROUNDWATER MANIPULATION	2	2
WY	TURTLE ROCK	RECREATIONAL USE	2	2
WY	TURTLE ROCK	ROAD/UTILITY CORRIDORS	2	2
CO	UNAWEEP	DAM/RESERVOIR OPERATION	2	2
CO	UNAWEEP	DEVELOPMENT-RESIDENTIAL	1	1
CO	UNAWEEP	FIRE MANAGEMENT	2	2
CO	UNAWEEP	GRAZING PRACTICES	2	1
CO	UNAWEEP	INVASIVE/ALIEN SPECIES-PLANTS	1	1
CO	UNAWEEP	MINING PRACTICES	1	1
CO	UNAWEEP	POACHING OR COMMERCIAL COLLECTING	2	2
CO	UNAWEEP	RECREATIONAL USE	2	2
CO	UNAWEEP	ROAD/UTILITY CORRIDORS	2	1
CO	UNAWEEP	ROAD/UTILITY CORRIDORS	2	2
CO	UNCOMPAGHRE / RED CLOUD	DEVELOPMENT-RESIDENTIAL	1	2

1 = High
2 = Medium
3 = Low

APPENDIX 17B: SOUTHERN ROCKY MOUNTAINS CONSERVATION AREA THREATS

State	Site Name	Threat	ThreatSeverity	ThreatUrgency
CO	UNCOMPAGHRE / RED CLOUD	DITCH,DIKE,DRAIN,DIVERSION	2	2
CO	UNCOMPAGHRE / RED CLOUD	FIRE MANAGEMENT	1	1
CO	UNCOMPAGHRE / RED CLOUD	INVASIVE/ALIEN SPECIES-PLANTS	2	2
CO	UNCOMPAGHRE / RED CLOUD	MGMT OF/FOR CERTAIN SPECIES	2	1
CO	UNCOMPAGHRE / RED CLOUD	MINING PRACTICES	1	2
CO	UNCOMPAGHRE / RED CLOUD	OVERFISHING/OVERHUNTING	2	1
CO	UNCOMPAGHRE / RED CLOUD	PARASITES/PATHOGENS	1	1
CO	UNCOMPAGHRE / RED CLOUD	RECREATIONAL USE	2	1
CO	UNCOMPAGHRE / RED CLOUD	RECREATIONAL VEHICLES	2	2
CO	UNCOMPAGHRE / RED CLOUD	SMALL POPULATION SIZE AND DISTRIBUTION	2	3
CO	UPPER SAN LUIS VALLEY	DEVELOPMENT-RESIDENTIAL	1	1
CO	UPPER SAN LUIS VALLEY	DITCH,DIKE,DRAIN,DIVERSION	1	2
CO	UPPER SAN LUIS VALLEY	FIRE MANAGEMENT	2	2
CO	UPPER SAN LUIS VALLEY	GRAZING PRACTICES	2	2
CO	UPPER SAN LUIS VALLEY	INVASIVE/ALIEN SPECIES-ANIMALS	1	2
CO	UPPER SAN LUIS VALLEY	INVASIVE/ALIEN SPECIES-PLANTS	2	3
CO	UPPER SAN LUIS VALLEY	MGMT OF/FOR CERTAIN SPECIES	2	1
CO	UPPER SAN LUIS VALLEY	MINING PRACTICES	1	1
CO	UPPER SAN LUIS VALLEY	RECREATIONAL USE	2	2
CO	UPPER SAN LUIS VALLEY	RECREATIONAL VEHICLES	3	3
CO	UPPER SAN LUIS VALLEY	ROAD/UTILITY CORRIDORS	2	1
CO	UPPER SAN LUIS VALLEY	SMALL POPULATION SIZE AND DISTRIBUTION	1	3
CO	UPPER SAN LUIS VALLEY	WATER QUALITY IMPAIRMENT	2	2
CO	UTE TRAIL	FIRE MANAGEMENT	3	3
CO , NM	VERMEJO PARK/LOWER PURGATOIRE	DAM/RESERVOIR OPERATION	2	2
CO , NM	VERMEJO PARK/LOWER PURGATOIRE	DEVELOPMENT-RESIDENTIAL	2	1
CO , NM	VERMEJO PARK/LOWER PURGATOIRE	FIRE MANAGEMENT	1	1
CO , NM	VERMEJO PARK/LOWER PURGATOIRE	FORESTRY PRACTICES	2	1
CO , NM	VERMEJO PARK/LOWER PURGATOIRE	GRAZING PRACTICES	2	1
CO , NM	VERMEJO PARK/LOWER PURGATOIRE	INVASIVE/ALIEN SPECIES-PLANTS	2	2
CO , NM	VERMEJO PARK/LOWER PURGATOIRE	MGMT OF/FOR CERTAIN SPECIES	3	1
CO , NM	VERMEJO PARK/LOWER PURGATOIRE	MINING PRACTICES	1	1
CO , NM	VERMEJO PARK/LOWER PURGATOIRE	OIL OR GAS DRILLING	1	2
CO , NM	VERMEJO PARK/LOWER PURGATOIRE	OVERFISHING/OVERHUNTING	2	1
CO , NM	VERMEJO PARK/LOWER PURGATOIRE	PARASITES/PATHOGENS	1	1
CO , NM	VERMEJO PARK/LOWER PURGATOIRE	RECREATIONAL USE	2	2
CO , NM	VERMEJO PARK/LOWER PURGATOIRE	ROAD/UTILITY CORRIDORS	2	1
CO , NM	VERMEJO PARK/LOWER PURGATOIRE	WATER QUALITY IMPAIRMENT	2	2
WY	WALLROCK CREEK	MINING PRACTICES	2	2
CO	WEST DALLAS CREEK	DAM/RESERVOIR OPERATION	2	2
CO	WEST DALLAS CREEK	DEVELOPMENT-RESIDENTIAL	3	3
CO	WEST DALLAS CREEK	FIRE MANAGEMENT	2	3
CO	WEST DALLAS CREEK	GRAZING PRACTICES	2	2
CO	WEST DALLAS CREEK	INVASIVE/ALIEN SPECIES-PLANTS	2	2
CO	WEST DALLAS CREEK	MINING PRACTICES	3	3
CO	WEST DALLAS CREEK	RECREATIONAL USE	2	3
CO	WEST DALLAS CREEK	RECREATIONAL VEHICLES	2	2
CO	WEST LAKE CREEK	FIRE MANAGEMENT	3	3
CO	WEST LAKE CREEK	INVASIVE/ALIEN SPECIES-PLANTS	2	2
CO	WEST LAKE CREEK	MGMT OF/FOR CERTAIN SPECIES	2	1
CO	WEST LAKE CREEK	MINING PRACTICES	3	3
CO	WEST LAKE CREEK	RECREATIONAL USE	2	2
CO	WEST LAKE CREEK	PARASITES/PATHOGENS	1	1
CO	WOLF CREEK	DAM/RESERVOIR OPERATION	2	2
CO	WOLF CREEK	DEVELOPMENT-RECREATIONAL	2	3
CO	WOLF CREEK	FIRE MANAGEMENT	2	2
CO	WOLF CREEK	INVASIVE/ALIEN SPECIES-PLANTS	2	2
CO	WOLF CREEK	MGMT OF/FOR CERTAIN SPECIES	2	1
CO	WOLF CREEK	PARASITES/PATHOGENS	1	1
CO	WOLF CREEK	RECREATIONAL USE	2	2
CO	WOLF CREEK	ROAD/UTILITY CORRIDORS	2	1
CO	WOODY CREEK HEADWATERS	CROP PRACTICES	2	2
CO	WOODY CREEK HEADWATERS	DEVELOPMENT-RESIDENTIAL	1	1
CO	WOODY CREEK HEADWATERS	DITCH,DIKE,DRAIN,DIVERSION	1	2
CO	WOODY CREEK HEADWATERS	FIRE MANAGEMENT	2	2
CO	WOODY CREEK HEADWATERS	INVASIVE/ALIEN SPECIES-ANIMALS	1	1
CO	WOODY CREEK HEADWATERS	INVASIVE/ALIEN SPECIES-PLANTS	2	2
CO	WOODY CREEK HEADWATERS	MGMT OF/FOR CERTAIN SPECIES	2	1
CO	WOODY CREEK HEADWATERS	MINING PRACTICES	1	3
CO	WOODY CREEK HEADWATERS	RECREATIONAL USE	2	2
CO	WOODY CREEK HEADWATERS	TRAILS	2	2
CO	WOODY CREEK HEADWATERS	PARASITES/PATHOGENS	1	1
CO	YAMPA RIVER	CONVERSION TO AGRICULTURE	2	3

1 = High
2 = Medium
3 = Low

APPENDIX 17B: SOUTHERN ROCKY MOUNTAINS CONSERVATION AREA THREATS

State	Site Name	Threat	ThreatSeverity	ThreatUrgency
CO	YAMPA RIVER	CROP PRACTICES	2	1
CO	YAMPA RIVER	DAM/RESERVOIR OPERATION	3	2
CO	YAMPA RIVER	DEVELOPMENT-COMMERCIAL	1	2
CO	YAMPA RIVER	DEVELOPMENT-RESIDENTIAL	1	1
CO	YAMPA RIVER	DITCH,DIKE,DRAIN,DIVERSION	2	1
CO	YAMPA RIVER	FIRE MANAGEMENT	2	2
CO	YAMPA RIVER	MINING PRACTICES	1	1
CO	YAMPA RIVER	RECREATIONAL USE	2	2
CO	YAMPA RIVER	STREAMBANK STABILIZATION	2	2

1 = High
2 = Medium
3 = Low

APPENDIX 18: SOUTHERN ROCKY MOUNTAINS ACTIVITY LEVEL EVALUATION WORKSHEET

Site #	Site Name	State	Conservation Value - Uniqueness			Conservation Value - Landscape Integrity			Threat - Urgency			Threat - Severity			Total Score	Activity Level
			Raw Score	Weight	Final Score	Raw Score	Weight	Final Score	Raw Score	Weight	Final Score	Raw Score	Weight	Final Score		
1	Agua Caliente	NM	2	2	4	3	1	3	2.0	2	4.0	2.0	1	2.0	13.0	**MED**
2	Animas River	CO	2	2	4	2	1	2	1.8	2	3.6	2.1	1	2.1	11.7	**MED**
3	Archuleta Creek	CO	3	2	6	1	1	1	2.0	2	4.0	2.0	1	2.0	13.0	**MED**
4	Baldy Chato	CO	2	2	4	2	1	2	2.5	2	5.0	3.0	1	3.0	14.0	**MED**
5	Baldy Cinco	CO	2	2	4	1	1	1	2.5	2	5.0	3.0	1	3.0	13.0	**MED**
6	Beaton Creek East	CO	3	2	6	3	1	3	2.0	2	4.0	1.5	1	1.5	14.5	**LOW**
7	Beaver Creek - Lone Cone	CO	3	2	6	3	1	3	2.0	2	4.0	2.0	1	2.0	15.0	**LOW**
8	Bennett Creek - South	CO	3	2	6	2	1	2	2.8	2	5.6	2.3	1	2.3	15.9	**LOW**
9	Berthoud Pass	CO	2	2	4	2	1	2	1.6	2	3.2	2.0	1	2.0	11.2	**HIGH**
10	Big Dominguez River	CO	3	2	6	1	1	1	2.1	2	4.2	1.7	1	1.7	12.9	**MED**
11	Billy Creek Uplands	CO	3	2	6	2	1	2	1.6	2	3.2	1.6	1	1.6	12.8	**MED**
12	Black Mountain	CO	3	2	6	2	1	2	1.5	2	3.0	2.5	1	2.5	13.5	**MED**
13	Box Elder Creek	WY	3	2	6	2	1	2	1.7	2	3.4	1.7	1	1.7	13.1	**MED**
14	Brush Creek at Cannibal Point	CO	3	2	6	1	1	1	1.7	2	3.4	2.3	1	2.3	12.7	**MED**
15	Burning Mountain	CO	3	2	6	1	1	1	2.0	2	4.0	2.0	1	2.0	13.0	**MED**
16	Butler Creek	CO	3	2	6	2	1	2	1.3	2	2.6	2.0	1	2.0	12.6	**MED**
17	Butterfly Haven	CO	3	2	6	3	1	3	1.2	2	2.4	1.4	1	1.4	12.8	**MED**
18	Canyon Largo	NM	3	2	6	1	1	1	2.0	2	4.0	2.0	1	2.0	13.0	**MED**
19	Carnero Creek	CO	2	2	4	2	1	2	1.9	2	3.8	2.0	1	2.0	11.8	**MED**
20	Castle Peak	CO	2	2	4	2	1	2	2.3	2	4.6	2.1	1	2.1	12.7	**MED**
21	Cattle Creek	CO	3	2	6	1	1	1	2.0	2	4.0	1.3	1	1.3	12.3	**MED**
22	Chacon Canyon	NM	3	2	6	1	1	1	3.0	2	6.0	3.0	1	3.0	16.0	**LOW**
23	Cheesman	CO	2	2	4	2	1	2	1.7	2	3.4	1.8	1	1.8	11.2	**HIGH**
24	Cimarron River	CO	3	2	6	2	1	2	1.7	2	3.4	2.0	1	2.0	13.4	**MED**
25	Colona Mountain	CO	3	2	6	3	1	3	2.0	2	4.0	2.0	1	2.0	15.0	**LOW**
26	Conejos River	CO, NM	3	2	6	2	1	2	1.2	2	2.4	1.8	1	1.8	12.2	**MED**
27	Conundrum	CO	2	2	4	2	1	2	2.0	2	4.0	1.9	1	1.9	11.9	**MED**
28	Corral Creek	WY	3	2	6	1	1	1	1.7	2	3.4	2.0	1	2.0	12.4	**MED**
29	Cottonwood Crk S San Juans	CO	2	2	4	2	1	2	2.0	2	4.0	1.8	1	1.8	11.8	**MED**
30	Cottonwood Pass	CO	2	2	4	2	1	2	2.2	2	4.4	2.0	1	2.0	12.4	**MED**
31	Coyote Creek	NM	2	2	4	2	1	2	1.0	2	2.0	1.5	1	1.5	9.5	**HIGH**
32	Crested Butte	CO	2	2	4	2	1	2	1.7	2	3.4	1.9	1	1.9	11.3	**HIGH**
33	Cross and Fall Creeks	CO	2	2	4	1	1	1	2.1	2	4.2	2.1	1	2.1	11.3	**HIGH**
34	Crown	CO	2	2	4	3	1	3	1.9	2	3.8	1.7	1	1.7	12.5	**MED**
35	Crystal Lake Creek	CO	3	2	6	1	1	1	2.0	2	4.0	2.5	1	2.5	13.5	**MED**
36	Culebra Range	CO, NM	1	2	2	2	1	2	1.7	2	3.4	1.8	1	1.8	9.2	**HIGH**

APPENDIX 18: SOUTHERN ROCKY MOUNTAINS ACTIVITY LEVEL EVALUATION WORKSHEET

Site #	Site Name	State	Conservation Value - Uniqueness			Conservation Value - Landscape Integrity			Threat - Urgency			Threat - Severity			Total Score	Activity Level
			Raw Score	Weight	Final Score	Raw Score	Weight	Final Score	Raw Score	Weight	Final Score	Raw Score	Weight	Final Score		
37	Cumbres Pass link	CO	3	2	6	1	1	1	1.3	2	2.6	2.3	1	2.3	11.9	**MED**
38	Dark Canyon	CO	2	2	4	3	1	3	2.0	2	4.0	1.8	1	1.8	12.8	**MED**
39	Dawson Draw Canyon East	CO	3	2	6	3	1	3	2.0	2	4.0	2.0	1	2.0	15.0	**LOW**
40	Death Valley Creek	CO	3	2	6	1	1	1	3.0	2	6.0	3.0	1	3.0	16.0	**LOW**
41	Debeque Canyon	CO	3	2	6	2	1	2	2.0	2	4.0	1.8	1	1.8	13.8	**MED**
42	Debeque South	CO	2	2	4	3	1	3	2.3	2	4.6	2.1	1	2.1	13.7	**MED**
43	Dry Laramie River	WY	3	2	6	1	1	1	2.0	2	4.0	1.5	1	1.5	12.5	**MED**
44	Eagle River at Gypsum	CO	2	2	4	3	1	3	1.8	2	3.6	1.6	1	1.6	12.2	**MED**
45	East Divide Creek	CO	3	2	6	3	1	3	3.0	2	6.0	3.0	1	3.0	18.0	**LOW**
46	East Mancos River	CO	3	2	6	3	1	3	3.0	2	6.0	2.0	1	2.0	17.0	**LOW**
47	East Rifle Creek	CO	3	2	6	2	1	2	2.0	2	4.0	2.0	1	2.0	14.0	**MED**
48	Elk Ridge	CO	3	2	6	2	1	2	2.3	2	4.6	2.3	1	2.3	14.9	**LOW**
49	Endlich Mesa Basin	CO	3	2	6	1	1	1	2.0	2	4.0	2.5	1	2.5	13.5	**MED**
50	Escalante River	CO	3	2	6	1	1	1	2.5	2	5.0	2.0	1	2.0	14.0	**MED**
51	Estes Park	CO	1	2	2	2	1	2	1.4	2	2.8	1.8	1	1.8	8.6	**HIGH**
52	Fall Creek	CO	3	2	6	1	1	1	2.0	2	4.0	2.0	1	2.0	13.0	**MED**
53	Flat Tops	CO	2	2	4	1	1	1	2.0	2	4.0	1.7	1	1.7	10.7	**HIGH**
54	Florida Creek	CO	3	2	6	3	1	3	2.0	2	4.0	2.0	1	2.0	15.0	**LOW**
55	Forbes/Sheep Mountain	WY	3	2	6	1	1	1	1.5	2	3.0	2.0	1	2.0	12.0	**MED**
56	Fossil Ridge	CO	3	2	6	2	1	2	1.5	2	3.0	2.5	1	2.5	13.5	**MED**
57	Fryingpan River	CO	3	2	6	1	1	1	2.0	2	4.0	1.8	1	1.8	12.8	**MED**
58	Garden Park	CO	2	2	4	2	1	2	2.2	2	4.4	1.8	1	1.8	12.2	**MED**
59	Glenwood Canyon	CO	2	2	4	1	1	1	1.6	2	3.2	1.6	1	1.6	9.8	**HIGH**
60	Golden Gate Canyon	CO	2	2	4	3	1	3	1.5	2	3.0	1.6	1	1.6	11.6	**MED**
61	Gore Range	CO	2	2	4	2	1	2	2.1	2	4.2	2.1	1	2.1	12.3	**MED**
62	Gray Mountain	CO	2	2	4	2	1	2	2.5	2	5.0	2.5	1	2.5	13.5	**MED**
63	Grays/Torrey	CO	2	2	4	3	1	3	1.6	2	3.2	1.7	1	1.7	11.9	**MED**
64	Great Sand Dunes/San Luis Lakes	CO	1	2	2	2	1	2	1.9	2	3.8	1.8	1	1.8	9.6	**HIGH**
65	Green Mountain	CO	3	2	6	2	1	2	1.8	2	3.6	2.1	1	2.1	13.7	**MED**
66	Greenhorn Mountain	CO	2	2	4	2	1	2	1.4	2	2.8	1.4	1	1.4	10.2	**HIGH**
67	Greenie Mountain	CO	3	2	6	3	1	3	1.6	2	3.2	1.4	1	1.4	13.6	**MED**
68	Grizzly Peak	CO	3	2	6	1	1	1	2.0	2	4.0	3.0	1	3.0	14.0	**MED**
69	Guanella	CO	2	2	4	2	1	2	1.9	2	3.8	2.0	1	2.0	11.8	**MED**
70	Gunnison Basin	CO	1	2	2	3	1	3	1.9	2	3.8	1.8	1	1.8	10.6	**HIGH**
71	Harden Creek	WY	2	2	4	3	1	3	1.0	2	2.0	1.0	1	1.0	10.0	**HIGH**
72	Hardscrabble	CO	3	2	6	2	1	2	2.4	2	4.8	2.4	1	2.4	15.2	**LOW**

APPENDIX 18: SOUTHERN ROCKY MOUNTAINS ACTIVITY LEVEL EVALUATION WORKSHEET

Site #	Site Name	State	Conservation Value - Uniqueness			Conservation Value - Landscape Integrity			Threat - Urgency			Threat - Severity			Total Score	Activity Level
			Raw Score	Weight	Final Score	Raw Score	Weight	Final Score	Raw Score	Weight	Final Score	Raw Score	Weight	Final Score		
73	Hermit Park	CO	3	2	6	3	1	3	1.0	2	2.0	2.0	1	2.0	13.0	**MED**
74	Highway Spring	CO	3	2	6	3	1	3	2.3	2	4.6	2.7	1	2.7	16.3	**LOW**
75	Hondo Creek, Rito	CO	3	2	6	2	1	2	3.0	2	6.0	3.0	1	3.0	17.0	**LOW**
76	Horseshoe Creek	WY	2	2	4	1	1	1	1.0	2	2.0	1.0	1	1.0	8.0	**HIGH**
77	Huerfano Grasslands	CO	3	2	6	1	1	1	2.3	2	4.6	2.3	1	2.3	13.9	**MED**
78	Hunter	CO	3	2	6	1	1	1	2.3	2	4.6	2.0	1	2.0	13.6	**MED**
79	Huston Park	WY	2	2	4	2	1	2	1.4	2	2.8	2.0	1	2.0	10.8	**HIGH**
80	Iron Creek	WY	3	2	6	3	1	3	3.0	2	6.0	3.0	1	3.0	18.0	**LOW**
81	Jemez Canyon Reservoir	NM	3	2	6	2	1	2	1.2	2	2.4	1.8	1	1.8	12.2	**MED**
82	Jemez Mountains	NM	1	2	2	3	1	3	1.5	2	3.0	1.7	1	1.7	9.7	**HIGH**
83	Kenosha	CO	3	2	6	2	1	2	2.1	2	4.2	2.3	1	2.3	14.5	**LOW**
84	La Bonte Creek	WY	3	2	6	3	1	3	1.5	2	3.0	1.5	1	1.5	13.5	**MED**
85	La Garita	CO	2	2	4	2	1	2	1.9	2	3.8	1.9	1	1.9	11.7	**MED**
86	La Veta Pass link	CO	3	2	6	2	1	2	2.0	2	4.0	2.0	1	2.0	14.0	**MED**
87	Laramie Foothills	CO, WY	1	2	2	2	1	2	1.4	2	2.8	1.6	1	1.6	8.4	**HIGH**
88	Laramie River	CO, WY	2	2	4	2	1	2	1.3	2	2.6	2.0	1	2.0	10.6	**HIGH**
89	Lawhead Gulch	CO	3	2	6	1	1	1	1.8	2	3.6	1.9	1	1.9	12.5	**MED**
90	Lion Creek	CO	3	2	6	1	1	1	3.0	2	6.0	3.0	1	3.0	16.0	**LOW**
91	Little Coal Creek	CO	3	2	6	1	1	1	1.4	2	2.8	1.8	1	1.8	11.6	**MED**
92	Lizard Head	CO	2	2	4	2	1	2	1.8	2	3.6	2.3	1	2.3	11.9	**MED**
93	Long Gulch	CO	2	2	4	3	1	3	2.3	2	4.6	2.3	1	2.3	13.9	**MED**
94	Lower Dolores River	CO	3	2	6	3	1	3	2.5	2	5.0	2.5	1	2.5	16.5	**LOW**
95	Lower Poudre	CO	2	2	4	3	1	3	1.8	2	3.6	1.6	1	1.6	12.2	**MED**
96	Lynx Link B	CO, WY	3	2	6	2	1	2	1.0	2	2.0	1.0	1	1.0	11.0	**HIGH**
97	Lynx links 3	CO	3	2	6	2	1	2	2.0	2	4.0	2.0	1	2.0	14.0	**MED**
98	Marten Link A	CO	3	2	6	2	1	2	2.5	2	5.0	2.3	1	2.3	15.3	**LOW**
99	McClure Pass	CO	2	2	4	2	1	2	1.9	2	3.8	2.0	1	2.0	11.8	**MED**
100	Middle Arkansas River	CO	2	2	4	2	1	2	1.7	2	3.4	1.7	1	1.7	11.1	**HIGH**
101	Middle Fork Powderhorn Creek	CO	3	2	6	1	1	1	3.0	2	6.0	3.0	1	3.0	16.0	**LOW**
102	Mill Creek	WY	2	2	4	3	1	3	1.0	2	2.0	1.0	1	1.0	10.0	**HIGH**
103	Montezuma Creek	CO	2	2	4	2	1	2	2.3	2	4.6	2.0	1	2.0	12.6	**MED**
104	Morrison Creek	CO	2	2	4	2	1	2	1.3	2	2.6	1.3	1	1.3	9.9	**HIGH**
105	Mosquito Range	CO	1	2	2	2	1	2	1.8	2	3.6	1.8	1	1.8	9.4	**HIGH**
106	Mount Callahan	CO	1	2	2	2	1	2	2.2	2	4.4	1.8	1	1.8	10.2	**HIGH**
107	Mount Falcon North	CO	3	2	6	3	1	3	1.8	2	3.6	2.3	1	2.3	14.9	**LOW**
108	Mount Massive	CO	3	2	6	1	1	1	2.5	2	5.0	2.5	1	2.5	14.5	**LOW**

APPENDIX 18: SOUTHERN ROCKY MOUNTAINS ACTIVITY LEVEL EVALUATION WORKSHEET

Site #	Site Name	State	Conservation Value - Uniqueness			Conservation Value - Landscape Integrity			Threat - Urgency			Threat - Severity			Total Score	Activity Level
			Raw Score	Weight	Final Score	Raw Score	Weight	Final Score	Raw Score	Weight	Final Score	Raw Score	Weight	Final Score		
109	Mount Zirkel	CO, WY	1	2	2	2	1	2	1.4	2	2.8	1.6	1	1.6	8.4	**HIGH**
110	Muddy Creek	CO	2	2	4	3	1	3	2.2	2	4.4	1.8	1	1.8	13.2	**MED**
111	Mule Creek	WY	3	2	6	1	1	1	3.0	2	6.0	3.0	1	3.0	16.0	**LOW**
112	Naturita Creek	CO	2	2	4	3	1	3	2.0	2	4.0	2.0	1	2.0	13.0	**MED**
113	North Boulder Creek	CO	3	2	6	3	1	3	1.6	2	3.2	1.5	1	1.5	13.7	**MED**
114	North Cameron Pass	CO	1	2	2	2	1	2	1.9	2	3.8	1.7	1	1.7	9.5	**HIGH**
115	North Laramie River	WY	3	2	6	2	1	2	2.0	2	4.0	2.0	1	2.0	14.0	**MED**
116	North Park	CO	2	2	4	2	1	2	1.9	2	3.8	2.0	1	2.0	11.8	**MED**
117	North Park Sand Dunes	CO	2	2	4	2	1	2	1.0	2	2.0	1.0	1	1.0	9.0	**HIGH**
118	North Platte River	WY	3	2	6	1	1	1	1.5	2	3.0	1.5	1	1.5	11.5	**MED**
119	North St Vrain	CO	1	2	2	2	1	2	1.8	2	3.6	1.6	1	1.6	9.2	**HIGH**
120	Oak Ridge	CO	3	2	6	3	1	3	3.0	2	6.0	3.0	1	3.0	18.0	**LOW**
121	Ojo Caliente	NM	2	2	4	3	1	3	1.4	2	2.8	1.6	1	1.6	11.4	**MED**
122	Ouray	CO	2	2	4	3	1	3	1.9	2	3.8	2.0	1	2.0	12.8	**MED**
123	Pagosa Springs	CO	2	2	4	3	1	3	1.7	2	3.4	1.8	1	1.8	12.2	**MED**
124	Disappointment Valley	CO	3	2	6	1	1	1	2.0	2	4.0	1.8	1	1.8	12.8	**MED**
125	Pass Creek	WY	3	2	6	1	1	1	3.0	2	6.0	3.0	1	3.0	16.0	**LOW**
126	Pennock Mountain	WY	3	2	6	2	1	2	3.0	2	6.0	3.0	1	3.0	17.0	**LOW**
127	Piedra River	CO	2	2	4	1	1	1	2.0	2	4.0	2.0	1	2.0	11.0	**HIGH**
128	Pikes Peak	CO	1	2	2	3	1	3	1.6	2	3.2	1.7	1	1.7	9.9	**HIGH**
129	Platte River	CO, WY	3	2	6	2	1	2	1.3	2	2.6	1.8	1	1.8	12.4	**MED**
130	Pleasant Valley Creek	CO	3	2	6	3	1	3	2.0	2	4.0	2.0	1	2.0	15.0	**LOW**
131	Pryor Creek	CO	3	2	6	2	1	2	1.7	2	3.4	1.6	1	1.6	13.0	**MED**
132	Punche Valley	CO, NM	2	2	4	3	1	3	1.4	2	2.8	1.7	1	1.7	11.5	**MED**
133	Questa	NM	2	2	4	3	1	3	2.0	2	4.0	1.7	1	1.7	12.7	**MED**
134	RaJadero Canyon	CO	2	2	4	2	1	2	1.8	2	3.6	2.0	1	2.0	11.6	**MED**
135	Red & White Mtn	CO	2	2	4	3	1	3	1.8	2	3.6	1.8	1	1.8	12.4	**MED**
136	Red Buttes	WY	3	2	6	2	1	2	3.0	2	6.0	3.0	1	3.0	17.0	**LOW**
137	Rifle Hogback	CO	3	2	6	3	1	3	3.0	2	6.0	2.0	1	2.0	17.0	**LOW**
138	Rifle Reach/Colorado River	CO	1	2	2	3	1	3	1.7	2	3.4	1.8	1	1.8	10.2	**HIGH**
139	Rio Chama	CO, NM	2	2	4	3	1	3	1.4	2	2.8	1.7	1	1.7	11.5	**MED**
140	Rio Grande	CO	2	2	4	2	1	2	2.4	2	4.8	2.0	1	2.0	12.8	**MED**
141	Rio Grande Gorge	NM	2	2	4	3	1	3	2.0	2	4.0	2.0	1	2.0	13.0	**MED**
142	Rio Grande Pyramid	CO	2	2	4	1	1	1	2.3	2	4.6	2.7	1	2.7	12.3	**MED**
143	Rio Hondo	NM	3	2	6	2	1	2	1.2	2	2.4	1.6	1	1.6	12.0	**MED**
144	Roan Cliffs	CO	1	2	2	2	1	2	1.9	2	3.8	1.7	1	1.7	9.5	**HIGH**

APPENDIX 18: SOUTHERN ROCKY MOUNTAINS ACTIVITY LEVEL EVALUATION WORKSHEET

Site #	Site Name	State	Conservation Value - Uniqueness			Conservation Value - Landscape Integrity			Threat - Urgency			Threat - Severity			Total Score	Activity Level
			Raw Score	Weight	Final Score	Raw Score	Weight	Final Score	Raw Score	Weight	Final Score	Raw Score	Weight	Final Score		
145	Rock Mountain	WY	3	2	6	2	1	2	3.0	2	6.0	3.0	1	3.0	17.0	**LOW**
146	Rocky Fork Creek	CO	3	2	6	2	1	2	1.8	2	3.6	1.6	1	1.6	13.2	**MED**
147	Rogers Unit	CO	3	2	6	2	1	2	3.0	2	6.0	3.0	1	3.0	17.0	**LOW**
148	Romley	CO	3	2	6	3	1	3	2.0	2	4.0	1.8	1	1.8	14.8	**LOW**
149	Roubideau	CO	3	2	6	2	1	2	2.1	2	4.2	2.0	1	2.0	14.2	**MED**
150	Sage Creek	CO	2	2	4	2	1	2	1.7	2	3.4	1.6	1	1.6	11.0	**HIGH**
151	San Juan River	CO	3	2	6	2	1	2	2.3	2	4.6	2.3	1	2.3	14.9	**LOW**
152	San Miguel River	CO	2	2	4	2	1	2	1.4	2	2.8	1.5	1	1.5	10.3	**HIGH**
153	Sangre de Cristo Mtns	CO	1	2	2	2	1	2	2.0	2	4.0	1.7	1	1.7	9.7	**HIGH**
154	Sapello/Mora Valleys	NM	2	2	4	1	1	1	1.3	2	2.6	1.7	1	1.7	9.3	**HIGH**
155	Sharkstooth Trail	CO	3	2	6	1	1	1	3.0	2	6.0	2.0	1	2.0	15.0	**LOW**
156	Shell Creek	WY	3	2	6	1	1	1	3.0	2	6.0	3.0	1	3.0	16.0	**LOW**
157	Slater Park	CO, WY	2	2	4	2	1	2	1.3	2	2.6	1.5	1	1.5	10.1	**HIGH**
158	SLV Greasewood	CO	2	2	4	2	1	2	1.8	2	3.6	1.8	1	1.8	11.4	**MED**
159	Snowmass Creek	CO	3	2	6	1	1	1	2.1	2	4.2	1.7	1	1.7	12.9	**MED**
160	Snowy Range	WY	2	2	4	3	1	3	1.0	2	2.0	1.0	1	1.0	10.0	**HIGH**
161	South Arkansas River	CO	2	2	4	2	1	2	1.8	2	3.6	1.9	1	1.9	11.5	**MED**
162	South Cameron Pass	CO	2	2	4	2	1	2	1.9	2	3.8	1.9	1	1.9	11.7	**MED**
163	South Cottonwood Creek	WY	3	2	6	1	1	1	3.0	2	6.0	3.0	1	3.0	16.0	**LOW**
164	South Fork Bear Creek	WY	3	2	6	2	1	2	2.0	2	4.0	2.0	1	2.0	14.0	**MED**
165	South Park	CO	1	2	2	3	1	3	2.1	2	4.2	1.8	1	1.8	11.0	**HIGH**
166	South San Juan	CO	2	2	4	1	1	1	2.0	2	4.0	1.8	1	1.8	10.8	**HIGH**
167	Southern Sangre de Cristo Mountains	NM	2	2	4	2	1	2	1.1	2	2.2	1.8	1	1.8	10.0	**HIGH**
168	Squaw Creek	CO	2	2	4	1	1	1	2.3	2	4.6	2.7	1	2.7	12.3	**MED**
169	Squirrel Creek	CO, WY	2	2	4	3	1	3	1.5	2	3.0	1.5	1	1.5	11.5	**MED**
170	St Charles River	CO	3	2	6	1	1	1	1.4	2	2.8	1.2	1	1.2	11.0	**HIGH**
171	Taos Pueblo	NM	3	2	6	3	1	3	1.7	2	3.4	1.7	1	1.7	14.1	**MED**
172	Tipperary Creek	CO	3	2	6	3	1	3	3.0	2	6.0	3.0	1	3.0	18.0	**LOW**
173	Tomichi Creek	CO	3	2	6	2	1	2	3.0	2	6.0	3.0	1	3.0	17.0	**LOW**
174	Trickle Mountain	CO	2	2	4	2	1	2	2.0	2	4.0	1.6	1	1.6	11.6	**MED**
175	Troublesome Creek	CO	2	2	4	3	1	3	2.2	2	4.4	1.8	1	1.8	13.2	**MED**
176	Troublesome Headwaters	CO	2	2	4	2	1	2	2.0	2	4.0	1.9	1	1.9	11.9	**MED**
177	Turtle Rock	WY	2	2	4	3	1	3	1.7	2	3.4	1.9	1	1.9	12.3	**MED**
178	Unaweep	CO	2	2	4	1	1	1	1.5	2	3.0	1.7	1	1.7	9.7	**HIGH**
179	Uncompaghre / Red Cloud	CO	1	2	2	1	1	1	1.6	2	3.2	1.6	1	1.6	7.8	**HIGH**
180	Upper San Luis Valley	CO	2	2	4	3	1	3	1.9	2	3.8	1.7	1	1.7	12.5	**MED**

APPENDIX 18: SOUTHERN ROCKY MOUNTAINS ACTIVITY LEVEL EVALUATION WORKSHEET

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			Raw Score	Weight	Final Score	Raw Score	Weight	Final Score	Raw Score	Weight	Final Score	Raw Score	Weight	Final Score		
181	Ute Trail	CO	3	2	6	1	1	1	3.0	2	6.0	3.0	1	3.0	16.0	**LOW**
182	Vermejo Park/Upper Purgatoire	CO, NM	2	2	4	2	1	2	1.4	2	2.8	1.8	1	1.8	10.6	**HIGH**
183	Wallrock Creek	WY	2	2	4	1	1	1	2.0	2	4.0	2.0	1	2.0	11.0	**HIGH**
184	West Dallas Creek	CO	3	2	6	3	1	3	2.5	2	5.0	2.3	1	2.3	16.3	**LOW**
185	West Lake Creek	CO	3	2	6	2	1	2	2.0	2	4.0	2.2	1	2.2	14.2	**MED**
186	Wolf Creek	CO	2	2	4	2	1	2	1.8	2	3.6	1.9	1	1.9	11.5	**MED**
187	Woody Creek Headwaters	CO	3	2	6	2	1	2	1.7	2	3.4	1.5	1	1.5	12.9	**MED**
188	Yampa River	CO	2	2	4	2	1	2	1.7	2	3.4	1.8	1	1.8	11.2	**HIGH**

APPENDIX 19

DESCRIPTIONS OF SPECIES TARGETS

Sources for the following descriptions include Natural Heritage Programs, NDIS, field guides, state rare plant field guides, Colorado Natural Diversity Information Source, natureserve.org, and other internet sites. The descriptions, developed by volunteers, are intended to provide general information on the distribution, habitat, and conservation status of species and are not intended to be exhaustive.

Amphibians/Reptiles

<u>Bufo boreas</u>, Western or Boreal Toad: G4T1Q. The western toad has a large range in much of the western United States and western Canada and occurs mainly between 8,500 and 11,500 feet in elevation in Colorado, southwest Wyoming, and north-central New Mexico. Habitat includes lodgepole pine or spruce-fir and associated ponds, lakes, and wetlands. They are up to about four inches in length and are dark greenish, brown or black in color, with a light stripe down middle of back. The Southern Rockies population is rapidly declining and is a candidate for USFWS endangered status. Chytrid fungus-associated die-offs have occurred in some populations that were thought to be highly viable. Critically imperiled in CO and WY and possibly extirpated in NM.

<u>Bufo cognatus</u>, Great Plains Toad: G5. The Great Plains toad is found in eastern Colorado at elevations below 6,000 feet. Occurs in grassland habitat, but a disjunct population is found between elevations 7,500 and 8,000 feet in the San Luis Valley and occurs in shrubland habitat. Globally it is found in a wide variety of habitats such as desert springs and streams, meadows and woodlands, and mountain wetlands. This species is up to 4½ inches in length, and is yellowish, brown, greenish, or gray in color with light edged usually symmetrical dark blotches on its back and has well-developed cranial crests. This species is globally secure with no known threats. The San Luis Valley population consists of exceptionally small individuals and may prove to be taxonomically distinct. Vulnerable in WY, apparently secure in CO and secure in NM.

<u>Chrysemys picta</u>, Painted Turtle: G5T5. Painted turtles are found in the northern United States and southern Canada from Lake Michigan and the Mississippi River westward to Washington and British Columbia. Isolated populations are found in the southwestern United States. The population in the southwestern portion of the Southern Rockies ecoregion is part of a disjunct southwestern population of this mainly eastern and northern species. This species occupies slow-moving, shallow streams, marshes, ponds, lakes and creeks that have soft bottom mud, basking sites, and aquatic vegetation. Painted turtles have a carapace length generally less than 10 inches and are green or brownish, with yellow borders around each shield with yellow streaks on their head, neck, and limbs. Threats include development in riparian zone and bullfrogs. Status and viability of montane populations are unknown. Apparently secure in NM and WY, secure in CO.

<u>Eumeces (multivirgatus) epipleurotus</u> (also called <u>gaigeae</u>), Variable Skink: G5T5. Variable skinks are found from Colorado and Utah to Arizona, New Mexico, Texas, and possibly Chihuahua. The subspecies *epipleurotus* may actually be a distinct species, but further study is needed. Variable Skinks are found up to 8,500 feet in elevation in Colorado, New Mexico and Wyoming. They occur in aspen, ponderosa pine and pinyon-juniper woodlands, mountain shrublands of oak and mountain mahogany, and shrublands on the floor of the San Luis Valley. They are dark olive brown in color with dark-edged light stripes and have glossy smooth scales on their backs. Protected in CO as a non-game species. Imperiled in WY.

<u>Phrynosoma hernandesi</u>, Short-Horned Lizard: G5. Short-horned lizards are found in southern Alberta and southern Saskatchewan south through eastern Montana, the western Dakotas, Wyoming, western Nebraska, Colorado, Utah, eastern Nevada, New Mexico, Arizona, western Texas and Mexico. They occur from semiarid plains to high mountains and occupy desert, grassland/herbaceous, shrubland/chaparral and conifer, hardwood and mixed woodland habitats between 5,700 feet and 11,300 feet in Colorado, New Mexico and Wyoming. They have short horns, and a row of pointed scales along their sides. Color is grayish with darker blotches usually in transverse rows, and they may have a faint light stripe down the back. Abundance ranges from locally common to scarce; there is concern that the species may have declined in abundance in some areas. Sand Luis Valley populations consist of exceptionally small individuals and may be taxonomically distinct. Secure in CO and NM, apparently secure in WY.

Plethodon neomexicanus, Jemez Mountains Salamander: G2. The Jemez Mountains salamander has a small distribution limited to New Mexico's Jemez Mountains. It is found in moss-covered rockslides, especially on steep north-facing slopes and under bark and beneath logs in and near mixed forests of fir, spruce, aspen and maple. It is a slender salamander between 9.5 and 14.3 cm in length with short limbs, 18-19 costal grooves and a brown dorsum with brassy flecks. Jemez Mountains salamanders lack lungs and instead obtain oxygen directly through the skin. The habitat of this salamander makes them particularly vulnerable to forest management practices such as logging, slash removal and/or fire. Candidate. Does not exist in CO or WY, imperiled in NM.

Rana pipiens, Northern Leopard Frog: G5. The northern leopard frog has a long range throughout the United States and southern Canada. It ranges to above 11,000 feet in elevation. It is found in springs, slow streams, marshes, bogs, ponds, canals, flood plains, reservoirs and lakes, usually in permanent water with rooted aquatic vegetation. This frog is green, brownish, or gray with well-defined pale-bordered oval or round dark dorsal spots and prominent unbroken dorsolateral ridges that are usually lighter in color. Threats include habitat loss, commercial overexploitation and interactions with non-native species. This species appears to be secure and abundant in substantial parts of the range, although it is declining in many areas. Fish free waters known to be inhabited by leopard frogs should not be stocked with exotic predatory fishes. Vulnerable in CO and WY, apparently secure in NM.

Rana sylvatica, Wood Frog: G5. Widespread in North America, and abundant in many areas. Widely disjunct populations occur in northern Colorado and southern Wyoming from 7,900-9,800 feet in elevation. Wood frogs inhabit the edges of ponds and streams in various types of forest and woodland habitats, as well as in willow, grass and aspen associations. These frogs have a distinctive dark mask through the eye and tympanum, and are brown, greenish, or yellowish gray in color with a lighter vertebral stripe and have prominent dorsolateral folds. Globally secure, however many local populations are declining due to agricultural and residential development, and intensive timber harvesting practices. Vulnerable in CO, imperiled in WY.

Birds

Amphispiza belli, Sage Sparrow: G5. Large range in the western U.S. and Mexico. Occurs in desert, grassland/herbaceous, and shrubland/chaparral habitats, and is strongly associated with sagebrush habitats during breeding season. This species is a small songbird with a gray-brown head, buffy brown back with dusky streaks, white belly with central dark spot, broken white eye ring, and white throat with black whisker. Globally stable, but threatened by habitat degradation, fragmentation, and loss. Apparently secure in NM, vulnerable in CO and WY.

Asio flammeus, Short-eared Owl: G5. Extensive range throughout the U.S. and Canada. During breeding season occurs in broad expanses of open land such as fresh and saltwater marshes bogs, dunes, prairies, grassy plains, old fields, tundra, moorlands, river valleys, meadows, savanna, open woodland, and heathland. Communally roost in winter in abandoned dumps, quarries, gravel pits, storage yards, stump piles, old fields, small evergreen groves, bayberry thickets, dunes, and open abandoned cellars. This species is a small to medium-sized owl 13 to 15 inches in length, with tawny brown to buff-colored wings, heavy but indistinct brown streaking on the breast, yellow eyes and a pair of barely visible "ear" tufts close together at the top of the facial disk. Secure due mainly to extensive range but appears to be declining in some areas due to habitat loss and destruction and degradation of marshes, grasslands, and low-use pastures. Imperiled in NM, CO and WY.

Bucephala albeola, Bufflehead: G5. Found throughout the United States and Canada. Buffleheads migrate northward in February-April and begin moving southward from October into November. This species breeds in natural tree cavities or abandoned flicker holes in mixed coniferous-deciduous woodland near lakes and ponds. Females often nest in the same site in successive years. Non-breeding wintering habitat includes sheltered bays and estuaries as well as open freshwater locations. This species is a small, compact diving duck about 10 inches in length with a small dark gray bill, dark back and head, white breast and a white cheek patch behind the eye. Critically imperiled in CO and WY, secure in NM.

Bucephala islandica, Barrow's Goldeneye: G5. Found throughout the western and northeastern United States, and throughout Canada. This species migrates northward and inland to breeding areas in April and migrates southward and to the coast to winter in October-November. It nests in natural tree cavities, abandoned woodpecker holes, rock cavities, or stream banks in mixed coniferous-deciduous woodlands near lakes and ponds and often nest in the same area in successive years. It is a medium sized diving duck about 13 inches in length with yellow eyes, steeply sloped foreheads with flatter crowns and peaks at the forward part of the crown, and a small, stubby bill. Globally secure. Imperiled in CO and NM, apparently secure in WY.

Buteo albonotatus, Zone-tailed Hawk: G4. Found in New Mexico, Arizona and Texas. Zone-tailed hawks occur in arid open country near open deciduous or pine-oak woodlands, mesa and mountain country near watercourses, and wooded canyons and tree-lined rivers along middle slopes of desert mountains. They nest in various habitats and sites, ranging from small trees in lower desert, giant cottonwoods in riparian areas, and mature conifers in high mountain regions and will often select nest sites close to cliffs or steep hillsides. Zone-tailed hawks frequently use the same nest tree for many years. This species is a medium sized hawk with entirely dark plumage and a long, broad, dark tail with white bands. The greatest threat in the United States to this species is loss of riparian nesting habitat. Globally, no significant decrease in range has been found. Vulnerable in NM.

Buteo regalis, Ferruginous Hawk: G4. Widespread and relatively common in the United States and Canada. Ferruginous hawks occur in open country, primarily prairies, plains and badlands, sagebrush, and other woodland and desert habitats. This species nests in tall trees or willows along streams or on steep slopes, in junipers, on cliff ledges, river-cut banks, hillsides, on power line towers and sometimes on sloped ground on the plains or on mounds in open desert. This hawk is about 23 inches long with a rusty back and shoulders and paler head. Conversion of grasslands for cultivation may be causing population declines in some areas by reducing the amount of available preferred habitat. Globally stable. Imperiled in NM, vulnerable in CO and WY.

Buteo swainsoni, Swainson's Hawk: G5. This species has a large breeding range in western and central North America and it winters mainly in southern South America. Swainson's hawk occurs in savanna, open pine-oak woodland, and cultivated lands (e.g., alfalfa and other hay crops, and certain grain and row croplands) with scattered trees. Swainson's hawk is a large, broad-winged and broad-tailed hawk about 18 inches in length with pale undertail coverts. Globally stable, but pesticide use and habitat loss have resulted in declines. Apparently secure in NM and WY, secure in CO.

Centrocercus minimus, Gunnison Sage Grouse: G1. Found only in a small area of western Colorado and eastern Utah. Gunnison Sage Grouse historically occurred in southwestern Colorado, Utah, New Mexico, and possibly Arizona. It occurs in sagebrush and associated riparian habitats. This species forms leks for courtship rituals during breeding season. Birds are about 22 inches in length, rounded-winged and chicken-like with a long, pointed tail. It is declining globally and is threatened range-wide; population declines and range contractions are largely attributed to the loss, fragmentation, and degradation of sagebrush habitat due to development, overgrazing, and agricultural practices. USFWS was petitioned in January 2000 to list the Gunnison sage grouse as a federally endangered species. Globally endemic. Critically imperiled in CO, and not currently known from WY or NM.

Centrocercus urophasianus, Greater Sage Grouse: G5. Found in the western United States and Alberta and Saskatchewan provinces in Canada. Greater Sage Grouse is found in foothills, plains and mountain slopes where a mixture of tall and short sagebrush, meadows, and aspen habitats occur. This species will form leks for courtship rituals during breeding season. It is a large grayish grouse with a blackish belly and long pointed tail feathers. Globally, this species is declining rapidly (has been extirpated in five states and one province) and is threatened by loss, fragmentation, and degradation of sagebrush habitat due to development, overgrazing, and agricultural practices. Populations that remain show continued declines and many are seriously threatened. Possibly extirpated in NM, apparently secure in CO, and vulnerable in WY.

Charadrius montanus, Mountain Plover: G2. Range through the western United States and Canada. Mountain plovers occur in high plains/shortgrass prairie and desert tablelands, shortgrass prairie with a history of heavy grazing or in low shrub semi-deserts during breeding season. Preferred non-breeding habitat consists of short-grass plains and fields, plowed fields, sandy deserts, and commercial sod farms. This species of plover has brown upperparts, a white throat, underwings and belly, and a buffy tinged breast. Rapidly declining globally due to loss of wintering and nesting habitat. Proposed for listing by USFWS as threatened. Imperiled in NM, CO, and WY.

Cinclus mexicanus, American Dipper: G5. Found in Alaska, from western and midwestern Canada to southwestern South Dakota, and from southern California and highlands of Mexico to western Panama. Occurs in mountainous habitats to the treeline primarily near swift flowing montane streams. American Dipper nests on raised sites overlooking water, on rocks in streams, cliff ledges, under waterfalls or bridges. This species is a small bird about six inches in length with a slender bill, slate-gray body, brown head, and a short tail. Globally secure. Information is needed on dependence on water quality, reproductive success in areas with high recreational use and winter habitat. Apparently secure in NM, secure in CO and WY.

Cypseloides niger, Black Swift: G4. Range in the western United States and Alaska and western to midwestern Canada. Black Swifts forage over forests and in open areas and nest behind or next to waterfalls and wet cliffs, on sea cliffs and in sea caves, and occasionally in limestone caves. This species is a small, black, aerial-feeding bird about seven inches in length with a cigar-shaped body, crescent-shaped wings and a short, strongly notched tail. Too little is known about this species to consider it globally secure. Critically imperiled in NM, vulnerable in CO, possibly extirpated in WY.

Empidonax traillii (extimus), Southwestern Willow Flycatcher: G5T2. Breeds in southwestern North America and winters from Mexico to South America. Occurs in thickets, scrubby and brushy areas, open second growth, swamps, and open woodland. This species is a flycatcher about six inches in length with brownish-olive upperparts, a whitish throat, pale olive breast, pale yellow belly, and two light wing bars, and generally lacks a conspicuous eye ring. Globally declining greatly in range and abundance due primarily to habitat loss and degradation of riparian habitats, livestock grazing and cowbird parasitism. An estimated 300-500 pairs remained in the mid-1990s. The species listed as endangered by the USFWS. Critically imperiled in NM and has only been reported in CO.

Falco peregrinus anatum, American Peregrine Falcon: G4T3. Has a widespread distribution with a large number of occurrences in the United States and Canada. Falcons occur in open habitats from tundra, moorlands, steppe, and seacoasts, to mountains, open forested regions, and human population centers. When not breeding, they occur in areas where prey concentrate, including farmlands, marshes, lakeshores, river mouths, tidal flats, dunes and beaches, broad river valleys, and cities. This species is a medium-sized falcon with long pointed wings, a dark crown and nape, and a dark wedge extending below the eye. Major threats include habitat loss, pesticide poisoning and illegal take. This species is protected in the United States and Canada under the Migratory Bird Treaty. It has been delisted under the Endangered Species act, and is being monitored for five years.   Critically imperiled in WY, imperiled in CO and NM.

Grus Canadensis, Sandhill Crane: G5T4. Large range throughout the United States and Canada. Occur in open grasslands, marshes, marshy edges of lakes, ponds and river banks during breeding season and nests on the ground or in shallow water on open tundra, large marshes, or wet forest meadows. Found in wintering habitat in a communal roost site in an open expanse of shallow water along river channels, on alluvial islands of braided rivers or natural basin wetlands. This species is a tall, long-necked, long-legged bird about 37-42 inches in length with gray plumage that may be stained with rust or brown, a whitish chin, cheek, and upper throat, dull red skin on the crown and lores and long, fluffy tertial feathers that droop over the rump. It is threatened by loss and degradation of wetland habitats, however the species is stable or increasing in most areas. Collisions with powerlines have been noted as a significant source of mortality in the Rocky Mountains. Apparently secure in NM and WY, imperiled in CO.

Haliaeetus leucocephalus, Bald Eagle: G4T?Q. Bald eagles have a widespread distribution in North America, with large numbers of occurrences in Alaska and British Columbia. Their breeding habitat most commonly includes areas close to coastal areas, bays, rivers, lakes, or other bodies of water that yield primary food sources including fish, waterfowl, and seabirds. This species usually nests in tall trees including pines, spruce, firs, cottonwoods, oaks, poplars, and beech or on cliffs near water. Colfax Co., NM, is an important wintering area. Adults are about 32 inches in length, have a large bright yellow bill and dark plumage with the exception of a white head and white tail. Major threats include habitat loss, disturbance by humans, biocide contamination, decreasing food supply, and illegal shooting. Bald eagles are protected in the United States by the Bald Eagle Protection Act, the Migratory Bird Treaty Act, and are listed as threatened under the Endangered Species Act.   Critically imperiled in CO and NM, imperiled in WY.

Leucosticte australis, Brown-capped Rosy Finch: G4. Found in New Mexico, Colorado and Wyoming. Occurs in barren, rocky or grassy areas and cliffs among glaciers or beyond timberline; winters in open fields, cultivated lands, brushy areas, and around human habitation. May nest in rock crevices, holes in cliffs, mine shaft or old abandoned building. This species is a small, dark sparrow-like bird about 6¼ inches in length with a black forehead, pink belly, undertail coverts, rump and wing feather edges and a forked tail. Endemic to the SRM. Critically imperiled in NM and WY, vulnerable in CO.

Passerina amoena, Lazuli Bunting: G5. Large range in the Western to Midwestern United States and Western Canada. Occurs in arid brushy areas in canyons, riparian thickets, chaparral and open grassy and woodland habitats. This bunting is a small bird about four to five inches in length with a small conical bill and white wing bars; males have a deep blue head and upperparts and orange breast. Globally secure. Secure in NM, CO, and WY.

Progne subis, Purple Martin: G5. Found throughout the continental United States and Canada, winters in South America. Occurs in conifer, desert, grassland, hardwood, savannah, shrubland/chaparral, suburban and woodland habitats, nesting in tree cavities, abandoned woodpecker holes, rock crevices and birdhouses. This species is a swallow about seven inches in length with dark purplish plumage on its upperparts, grey breast band, speckling on throat and belly, and a forked tail. Globally secure. Apparently secure in NM, vulnerable in CO, possibly extirpated in WY.

Spizella breweri, Brewer's Sparrow: G5. Fairly large range in western North America and western Canada; declining in many areas of the United States. Found in desert, grassland and sagebrush or chaparral habitats. This species is a small songbird 4½ inches in length with a tan back with dark streaks, pale underbelly, brown crown with dark streaks, and a slim forked tail. Globally declining due to habitat loss/fragmentation. Vulnerable in NM and WY, apparently secure in CO.

Strix occidentalis lucida, Mexican Spotted Owl: G3T3. Range in the southwestern United States and northern Mexico. This species occurs in uneven-aged mixed-conifer forests that have experienced minimal human disturbance. It nests on broken tree tops, cliff ledges, in natural tree cavities, in caves or on cliff ledges in steep-walled canyons. The Mexican Spotted Owl is a medium-sized owl about 16 inches in length with dark-eyes, no ear tufts, a round-head, brown with whitish spotting on the head, back, and underparts. Globally this species is declining due to past and continuing loss/fragmentation of habitat, especially even-age timber management. Critically imperiled in CO, imperiled in NM. Does not occur in WY.

Tympanuchus phasianellus columbianus, Columbian Sharp-tailed Grouse: G4T3. Formerly widespread from British Columbia and northern California to Montana and Colorado; now occupies less than 10% the area within its former range (in Moffat and Rio Blanco Co.'s in CO and south central WY in the SRM). It has the smallest population size and most restricted distribution of six grouse subspecies of sharp-tailed grouse in North America. It occurs in native bunchgrass, sagebrush and shrub-steppe habitats and will form leks for courtship rituals during breeding season. The Columbian sharp-tailed grouse is a medium-sized grouse about 15 inches in length with a short crest on its crown, whitish plumage with darker brown, black and tan chevrons on its head, neck, back and belly and a narrow, pointed tail with white outer tail feathers. It is threatened by habitat loss/degradation due to agricultural practices, invasive species, development and livestock overgrazing. Critically imperiled in WY, imperiled in CO, does not occur in NM.

Vermivora virginiae, Virginia's Warbler: G5. Range from southeastern Idaho, northeastern Utah, and central Colorado to southeastern California, southern Nevada, southeastern Arizona, and central New Mexico. Found in arid montane woodlands, oak thickets, pinyon-juniper, coniferous scrub, and chaparral habitats. This species is a small warbler about 4¼ inches in length with grey upperparts, yellow rump and undertail coverts, plain grey wings, a white eye ring and a thin pointed bill. Limited breeding range in SRM. Threatened by development. Targeted in Front Range, but coarse-filter

Fish

Catostomus plebeius, Rio Grande Sucker: G3G4. Found in New Mexico, Colorado, Arizona, and south into Mexico. Occurs in pools, runs, and riffles of small to moderately large streams with clean gravels and aquatic vegetation. This species is a small fish about four to six inches in length with a toothless, sucker-like mouth with thick lips. It is dull brown with scattered black blotches, males may have black and red lateral stripes during breeding season. Globally declining due to hybridization with the introduced white sucker, habitat modifications and extirpation by the introduction of predaceous northern pike. Globally, critically imperiled. Does not exist in WY.

Gila pandora, Rio Grande Chub: G3. Small range in New Mexico, Texas, and Colorado. Occurs in flowing pools of headwaters, creeks, and small to moderate streams and rivers in association with cover such as undercut banks and plant debris. Locally common; current abundance appears to be fairly stable. Primary threats are stream dewatering, stocking of non-native fishes, and habitat modification due to channelization. Listed as threatened in Texas; state species of special concern in Colorado. Vulnerable. Does not exist in WY.

Gila robusta, Roundtail Chub: G2G3. Range from Wyoming south to New Mexico west to California. Occurs in rocky runs, rapids and pools of creeks and small to large rivers with cobble-rubble, sand cobble or sand-gravel substrate. Also found in large reservoirs in the upper Colorado River system. This species is a minnow about 10-14 inches in length with a completely scaled body, two rows of pharyngeal teeth, dark colored dorsum and an orange-red color on ventrolateral surfaces and all fins except the dorsal fin. Threats include watershed changes, channel downcutting, substrate sedimentation, water diversion, groundwater pumping, and the invasion of non-native predatory and competitive species. Globally declining. Imperiled in NM, CO, and WY.

Oncorhynchus clarki pleuriticus, Colorado River Cutthroat Trout: G4T3. Range from New Mexico up to Utah. Occurs in lakes and cool, clear water with deep pools, boulders, and logs; thrives at high elevations. This species is a trout with bright red sides, coarse dark spots on the body and tail, a bright red stripe on each side of the lower jaw, and may have bright tints of crimson, orange, and gold on the belly. Globally declining, this species may occupy less than 1% of its historic range. Threats include hybridization with introduced rainbow trout, replacement by introduced brook trout and brown trout, and habitat alteration, degradation and fragmentation. American Fisheries Society lists this fish as a species of special concern. Presumed extirpated in NM, vulnerable in CO, imperiled in WY.

Oncorhynchus clarki stomias, Greenback Cutthroat Trout: G4T2T3. Small range in the upper reaches of the South Platte and Arkansas rivers in Colorado and Wyoming. Occur in clear, swift-flowing mountain streams with cover, such as overhanging banks and vegetation, during breeding season females spawn in riffles. This species is a brightly-colored subspecies of cutthroat trout with large spots on the body and bright tints of red and orange on the belly during breeding season. This species is federally listed as threatened due to its decline from habitat degradation and effects of introduced trout species; its population has increased in recent decades through successful reintroduction efforts. Presumed extirpated in WY, imperiled in CO, does not occur in NM.

Oncorhynchus clarki virginalis, Rio Grande Cutthroat Trout: G4T3. Small range in the Rio Grande drainage of Colorado and New Mexico. Occur in clear, cold streams and lakes, most populations restricted to small headwater streams. During the breeding season females spawn in riffles. This species has a yellowish-green to gray-brown body, peppered with black spots, including the fins; the males' undersides turn a bright reddish-orange during the breeding season. Has declined greatly over the long term and now only occupies 5-7% of its historical range. Threats include habitat degradation through livestock overgrazing, loss of habitat and hybridization and competition with introduced, non-native trout. Vulnerable in CO, may be exotic imperiled in NM, does not occur in WY.

Phoxinus erythrogaster, Southern Redbelly Dace: G5. Range in Great Lakes and Mississippi River basins south to Tennessee River drainage, Alabama, White-Arkansas river drainage, Mississippi, Kansas River system, and in upper Arkansas River drainage. Occur in headwaters and upland creeks with clear water. This species is a slender minnow with extremely small scales and two narrow dusky stripes along its side separated by a broad light colored stripe. Globally stable, threats include habitat degradation and dewatering from irrigation. Critically imperiled in NM and CO, does not occur in WY.

Ptychocheilus lucius, Colorado Pikeminnow: G1T?Q. Restricted to the Colorado River system. Occurs in medium to large rivers to include deep, turbid strongly flowing water, eddies, runs, flooded bottoms, or backwaters. This species is a torpedo-shaped fish with an olive-green and gold back, silver sides and white belly. Threats include dam construction and introduction of non-native fishes. Listed by USFWS as endangered range-wide. Critically imperiled in NM and CO, presumed extirpated in WY.

Xyrauchen texanus, Razorback Sucker: G1. Restricted to the Colorado River system. Occurs in medium to large rivers to include slow areas, backwaters, eddies, and flooded lowlands. This species is a brownish-green fish with a yellow to white-colored belly and an abrupt, bony keel on its back. Globally declining, this species is very threatened range-wide. Threats include habitat alteration and destruction of habitat by dams and interactions with non-native fishes. Presumed extirpated in NM and WY, critically imperiled in CO.

Invertebrates

Acerpenna pygmaea, Mayfly: G5. Ranges in Colorado, Illinois and Kentucky. Nymphs occur in a variety of aquatic habitats. This species is a small mayfly with front wings elongate-oval and hind wings very small or lacking. Globally secure. Critically imperiled in CO, does not occur in NM and WY.

Agrypnia colorata hagen 1873, Caddisfly: G2. Found in Colorado. Larvae occur primarily in marshes and lakes, only a few are found in streams. Larvae build slender, cylindrical cases, usually constructed in a spiral pattern from narrow strips of plant materials. This species is a large caddisfly about 14-25 mm in length with mottled gray and brown wings. Imperiled globally due to rarity or possible threats. Critically imperiled in CO does not occur in NM and WY.

Alloperla pilosa, Stonefly: G3. Endemic to the high elevations of the Rocky Mountains of Colorado. Larvae often occur stones in streams or along lakeshores. Adults occur near streams or rocky lakeshores. This species is a stonefly about 6-15 mm in length with a small anal lobe in the hind wing. Acid disposition and high elevation grazing may be a threat. Globally vulnerable. Imperiled in CO. Does not occur in NM and WY.

Amblyderus triplehorni, Anthicid Beetle: G?. Restricted to the Great Sand Dunes in San Luis Valley, Colorado; first described in 1998. Occur on flowers and foliage. This species is an antlike flower beetle about 2-12 mm in length with the head deflexed and strongly constricted behind the eyes. Global rank unknown. Unknown in CO, does not occur in NM and WY.

Amblyderus werneri, Great Sand Dunes Anthicid Beetle: G1?. Restricted to the Great Sand Dunes in the San Luis Valley, Colorado; first described in 1998. Occur on flowers and foliage. This species is an antlike flower beetle about 2-12 mm in length with the head deflexed and strongly constricted behind the eyes. Global rank may be imperiled due to endemism. Critically imperiled in CO, does not occur in NM and WY.

Andrena durangoensis, Andrenid Bee: G?. This genus contains small to medium sized bees with two subantennal sulci below each antennal socket. Often found nesting in burrows. Global rank unknown. State conservation status for SRM region unknown.

Aphelia sp., Moth: G?. This genus contains many common pest species of moths that vary in habitat but often occur on perennial plants. They are usually small gray, tan or brown with dark bands or mottled areas on their wings. Global rank unknown.

Aphonopelma echinum (Araneae; theraphosidae), Tarantula: G?. This family of spiders occurs in the west and southwest United States. Mostly nocturnal. Tarantulas are large spiders that feed primarily on insects or occasionally small vertebrates. Global rank unknown. State conservation status rank for SRM region unknown.

Arctia undescribed sp, Tiger Moth: G?. This genus contains small to medium sized tiger moths with bright spots or bands. They are mostly nocturnal. Global rank unknown.

Arcynopteryx compacta, Stonefly: G4. Found in Colorado, Montana and Wisconsin. This genus includes stoneflies about 6-15 mm in length with green wings and a yellow, green, black or brown body. Adults are primarily pollen feeders, nymphs are aquatic and omnivorous or carnivorous. Apparently globally secure. Critically imperiled in CO, does not occur in WY or NM.

Baetis adonis, Mayfly: G4. Members of this family of mayflies are common and found in a variety of habitats. Nymphs are aquatic, adults are small with front wings elongate-oval and hind wings small or lacking. Apparently globally secure. State Conservation status for SRM region unknown.

Baetis bundyae lehmkuhl, Mayfly: G?. Members of this family of mayflies are common and found in a variety of habitats. Nymphs are aquatic, adults are small with front wings elongate-oval and hind wings small or lacking. State and Global rank unknown.

Baetis virile, Mayfly: G3. Members of this family of mayflies are common and found in a variety of habitats. Nymphs are aquatic, adults are small with front wings elongate-oval and hind wings small or lacking. Globally vulnerable. State Conservation status for SRM region unknown.

Boloria improba acrocnema, Uncompahgre Fritillary: G2. Restricted to isolated alpine habitats in the San Juan Mountains of southwestern Colorado. Found in moist alpine slopes above 12,000 feet with extensive snow willow patches which serve as the larval foodplant. This species is a dull and dingy lesser fritillary without silver beneath. Over-collection, increased recreation, and global climate change threaten colonies of this butterfly and driving it to extinction. Globally imperiled, listed Federally as endangered. Is not known from NM or WY.

Bolshecapnia milami, Stonefly: G3. Ranges in the Rocky Mountains from Colorado, Montana, Idaho and Alberta. Occurs in medium-sized montane streams, emerging during winter months. This genus is blackish in color and about 10mm or less in length with short or rudimentary wings in some species. Globally vulnerable.

Brachycercus prudens, Mayfly: G3. Found in Alabama, Colorado, Illinois, Indiana, Kansas, Wisconsin, Wyoming in the U.S. and Canada. Nymphs occur in a variety of aquatic habitats, but generally occur in quiet water. This genus of mayflies is small with three caudal filaments and hind wings lacking. Globally vulnerable. Does not occur in NM.

Callophrys mossii schryveri, Moss' Elfin: G3G4T3. Found in Colorado, Wyoming in the U.S. and Alberta in Canada. Occurs in sparsely wooded or brushy foothill canyons ranging in elevation from about 5,600 to slightly over 8,000 feet. This species of butterfly is reddish-brown with a bold white postmedian line which separates darker inner and lighter outer portions of wing. Threatened by habitat destruction due to increasing urban development and habitat alteration due to grazing and recreational development. Globally vulnerable.

Cicindela theatina, San Luis Dunes Tiger Beetle: G1. This species is endemic to the Great Sand Dunes in the San Luis Valley in the SRM. It belongs to a group of tiger beetles restricted to sandy habitats in North America. It is the only tiger beetle in North America considered endemic due to a restricted geographical region, the Great Sand Dunes ecosystem. Globally imperiled.

Copablepharon undescribed sp: This moth was recently discovered in the San Luis Valley, Colorado and is currently being described as a new taxon.

Daihinibaenetes giganteus, Giant Sand Treader Cricket: G?. Occurs in the Great Sand Dunes in the San Luis Valley in the SRM.

Erebia theano ethela, Banded Alpine: G4G5. This butterfly is endemic to alpine areas within the SRM.

Ethmia monachella, Lost Ethmid Moth: GH. This moth is only known from historical occurrences in the SRM. Possibly extinct.

Grammia cervinoides, Alpine Tiger Moth: This tiger moth is endemic to alpine areas within the SRM.

Neoarctia bruce, Alpine Tiger Moth: This tiger moth is endemic to alpine areas within the SRM.

Ochlodes yuma anasazi, Yuma Skipper: G5. Found only at Big Arsenic Springs in the Rio Grande Gorge, Taos County, NM. The species as a whole is gold-colored and more widespread in the Southwestern US. The species is dependent on a single plant species—common reed (*Phagmites communis)*—an emergent aquatic plant that is very local in the arid Southwest. The Taos county colony is much darker in color and very disjunct from sister colonies; it is the only colony east of the Continental Divide and in the Rio Grande watershed.

Oenis alberta capulinensis, Capulin Mountain Arctic: G5. This grassland butterfly occupies islands within the archipelago of grassy, volcanic mesa tops (>8,000 ft. elevation) known as the Raton Mesa complex. This includes Capulin Mountain, the centerpiece of Capulin Volcano National Monument, in Union Co., NM, and the type locality of this butterfly. Its larvae probably eat Arizona fescue (*Festuca arizonica*) which thrives on the cold, wind-blown mesa and mountain tops. The Raton Mesa complex is one cluster of satellite, glacial relict populations; others are in AZ and CO. Ecoregional boundaries trisect the range of this butterfly, and should be a conservation target in at least one ecoregion.

Poanes hobomok wetona, Hobomok Skipper: G5. This is the Front Range race of a butterfly of the eastern and northern Great Plains. Populations exhibit strong sexual dimorphism. Populations of the western race are strung out along the ecotone between the Great Plains prairies and mixed woodlands of the Rocky Mountain foothills. Type locality of this race includes the Wet Mountains, CO and Raton Mesa, NM and CO. In those mountains the species lives in riparian areas, where larvae eat unknown streamside grasses. Western populations exhibit little sexual dimorphism.

Polites origenes rhena, Cross-line skipper*:* G5. This is the Front Range race of a butterfly of the eastern and northern Great Plains. Western populations are strung out along the ecotone between the Great Plains prairies and mixed woodlands of the Rocky Mountain Front Range. Resemblance to *P. themistocles*, with which it co-occurs, has complicated study of this taxon. It appears to prefer drier sites than *P. hobomok wetona*, with which it is somewhat sympatric.

Speyeria hesperis ratonensis, Northwest Fritillary: G5. This is an isolated, paler race of the widespread Northwest fritillary, which usually is bright orange with dark markings. It occurs solely on the Raton Mesa complex, which is separated by about 30 miles from the Sangre de Cristo Mountains and juts eastward into the Great Plains. Its larvae eat Canada violet (*Viola canadensis*) which grows in the shady woodlands of the mesa side slopes.

Speyeria nokomis nokomis, Great Basin Fritillary: G4T2. This large buttefly has orange males and blue-black females. For larval food it appears to depend entirely on kidney-leaf violet (*Viola nephrophylla*). This plant and its butterfly herbivore thrive primarily in wet meadows and shallow marshes from 7,000 to 8,000 ft. Although widespread through the Southwest, Holocene climatic drying combined with narrow habitat requirements has made for isolated colonies that are extremely vulnerable to human disturbance.

Descriptions of these species are still needed.
Capnia arapahoe, a stonefly. G1.
Capnia nelsonii, undescribed sp. G?.
Capnia uintahi gaufin, G?
Capnia, undescribed sp, G?.
Catocala coccinata, ssp, a moth. G5.
Cauchas elongata, Incurvariid moth. G?.
Celastrina humulus, Hops azure. G2G3.
Ceraclea arielles, a caddisfly. G2.
Chromagrion conditum, Aurora damsel. G4.
Cicindela nebraskana, Tiger Beetle: G4.
Clistoronia maculata, Caddisfly: G2.
Cordulegaster dorsalis, Pacific Spiketail G3.
Corticaria undescribed sp, Beetle:
Daihinioides larvale, Strohecker's Camel Cricket: G?.
Dasylophia, Notodentid Moth:
Decodes stevensi, Steven's Tortricid Moth: G?.
Distichlicoccus fontanus, Mealybug:
Ephemera simulans: G5.
Ephemerella apopsis, Mayfly: G1.

Euchloa lotta undescribed pop:
Eucosma dapsilis, Tortricid Moth:
Eucosma fandana, Moth: G?
Eucosma fofana, Tortricid Moth:
Euhyparpax rose:
Euphilotes ellisi, Ellis' Blue: G4G5.
Euphilotes rita, Rita Blue: G3G4.
Euphyes bimacula, Two Spotted Skipper: G4.
Euproserpinus Wiesti, Wiest's Sphinx Moth: G3G4.
Gazpructra undescribed sp, Ghost Moth
Glossosoma alascense, Caddisfly: G3.
Gnophaela clappiana: G?.
Grammia undescribed sp, Moth: G?.
Grammia undescribed sp #2:
Grammia undescribed sp #3:
Hesperia leonardus montana, Pawnee Montane Skipper: G4T1.
Heterocampa rufinans:
Heterocloeon frivolum, Mayfly: G4.
Hypochilus bonneti, Lampshade Spider:
Hypochilus jemez, Jemez Lampshade Spider: G?.
Hyptoites sp, Triangle Webspider:
Lepidostoma Cinereum, Caddisfly: G4.
Leucrocuta petersi, Mayfly: G1.
Libellula Nodisticta, Hoary Skimmer: G3.
Lycia Undescribed sp, Moth:
Lymnaea caperata, Say's Pondsnail:
Macdunnoa Persimplex, Mayfly: G3.
Melemaea N. sp, Geometrid Moth:
Meximachilis N. sp, Bristletail:
Neocyrtusa N. sp, Beetle
Neominois ridingsii undescribed sp, Ridings' Satyr: G5.
Neominois wyomingo, Swale Satyr: G3G4.
Neotrichia downsi, Caddisfly: G1.
Ochrotrichia susanae, Caddisfly: G2.
Ochrotrichia trapoiza, Caddisfly: F2.
Oeneis alberta ssp, Alberta Arctic: G5.
Oeneis bore/taygete edwardsii, White-veined Arctic: G5.
Papilio indra minari, Minor's Swallowtail: G5T1T2.
Paraleptophlebia temporalis, Mayfly: G4.
Paraleuctra jewetti, Stonefly; G4.
Paraleuctra projecta (=P. Rickeri as recorded from NM)
Paraleuctra rickeri, Stonefly: G4.
Phaneta insignata, Tortricid Moth: G?.
Phaneta undescribed species:
Phragmotobia assimilans, Tiger Moth: G5.
Phyciodes batesi anazazi, *Canyon Crescent: G4T2T3.*
Phyllogomphoides albrighti, *Five-striped Leaftail: G4.*
Pisidium sanguinichristi, *Sangre de Cristo Peaclam: G1Q.*
Plauditus cestus, *Mayfly: G3.*
Prodoxus phylloryctis, Yucca Moth:
Proserphinus flavofasciata, Yellow Banded Day Sphinx: G4.
Pseudocentria, Tortricid Moth:
Psidium lilljeborgi, Lilljeborg's Peaclam:
Psychoronia brooksi ruiter, 1999 Caddisfly:
Pteronarcella regularis, Stonefly: G3.
Rhyacionia salmonicolor, Pinetip Moth: G?.

Rithrogena Flavianula, Mayfly: G1.
Rithrogena pellucida, Mayfly: G5.
Schinia avemensis, Flower Moth: G?.
Schinia carminatra, Flower Moth: G?.
Schinia Masoni, Flower Moth:
Schinia new sp, Flower Moth:
Sericoderus lateralis, Beetle:
Somatochlora hudsonica, Hudsonian Emerald: G5.
Speyeria atlantis (hesperis) ratonensis, Raton Mesa Fritillary:
Sphinx asella: G3.
Stygobromus coloradensis, Cave Obligate Amphipod: G1G2.
Stygobrumus holsingeri, Cave Obligate Amphipod: G1G2.
Stygobromus pennaki, Cave Obligate Amphipod: G3.
Suwallia wardi, Stonefly: G3.
Sweltsa hondo, Stonefly: G3.
Taeniopteryx parvula, Stonefly: G5.
Trachysmia grandis, Moth:
Trimerotropis fratercula, Grasshopper: G?.
Utacapnia poda, Gunnison Snowfly:

Mammals

Bos bison, American Bison: G4X. The American bison once lived throughout the western plains. Today they are limited to a few managed herds in Colorado, while free ranging bison roam the Yellowstone and Grand Teton National Parks in Wyoming. Bison have a large head and neck with brownish-black long, wooly hair that tapers to a leaner hindquarters, usually lighter in color that varies seasonally from chocolate to tan. Bison inhabit montane and foothills grasslands and historically played an important role in grassland dynamics. Extirpated in NM, limited in CO and WY.

Canis lupus, Gray Wolf: G5TX. Gray wolves historically occurred throughout the Rocky Mountains as well as northwestern Montana, central Idaho, and Yellowstone National Park. Wolf reintroduction into the Northern Rockies is underway. This species varies in color usually with a dorsal color of pale tan or cream with a mix of lighter and darker hairs, with more pale hair on the lower body and facial areas. They rely on a variety of habitats but are dependant on valley bottoms. The species has recently been reintroduced into Wyoming. Imperiled in WY, extirpated in CO.

Corynorhinus townsendii pallescens, Western Big-eared Bat: G4T4. The western big-eared bat has the largest range of its species including British Columbia, the western United States, and northeastern Mexico. They have large slate or gray ears with cinnamon brown or blackish brown tips. Imperiled in CO.

Cynomys gunnisoni, Gunnison's Prairie Dog: G5. The Gunnison's prairie dog occupy the four corners area of southwestern and south-central Colorado and northwestern New Mexico including the Gunnison, South Platte, and Arkansas River drainages of the San Juan Valley. They inhabit the grasslands, semi-desert and montane shrublands. This is the smallest in Colorado with a yellowish or cinnamon color with black hairs interspersed and darker head and cheeks. They are considered a small game species and thus receive no protection. Secure in CO, imperiled in NM.

Dipodomys ordii evexus, Ord's Kangaroo Rat: G5T2. The Ord's kangaroo rat is found in Colorado's Arkansas Valley between Salida and Canon City but range throughout central Mexico, the western United States and into Canada. They inhabit sandy soil. Endemic to CO.

Dipodomys ordii montanus, San Luis Kangaroo Rat: G5T3. The San Luis kangaroo rat ranges from central Mexico throughout the western United States and into Canada. The San Luis Valley makes up the center of the species range. They prefer sandy soil. The species is threatened by limited range. Globally vulnerable. Vulnerable in CO.

Eutamias minimus caryi, San Luis Least Chipmunk: G5T3. The San Luis Least chipmunk occurs in the northeastern San Luis Valley. They inhabit arid to semiarid shrublands and often live on dune sands or alkaline soils. They are a pale grayish color with distinct dorsal stripes. Endemic to the San Luis Valley.

Gulo gulo, Wolverine: G4. Wolverines historically inhabited the northern and western mountains of Wyoming and Colorado as far south as the San Juans. They are blocky and bear-like, with coloration ranging from medium to dark brown with a tail about a fourth of their body length. Wolverines inhabit alpine cirque above treeline. Today, wolverines are considered extirpated in most of the ecoregion. Endangered in CO and NM, rare in WY.

Gynomys leucurus, White-tailed Prairie Dog: G4. The white-tailed prairie dog occurs in Montana, Wyoming, Utah, and Colorado. They inhabit the semi-desert shrublands, grasslands and mountain Valleys of northwestern and west central Colorado and central Wyoming. They have grayish to yellow buff body with a distinctive white to grayish tip on their tail and black or dark brown cheek patches. Imperiled in WY, apparently secure in CO.

Lagurus curtatus, Sagebrush Vole: G5. Range from Alberta to Sask. through the western U.S. They inhabit semiarid shrublands and grasslands with sparse vegetation. Globally secure. Secure in WY, rank unknown in CO.

Lepus americanus, Snowshoe Hare: G5. The snowshoe hare can be found in the Rocky Mountains between 8,000 and 11,500 feet of elevation. They inhabit montane or subalpine forest, coniferous forest and along the alpine tundra treeline. In the summer they range from rusty brownish to gray-brown with a white underside; whitish-grayish stockings are common as well. In the winter they molt white with only the tips of their ears remaining black. Secure in WY and CO, vulnerable in NM.

Lynx canadensis, Lynx: G5. Lynx originally inhabited the higher regions (above 2,700m) of Wyoming and Colorado including the San Juan and La Plata Mountains. Today most lynx occur from New Mexico north to Gunnison from Taylor Mess east to Monarch Pass. They inhabit montane regions of coniferous and mixed forest. The distribution of lynx is dependant on the population of snowshoe hare. Lynx have been reintroduced into Colorado by the Colorado Division of Wildlife. Listed as threatened by the USFWS.

Martes americana caurina, Pine Marten: G5. The pine marten ranges from northern New Mexico to far northern Alaska. Within the ecoregion they reach from the Sierra Nevada Mountains to the Rocky Mountains and prefer higher elevations. Significant populations are found in the Sangre de Cristo Mountains and it is thought there is potential in the Jemez Mountains. The Pine Marten inhabits dense forests including lodgepole pine, spruce and fir. This species is disjunct.

Microtus mogollonensis Mogollon Vole: G5G5Q. The Mogollon vole is found in the Jemez Mountains, Bandalier National Monument, and Santa Fe National forest above 9,000 feet. They inhabit lava rock in montane alpine and subalpine regions. They are considered sensitive by the USFS. Vulnerable in CO, exotic in NM.

Mustela nigripes, Black-footed Ferret: G1. The black-footed ferret range from southern Canada to Arizona and Texas, however the only known occurrence is in northwestern Wyoming. They inhabit intermontane basins, and semiarid grasslands. They are yellowish buff with lighter face and black facial marks, a black tipped tail and black feet. Listed as endangered by USFWS. Possibly extirpated in CO and NM, Critically imperiled in WY.

Ochotona princeps nigrescens, Goat Peak Pika: G5T1. The goat peak pika occupies mountains of the western United States and is found in the Jemez mountains in New Mexico and the San Juan and Rocky Mountains of Colorado. They inhabit the higher elevations surrounding tree line. Critically imperiled in NM.

Ovis canadensis, Bighorn Sheep: G4G5. Once common throughout Wyoming, the mountains and foothills of Colorado, and New Mexico's Sangre de Cristo and San Juan Mountains, Bighorn Sheep are now limited and thought to be declining in numbers. They were at one time extinct in New Mexico. They are heavily built with grayish brown to medium brown coats that vary seasonally and geographically with a grayish white to pale gray rump, underbelly and inner rear legs. Bighorn sheep males also have characteristically large ridged horns that eventually curve into "full curls." Bighorn sheep are associated with high mountains and steep canyons. Vulnerable in WY, apparently secure in CO and NM.

Perognathus flavescens relictus, Plains Pocket Mouse: G5T2. The plains pocket mouse are found from the Mississippi Valley to the Rocky Mountains in southeast Colorado north of the Yampa and Arkansas Rivers. They inhabit grasslands and enjoy grasses, cacti and shrubs. This mouse is a pale buff to yellowish or reddish color. Imperiled in CO.

Perognathus flavus sanluisi, Silky Pocket Mouse Subspecies: G5T3. The silky pocket mouse is endemic to the San Luis Valley of southern CO and northern NM. They inhabit semiarid grasslands and enjoy sandy soil, shrubs, cactus, and yucca. They are small, with a pinkish buff mixed with black on upper parts and pure white under parts. Endemic in CO.

Reithrodontomys megalotis caryi, Western Harvest Mouse: G5T?. The western harvest mouse is found in the northern Great Plains to the Columbia Plateau. They inhabit wetlands, grassy uplands, and riparian communities, and prefer weedy or dense, tall grass areas. In western Colorado their habitat includes semidesert shrublands and dry riparian sites as well as agricultural land. They range from buff to grayish brown and often have an undefined blackish mid-dorsal stripe.

Sorex hoyi montanus, Pygmy Shrew: G5T2T3. This shrew occupies various forest, meadow and parkland habitats across most of the northern U.S and Canada. The color of this tiny shrew ranges from dark brown in Colorado, to reddish- or grey-brown in other populations. It is smaller, darker and has a shorter tail than the montane shrew. Global conservation concern. Imperiled in CO.

Sorex preblei, Preble's Shrew: G4. The Preble's shrew ranges from the Columbia Plateau and northern Great Basin, extending east to Montana and Wyoming, and south to Utah. One specimen was captured in Colorado in 1966. It lives in semiarid shrublands, like sagebrush, grasslands, alpine tundra, as well as sagebrush openings in subalpine forest. It is a tiny, long-tailed shrew with the third unicuspid tooth clearly larger than the fourth. Critically imperiled in NM, Co and WY.

Spermophilus tridecemlineatus blanca, Thirteen-lined Ground Squirrel Subspecies: G5T3. This ground squirrel occupies the eastern third of Colorado and the northwestern corner of the state including the San Luis Valley. They inhabit grasslands with short to mid-length grass and are adaptable to other prairie such as agricultural land. They prefer heavier soil and clay rather than the sandy soil of Colorado and Wyoming. They are small with light and dark stripes on their back and head, and small square dots on the dark stripes, and a yellow background color. Vulnerable in CO.

Tadarida brasiliensis, Mexican Free-tailed Bat: G5. Mexican free-tailed bat has distribution throughout north and south America from Chile and Argentina to Nebraska and southeastern South Dakota. They migrate to the states in spring and stay throughout the summer, leaving in late summer or early fall. They prefer caves but will inhabit large cracks and crevices as well. The Mexican Free-tailed Bat is dark grayish brown on its upper parts. Critically imperiled in CO, imperiled in NM.

Thomomys bottae cultellus, Botta's Pocket Gopher subspecies: G5T3Q. Colorado represents the northeastern edge of the Botta's Pocket Gopher subspecies that range from Texas to northern Mexico to California. They inhabit the arid southwest. Globally rare. Nearly endemic in CO.

Thomomys bottae internatus, Pocket Gopher: G5T?. This pocket gopher is distributed in Colorado from Pueblo west to the Arkansas River drainage. Endemic to CO.

Thomomys bottae pervagus, Botta's Pocket Gopher Subspecies: G5T3. This Botta's pocket gopher inhabits the southern San Luis Valley in the arid southwest and range from Texas to northern Mexico to California. It is globally vulnerable. Vulnerable in CO.

Thomomys bottae rubidus, Botta's Pocket Gopher Subspecies: G5T1. This subspecies inhabits the area near Canyon City and range throughout the arid southwest from southwestern Texas to northern Mexico to California. Globally imperiled. Endemic to CO.

Thomomys talpoides agrestis, Northern Pocket Gopher Subspecies: G5T3. The northern pocket gopher is found in the northern Great Plains from Southern Canada to northern New Mexico and Arizona. The soil type is more important to the gopher than vegetation preferring rocky soils or heavy clay. They inhabit many environments from pasture and agricultural lands to semi-desert, shrublands, and grasslands. They vary in color from dark brown to yellow brown or a grayish yellow. Globally vulnerable. Vulnerable in CO.

Ursus arctos, Grizzly or brown bear: G4X. The grizzly or brown bear is now found in Idaho, Montana, and in the Yellowstone region of Wyoming, but their range historically included Colorado. It can find its home in many habitats and is not limited. They range from prairie grasslands to alpine tundra. Grizzlies are largely vegetarian and feed mostly on grasses, berries, sedges and roots and follow their food source throughout the seasons. It is brownish in color and large in size with higher shoulders and long main-like hair on its shoulders. The grizzly is listed as federally threatened under the Endangered Species Act. Presumed extirpated in CO and NM, imperiled in WY.

Zapus hudsonius luteus, New Mexican Jumping Mouse: G5T2. The New Mexican jumping mouse range throughout the arid southwest and Great Plains from northern Canada south to the Rio Grande Valley in New Mexico. It inhabits coniferous forests, deciduous forests, riparian wetlands and enjoy herbaceous or grassy ground cover. This mouse has a yellowish-brown to black tipped hairs forming a dorsal stripe with its sides a yellowish orange. In New Mexico they are known from three localized vicinities.

Zapus husonius preblei, Preble's Jumping Mouse: G5T2. Preble's jumping mouseis limited to lower foothills of the Rockies between Colorado Springs and Cheyenne, WY. It inhabits riparian wetlands, shrublands and woodlands. It is vulnerable to land use conversions along the Front Range. It has large hind feet and legs that allow it to leap distances of 5-6 feet. Its tail is nearly 2/3 its total length. The Preble's jumping mouse is listed as threatened under the Endangered Species Act. Critically imperiled. Endemic to CO.

Mollusks

Acroloxus coloradensis, Rocky Mountain Capshell: G1G2. A rare North American freshwater limpet, it is only known from seven locations in Canada, Colorado and Montana. Imperiled in CO.

*Anodontoides ferussacianus***,** Cylindrical Papershell: G5. This freshwater bivalve mussel is a native endemic to many nations, and a migratory transient in Wyoming. It is found throughout mid- to eastern U.S. and Canada. Its known hosts are mottled sculpin and the sea lamprey. Globally endemic. Imperiled in CO.

Lymnaea stagnalis, Swamp Lymnaea: G5. This freshwater snail occurs regularly as a native taxon in multiple nations. It is distributed throughout the northern third of the U.S. and Canada, but is unranked in most areas. Imperiled in CO.

Physa cupreonitens, Hot Springs Physa: G2. This freshwater snail is endemic to Colorado and is imperiled.

Physa skinneri, Glass Physa: G5. A freshwater snail that is endemic as a native taxon in many nations. Status is unranked throughout Canada and most of the northern United States. Imperiled in CO.

Physella utahensis, Banded Physa or Utah Physa: G2. A freshwater snail that is found only in three states. Its benthic habitats are in rocky substrates of shallow waters of creeks, springs and brooks. Though found in a saline Utah Lake, salinities were not recorded where this snail was found. It can tolerate calcareous silty substrates. It can inhabit large springs, but has not been found in backwater sloughs. Critically imperiled in CO, unranked in WY.

Promenetus exacuous, Sharp Sprite: G5. This freshwater snail considered endemic to several nations is unranked throughout most of the western U.S. and Canada. Imperiled in CO.

Promenetus umbilicatellus, Umbilicate Sprite: G4. This freshwater snail is found throughout the western U.S. and western Canada. It occurs regularly as a native taxon in multiple nations. Vulnerable in CO.

Valvata sincera, Mossy Valvata: G5. The mossy valvata is a freshwater snail. Native species is endemic to multiple nations. It occurs in the northern central region of the U.S. from Idaho to Michigan, and throughout Canada south to Colorado. Vulnerable in CO, unranked in most other areas.

Plants

Agastache foeniculum, Lavender Hyssop (=blue giant h.): G4G5. This widespread species occurs from Ontario to Alberta, south to Wisconsin, with disjunct populations in Colorado, where it is found in well-drained soils at elevation 7,000 to 8,000 feet. The stems are 50-120 cm tall and little branched. Leaves are ovate-lance-shaped, coarsely serrate, and whitish beneath. When crushed between the fingers they smell of anise. It has dense spikes of blue flowers.

Aletes humilis, Larimer Aletes: G2G3. This plant is restricted to Wyoming and Colorado (Boulder and Larimer counties). The mat-forming perennial herbs occur on and around large, west and north-facing cliffs of Silver Plume Granite, in cracks in massive rocks and in adjacent thin soils composed of disintegrated granite as well as in duff with ponderosa pine. Larimer aletes is found at elevation ranges from 6,500 to 8,700 feet. Plants are only 2-10 cm high and have thick, leathery leaves and from March-June small yellow flowers. This plant is a former candidate (C2) for listing. Imperiled/vulnerable globally. Endemic to the SRM ecoregion.

Alsinanthe macrantha (= Arenaria or Minuartia), Chickweed (=House's stitchwort): G3?. This plant has only a limited distribution outside of the SRM ecoregion and is found in Colorado, Utah, and Wyoming. It is one of several chickweeds that whiten alpine tundra and trail-sides above tree line. Globally vulnerable?

Aquilegia laramiensis, Laramie Columbine: G2. This columbine is endemic to the Laramie Range, Wyoming (Albany and Converse counties) and occurs in crevices of granite boulders and cliffs at elevations from 6,400 to 8,000 feet. The many-stemmed 10-20 cm tall herb is leafy with nodding flowers. The sepals are greenish-white while the petals are cream colored with little spurs. Imperiled globally.

Aquilegia saximontana, Rocky Mountain Columbine: G3. This species is endemic to central and north-central Colorado in Boulder, Clear Creek, El Paso, Gilpin, Jackson, Jefferson, Larimer, Park, Summit and Teller counties. It grows on cliffs and rocky slopes of the subalpine and alpine zone (elevation range 9,000-12,300 feet) and flowers in June and August. Its short blue spurs are hooked at the tip. The flowers are usually less than 2 cm long and the plant is 8-15 cm tall. Former candidate (C2). Globally vulnerable.

Arabis crandallii (= Boechera), Crandall Rockcress: G4. This rockcress is almost limited to the SRM ecoregion; only known from 2 counties in Wyoming (outside SRM) and 2 counties in Colorado (with only 8 occurrences on record). Most records from/near Gunnison County, at 7,000 to 8,000 feet. Often it is found together with Rocky Sagebrush. The plant is 15-40 cm tall and has white or pink petals. Need to reassess rank. Endemic to CO and WY. Critically imperiled in WY, imperiled in CO.

Arabis gunnisoniana (=Boechera), Gunnison's Rockcress: G3. These perennial plants are endemic to Gunnison County, Colorado and grow at approximately 8,000 feet. The stems are 10-20 cm tall, basal leaves are pubescent, linear-oblanceolate, and the petals are pink or purplish. Globally vulnerable.

Armeria maritima ssp. sibirica (=Armeria scabra ssp. sibirica), Sea Pink: G5T5. This species occurs in Alaska, New York, and Colorado. In Colorado sea pink is known from Park and Summit counties. It requires grassy tundra slopes, wet, sandy or spongy organic soils and grows at elevations from 11,900 to 13,000 feet. Plants are 5-20 cm tall. From late June to early July they have bright pink flowers.

Artemisia pattersonii, Patterson's Wormwood: G3. This species is endemic to the ecoregion as they are restricted to the high mountains of Colorado, New Mexico, and Wyoming. It occurs on open tundra at upper elevational limit of Engelmann spruce or above timberline (11,000-13,000 feet). Stems are 8-20 cm tall, erect and unbranched. White balls framed in burgundy atop delicate stalks compliment divided silver fragrant foliage. 30-100 flowers form a head. Not relocated in Medicine Bow Range where it was historically reported to occur. Globally vulnerable. Vulnerable in CO, reported but status unknown in WY and NM.

Asclepias uncialis, Dwarf Milkweed: G3?. This widespread species is known from isolated occurrences in Arizona, New Mexico (northeast, central and southeast, but not in the ecoregion), Wyoming (outside SRM), Oklahoma and eastern Colorado (Baca, Bent, Cheyenne, Denver, Fremont, Huerfano, Jefferson, Kit Carson, Las Animas, Otero, Prowers, Pueblo, Sedgewick, Washington and Weld counties). *A. uncialis* is found in tiny populations from 4,000 to 6,500 feet and is widely distributed in shortgrass prairie habitats with sandstone-derived soils and gravelly or rocky slopes. There are two collections from pinyon-juniper woodlands in the New Mexican part of the ecoregion. This low and sprawling plant has rose-purple flowers. Stems exude milky sap when broken. It was historically more widespread. In general, its habitat, shortgrass prairie, is threatened by extensive human alterations for agricultural, residential, and recreational uses. Rare. Globally vulnerable.

Aster alpinus var. vierhapperi (=Diplactis alpina), Alpine aster (=Vierhapper's aster): G5TU. Occurs on calcaerous meadows from montane to alpine zones in Eurasia, Canada, and Alaska with widely disjunct populations in Colorado.

Astragalus anisus, Gunnison Milkvetch: G2. Known from few occurrences in Colorado but described as locally abundant (Gunnison and Saguache counties). The type locality in Pueblo county is almost certainly incorrect. It occurs on dry gravelly flats and hillsides, in sandy clay soils overlying granitic bedrock, usually among or under low sagebrush from 7,500 to 8,500 feet. The dwarf plants bloom from May to June in racemes of 3-7 pink-purple flowers. Ovoid strigose pods, 15 to 20 mm in length. Imperiled globally. Endemic to CO.

Astragalus cerussatus, Powdery Milkvetch: G3G4. Known from occurrences in Colorado (Chaffee, Fremont, Gunnison, Rio Grande, La Plata, Costilla, Conejos and Saguache counties) and New Mexico. Powdery milkvetch is locally abundant only in southern Colorado along the Arkansas River from Canon City upstream to Poncha. It is rare on rocky hillsides, on the south side of Gunnison Basin. There are approximately100 occurrences. The species is found on sandy slopes and near streams, from 5,400-8,300 feet. This species is an inconspicuous milkvetch, with diffuse stems, tiny, milky-lilac flowers (Petals are pale lilac, or whitish with lilac tips and pale purple veins in the banner). The plant is low, slender, diffuse, with a short-lived perennial taproot but flowering the first season and then appearing annual. Several stems, ascending or decumbent with ascending tips, branch together to form densely leafy tufts or loose, low clumps. This species flowers from April through August. A low threat from recreation is reported form Colorado. Globally vulnerable. Endemic to the SRM ecoregion.

Astragalus cyaneus, Cyanic Milkvetch: G3. This species occurs in New Mexico (Rio Arriba, Santa Fe, and Taos Counties). About 50-80% of the occurrences of this species fall within the SRM ecoregion. It is fairly common in a limited range (about 60 square miles in a 3 county area). It is found on dry hillsides and gullied banks, in sandy or gravelly soils, commonly in pinyon-juniper woodland; 6,900-7,300 feet. It flowers late April to June (August). This plant is relatively common within its limited range. Current land uses pose little threat to this species. Globally rare and vulnerable.

Astragalus debequaeus, Debeque Milkvetch: G2. This milkvetch occurs in Colorado (Colorado River Valley near Debeque, Garfield and Mesa Counties) from 5,100 to 6,400 feet in elevation with a limited distribution outside of the SRM ecoregion. The total range is about 300 square miles on a specific geologic formation—varicolored, fine textured, seleniferous, saline soils of the Wasatch Formation-Atwell Gulch Member. Barren outcrops of dark clay interspersed with lenses of sandstone. It also occurs in areas surrounded by pinyon-juniper woodlands. It flowers from late April to May. The plants are multi-branched, forming clumps. Flowers are white or yellowish-white, stems and pods are glabrous, but it short black hairs on calyx are distinctive. Threats include recreation, grazing, the spread of exotic plant species and disturbance from roads, off-road vehicles and oil and gas development. In spite of intensive searching, the only known occurrences of this species have been found within a few miles of the town for which it is named. Only 15 occurrences are known; most occurrences are high quality and have been visited recently. Imperiled globally.

Astragalus feensis (= A. sanctae-fidei), Santa Fe Milkvetch: G3. The global distribution of Santa Fe milkvetch is strongly limited, including only four counties in New Mexico (Bernalillo, Sandoval, Santa Fe, and Torrance counties). It is narrowly endemic to the hills beween Albuquerque and Santa Fe, and though mostly found outside of the SRM ecoregion, it exists in the Arizona and New Mexico Mountains ecoregion. With more than 100,000 individuals it is very abundant. It occurs on sandy benches and gravelly hillsides in piñon-juniper woodland or plains-mesa grassland from 5,100-6,000 feet. Originally collected in the 1840s, it was not located again until the 1940s or 1950s. That the species was not collected for a century after its discovery is curious for it is relatively common in suitable habitat within its range. There is a single recent collection for the species well outside its normal range from a roadside in Hidalgo County where it probably was introduced. Although it tolerates man-made disturbances (e.g. livestock grazing) some populations (e.g. in and around Albuquerque) have suffered from urbanization. Many populations are isolated and safe from most disturbances and not threatened by the current land uses. Globally vulnerable.

Astragalus hallii var hallii, Hall's Milkvetch: G4T4. Occurs in Colorado and New Mexico. Hall's milkvetch is frequent in intermountain valleys according to Weber. Little alpine plants with blue to purple flowers. Endemic to SRM ecoregion.

Astragalus iodopetalus, Violet Milkvetch: G3G4. Violet Milkvetch occurs in Colorado (along trail to Chimney Rock, Devils Creek/Piedra, in Gunnison Basin, and Archuleta counties) and New Mexico. There are at least 12 locations in Colorado and New Mexico. It is described as locally plentiful. This species range is about 150 miles in length. It occurs in dry places within sagebrush communities. This is a low growing violet flowered milkvetch. This species occurs on dry stony hillsides and benches, commonly on granite, often about oak thickets, in oak-pinyon forests, or among sagebrush, from 6,000-8,100 feet. Endemic to the SRM ecoregion.

Astragalus leptaleus, Park Milkvetch: G4. This species has a limited, bipolar distribution with populations in southeast Idaho and Montana and again in southeast Wyoming and adjacent Colorado. Wyoming populations are all historical. This species may be decreasing in abundance.

Astragalus linifolius, Grand Junction Milkvetch: G3Q. This plant occurs at the western edge of the ecoregion in Colorado (Mesa, Montrose, Delta counties). There are currently 21 documented occurrences. It is found only on the Uncompahgre Plateau. There are taxonomic questions about the relationship of *A. linifolius* and *A. rafaelensis*, which occurs west of the plateau. Grand Junction milkvetch grows from 4,800-6,200 feet, on the Chinle and Morrison Formations on steep dry, clayey slopes and mesa rims, with pinyon-juniper and sagebrush, occasionally near cottonwood trees. The perennial herbaceous plants reach up to 1.2 m in height, and plants form dense clumps. Flowers are white with purple tipped keel, and appear from late May to June. Pots are erect. Insect infestation may threaten reproductive viability at one site. No other threats are currently known. Formerly a candidate (C2) for listing by USFWS. Globally vulnerable. Endemic in CO.

Astragalus microcymbus, Skiff Milkvetch: G1. This species occurs in Colorado (South Beaver Creek, Gunnison, Saguache? counties). Currently there are no records from Saguache county, but it is expected to occur. It occurs in open sagebrush or juniper-sagebrush communities on moderately steep to steep slopes. It is found from 7,600 to 8,400 feet in rocky areas with a variety of soil conditions from clay to cobbles, gray to reddish in color, but also on gypsum outcrops which support other important species and communities such as a low elevation limber pine woodland . It is mainly associated with sagebrush, yucca and Indian ricegrass. Flowers from May-early with white tinged flowers with purple form loose racemes. Stems are purplish and 25-60 cm long. Grazing, contour plow treatment, residential development and off-road vehicles are threats to this species. This species may have suffered population declines due to drought. Formerly a candidate (C2) for listing by USFWS. Critically imperiled globally. Endemic to the SRM ecoregion.

Astragalus micromerius, Chaco Milkvetch: G2. This milkvetch is only known from four Counties in New Mexico (McKinley, Rio Arriba, San Juan, and ? counties) and Navajo Nation. It is peripheral to the ecoregion and more common to Colorado plateau habitats. It occurs in piñon-juniper woodland or Great Basin desert scrub, from 6,600 to 7,300 feet. This diminutive endemic is usually associated with outcrops of sandstone that are blended with Todilto gypsum or limestone. It occurs on ledges of sandstone cliffs and, occasionally, talus slopes. Often it is partly submerged in drifting sand. Chaco milkvetch has a fairly wide range, but is sporadically distributed in isolated populations. It is not significantly threatened by the prevailing land uses within its habitats. Imperiled globally.

Astragalus missouriensis var. humistratus, Missouri Milkvetch: G5T2. This species is endemic to the ecoregion and is only found in Colorado. Many sites have been impacted by grazing. Imperiled globally.

Astragalus molybdenus, Molybdenum Milkvetch (=Leadville m.): G3. This rare alpine legume is found primarily on limestone substrates in tundra and on scree slopes above treeline (occasionally on subalpine) between 11,000 to 13,200 feet. It's purplish flowers appear in July. The plant is 2-10 cm in height and has sessile pods. It is a low loosely-tufted or matted perennial. The known threats include re-activation of mining and current mining near populations, development, invasive species (*Matricaria perforata*), and overuse of hiking trails, i.e., hiker use off-trails which may trample populations. This species is endemic to the ecoregion and known from approximately 20 locations in Colorado near Leadville and Aspen (Lake, Park, Pitkin, Gunnison and Summit counties). Ranked as sensitive by the Forest Service. Was formerly a candidate (C2) for listing by the USFWS. Globally vulnerable.

Astragalus molybdenus, as treated here, follows the intent of Kartesz (1999), excluding plants in Montana (recognized as the separate species A. lackschewitzii), but including plants from Colorado and Wyoming (Wyoming plants have been distinguished as A. shultziorum) based on Kartesz's 1998 review draft and discussion with him on 14Dec98; however, Montana is shown in the distribution of A. molybdenus in the published Synthesis (1999). Lavin and Marriott (1997) recognize three different species: plants in Montana are *A. lackschewitzii*, plants in Wyoming are *A. shultziorum*, and *A. molybdenus* is restricted to Colorado. Kartesz's 1994 treatment of *A. molybdenus* included Colorado, Montana, and Wyoming plants (as indicated in 1996 unpublished distribution data).

Astragalus osterhoutii, Osterhout Milkvetch: G1. Found in a five square mile area north of the town of Kremmling, Colorado (Grand Co.), this species occurs on highly seleniferous, grayish-brown clay soils derived from shales of the Niobrara, Pierre, and Troublesome formations in the Muddy and Troublesome Creek drain-ages, on moderate slopes, sometimes growing up through sagebrush from 7,400-7,900 feet. The species is an selenophyte and is able to withstand harsh site conditions. Recent intensive inventories for the species have not increased its known range. A perennial herb, up to 10 dm tall, with linear leaves and erect, rush-like stems. Large cream-colored flowers bloom June-August, followed by pendulous pods. Construction of Muddy Creek Dam, a reservoir north of Kremmling in 1995, flooded at least 1 occurrence and impacted others. Other threats to this species include off-road vehicles, oil and gas drilling, and mining. This species is listed as endangered by the USFWS. Critically imperiled globally. Endemic to the SRM ecoregion.

Astragalus puniceus var gertrudis, Taos Milkvetch (= Trinidad m.): G4T3?Q. This species is endemic to the SRM ecoregion and is only known from two counties in New Mexico. It is uncommon and globally vulnerable. Should be a T2. ***Questionable Taxon.

Astragalus ripleyi, Ripley Milkvetch: G3. Limited findings of the species in New Mexico (Rio Arriba and Taos counties) and Colorado (Conejos county). It occurs on volcanic substrates in open-canopy ponderosa pine-Arizona fescue savannah and along the edges of mixed coniferous woodlands where Arizona fescue is dominant (elevation 8,200-9,300 feet). The plant is 40-70 cm tall with few stout, erect stems. In June and July its dense raceme of pale lemon-yellow flowers appear. It may occasionally be impacted by brush control projects since it is often found in piñon-juniper-oak communities and with big sagebrush. Grazing is the primary current land use in its habitat, but other uses include logging, firewood cutting, big game management, agricultural conversion, road building and maintenance, and off-road-vehicle recreation. Fire suppression may represent a significant threat. A New Mexico population that burned in 1996 apparently had dramatically increased numbers of plant. It is also grazed by livestock and wildlife. Plants appear to tolerate moderate grazing. Erosion caused by heavy cattle grazing may be more detrimental to the plants than the herbivory itself. Heavily grazed sites may also be more vulnerable to weed invasion, especially yellow-sweet clover, that appears to out-compete Ripley milkvetch. USFS Region 2 Sensitive Species. Globally vulnerable. Endemic to NM and CO.

Astragalus sparsiflorus, Front Range Milkvetch: G3?. This endemic species is only known from Colorado in South Platte Canyon. Globally vulnerable.

Astragalus wetherillii, Wetherill Milkvetch: G3. Wetherill milkvetch has a limited distribution. Extant only in six to seven western counties in Colorado (Garfield, Mesa, Montezuma, Moffat, Ouray, and San Miguel counties), where there are 38 occurrences. There is one historical population from Utah. This short-lived perennial occurs on steep slopes, canyon benches, and talus under cliffs and requires sandy clay soils derived from shale or sandstone. It grows in sagebrush, sagebrush-greasewood, oakbrush, and juniper communities at 5,250-7,400 feet of elevation. From early late-May to June it shows pinkish white flowers with pink lines on the banner. Pods are elevated on a stalk and show the same strictly appressed pubescence as the leaves do. Although relatively widespread, populations are infrequent and invariably consist of few individuals. Populations are threatened by oil and gas development, overgrazing, erosion, and road construction. Globally vulnerable.

Azaleastrum albiflorum (=Rhododendron albiflorum ssp. warrenii), Cascade Azalea: G4. Populations of this taxon ares disjunct from the northwest, occurring in Colorado (Jackson, Larimer and Routt counties), while the other subspecies, *albiflorum*, is found in Idaho, Montana, Oregon and Washington. This small, flowering shrub occurs in moist to well-drained woods, occasionally forming a relatively dominant understory with Engelmann spruce and subalpine fir and lodgepole pine. This species has grayish bark and short-petiolate, narrowly elliptic, sparingly pubescent leaves. It has white flowers borne in small axillary clusters. Corollas are broadly campanulate and up to 2 cm wide. The flowers of the Cascade azalea are present from July to August and are mildly citrus-scented. There do not appear to be any major threats or management concerns for existing populations, however, logging and other surface-disturbing activities should be avoided.

Besseya ritteriana (=Synthyris r.), Ritter's Coraldrops (=Kitten Tails), G3?. This species is only known from Colorado. Ritter's coraldrops tend to grow quite scattered in meadows (often among much taller or showier plants) and is also found on tundra and on moist banks near treeline (2,130-3,500 m). These subalpine/alpine plants bloom early, and are thus known to few hikers. Their tiny yellow flowers cluster tightly and resemble small corncobs. Globally vulnerable. Endemic to the SRM ecoregion.

Botrychium campestre, Prairie Moonwort (=p. dunewort): G3. This species is widespread and can be found in Ontario, Saskatchewan, central Alberta to southern Iowa, Michigan, Minnesota, Oregon, Montana, Nebraska, New York, North Dakota, Wisconsin, the Wyoming Black Hills (Crook county), and northeastern Colorado (Clear Creek and Yuma counties). *Botrychium campestre* occurs over a fairly broad range. It occurs on dry, gravelly hillsides from 3,700-10,800 feet on prairies, dunes, and fields over limestone. It is often associated with little bluestem although it can compete in dense prairie vegetation. Due to its small stature, it may be overlooked, and rhizomes may not produce an aboveground leaf every year. Leaves appear in early spring, spores produced in early spring, dying back in late spring and early summer. Because it is extremely inconspicuous and difficult to locate, it has been thought to be more rare than is actually the case. Globally vulnerable.

Botrychium echo, Reflected Moonwort: G2. This widespread moonwort species is known from nineteen occurrences scattered across northern Utah and central Colorado. (Boulder, Clear Creek, Conejos, El Paso, Grand, Gilpin, Gunnison, Lake, Larimer, Park, San Juan and Teller counties). Report from northern Arizona needs verification. Many occurrences consist of fewer than 10 individuals and the total number of individuals documented at all extant sites is less than 50. This species hybridizes with western moonwort *(B. hesperium)*. It occurs on grassy slopes, roadsides, and at the edges of lakes at elevations between 9,500 and 11,000 feet, usually in gravelly soils and also in disturbed subalpine forest sites. Leaf blade divided into dissimilar vegetative (sterile) and sporebearing (fertile) segments. The plant has a shiny green frond. Basal pinnae mostly cleft into a smaller lower segment and larger upper segment. Imperiled globally.

Botrychium hesperium, Western Moonwort: G3. This species is widespread and can be found from southwestern Atlanta to Washington, Montana, Michigan, Utah, Arizona, Colorado, and Wyoming (unconfirmed). It occurs on dry to moist, often gravelly and lightly disturbed soil of grasslands, meadows, and mid-succession gravel bars in the valley and montane zones (3,200-8,200 feet). Western moonwort is a small perennial fern with a single erect frond, 3-13 cm high. It is divided into a sterile segment and a fertile segment. The sterile segment has a stalk 0-4 mm long, and a broadly lance-shaped to triangular blade that is pinnately divided with 1-6 pairs of closely adjacent leaflets (pinnae). The basal pinnae are usually partly to wholly pinnately divided and are larger than the lobed or entire-margined upper pinnae. The fertile segment is 2-3 times as long as the sterile segment and 1-3 times pinnately divided into linear segments that bear the spores. Leaves appearing in mid-spring, dying in early fall. Mature fronds in June-July. It is a facultative wetland species. Globally vulnerable.

Botrychium lineare, Narrowleaf Grapefern (=Slender moonwort): G1. This small fern was once found in New Brunswick, Quebec, Idaho, Oregon, Montana, California, and Colorado. Today, only five known sites support slender moonwort: two in Oregon, two in Colorado, and one in Montana. Remaining populations of the plant are extremely small, ranging from two to 53 individuals. One of several moonworts with a large range, but with sporadically occurring, widely separated, and extremely small populations. The total number of individuals so far observed throughout North America is very low (< 100) with the largest number of individuals ever noted at a single site being 45 (counted in 1989 in Colorado). The plant occurs in meadows, under trees, on grassy slopes, among medium height grasses, along edges of streamside forests and on limestone cliffs mostly at higher elevations (7,900-9,500 feet). Plants are pale green and vegetative segments have 4-6 strongly separated pinna pairs. Threats to this species include habitat succession due to fire suppression, livestock grazing, mining, exotic species, urban development, timber harvest, roads, recreation and naturally occurring events. Critically imperiled globally.

Botrychium pallidum, Pale Moonwort: G2. This species has a broad but disjunct range and is local in its distribution. It can be found in southern Canada, Maine, Michigan, Minnesota and Colorado (Boulder, Conejos, Gunnison, Larimer, Park, San Juan and Teller couties). It occurs on open exposed hillsides, burned or cleared areas, old mining sites, overall areas kept open due to regular disturbance regimes (e.g. fire, cattle grazing); primarily open fields. Occasionally found in more shaded places. Often associated with other moonworts. Elevation range between 9,800 and 10,600 feet. Plants are pale green and glaucous. The basal pinnae has an enlarged upper lobe. Spore-producing period is July and August. Some years plants don't show above the ground. This small, inconspicuous species may have been overlooked; its range may be more continuous than our present knowledge indicates. It is vulnerable to successional overgrowth of its habitat. Imperiled globally.

Botrychium pinnatum (=Botrychium boreale var. obtusilobum), Northwestern Moonwort: G4? This species occurs in Alaska, Arizona, California, Idaho, Montana, Nevada, Oregon, Washington, with a disjunct distribution in Utah, Colorado (San Juan, Archuleta, Montezuma, and Mineral counties) and Wyoming (unconfirmed). At least 6 locations in the San Juan Mountains are known. No occurrences outside the San Juans are known. Terrestrial on grassy slopes, streambanks, and in mossy woods in moist to wet soil. Found growing in a relatively dense growth of low herbs in contrast to the more open habitat (roadsides) where Colorado moonworts are usually found. Reflected moonwort is an associated species.

Botrypus virginianus (=Botrychium virginianum ssp. europaeum), Rattlesnake Fern: G5. Widely distributed throughout Asia, Europe, Canada, Mexico, Central and South America. It is found in every state in the U.S. except Hawaii, California, Puerto Rico and Virgin Islands. Known from WY outside the SRM. In Colorado it occurs in Boulder and El Paso counties. Occurs from 6,000 to 9,500 feet in springs and moist areas in cool ravines. It is much taller than other *botrychium* species. Spores are produced in June and July. Sterile portion triangular, dissected. The fertile branch consists in a spike of brown spore-bearing branches. Disjunct.

Braya glabella var glabella, Arctic Braya: G5. Arctic braya is found in Alaska, Yukon, British Columbia, Northwest Territories, Quebec with strongly disjunct populations in central Colorado (Chaffee, Gunnison, Park and Pitkin counties). Recently found in WY outside the SRM. It occurs on calcareous substrates, especially Leadville limestone; sparsely vegetated slopes above timberline with fine gravels or on disturbed sites associated with inactive mines. Elevation ranges from 12,000-13,000 feet. It has white to purple tinged flowers (July), short thick capsules, and a leafless stem.

Braya humilis, Alpine Braya: G4. Ranges from Alaska, Alberta, British Columbia, east to Greenland, Newfoundland, and Vermont, with severely disjunct populations in central Colorado (Chaffee, Gunnison, Park, Pitkin, and Summit counties) on calcareous soils (Leadville limestone or Manitou dolomite), exposed slopes, solifluction lobes, scree slopes; slightly disturbed microsites from 11,400-12,800 feet. It has leafy stems, long, narrow fruits, and grayish white petals. Recently documented from WY, but outside the SRM.

Calochortus gunnisonii var perpulcher, Pecos mariposa Lily: G4G5T2. This lily is endemic to New Mexico (southwestern Mora and northwestern San Miguel Counties; southeastern part of the Sangre de Cristo Mountains). It occurs in meadows and aspen glades in upper montane coniferous forest; 9,500-11,200 feet. Flowers late July and August with pale yellow petals. The variety *gunnisonii* also occurs in the Sangre de Cristo Mountains and is distinguished by its white, pale purple, or dark purple petals. The variety *perpulcher* may be a color form of a variable species and needs further study. Attempts to relocate the historical population on Hermit Peak have been unsuccessful. Efforts to transplant the bulbs of this species to landscape gardens nearly always go unrewarded and should not be attempted. All known locations for this variety are within the eastern half of the Pecos Wilderness in the Santa Fe National forest. Presumably, it requires the same habitats as the common variety. Nothing is known of this species' response to livestock grazing and forest fire. Gardening hobbyists will occasionally take mariposa lily bulbs from their native habitats. Habitat is diminishing from lack of forest fire.

<u>*Carex concinna,*</u> Low Northern Sedge: G4G5. This sedge occurs in Alaska, Yukon east to Newfoundland and Michigan, Montana, South Dakota, Wisconsin, and Oregon. It is an arctic disjunct in Wyoming (outside SRM) and Colorado (Chaffee, Summit, Clear Creek counties). It is found in cool, moist forests with mosses, on rich peaty soil, often calcareous, and it occurs in wetlands as well as in non-wetlands bewtween 8,800-10,500 feet in elevation. Fruits mature in July. Stems single or loosely tufted, 10-40 cm tall, rhizomatous. Bract reduced to bladeless sheath. Roads and mining have likely destroyed some populations however, currently known populations do not appear immediately threatened.

<u>*Carex lasiocarpa,*</u> Slender Sedge (=Woolyfruit s.): G5. This is an arctic disjunct. It has a scattered distribution across North America and Europe. In the United States it is known from Washington to Maine, south to California, Utah and Colorado (Jackson and Larimer counties), in Wyoming (outside SRM), and absent from New Mexico. It occurs form 9,000 to 10,000 feet. It is found in swampy meadows and ponds in water to about 30 cm deep. In Colorado it is an obligate wetland species, but in Utah it is also found on subalpine moraines. Fruits mature by mid to late August. Populations are threatened by hiking trails into or very near wetlands. Several populations are in wilderness areas or proposed natural areas. Any hydrological modifications such as water diversion, heavy grazing, etc. should be avoided in areas where this species occurs.

<u>*Carex livida,*</u> Livid Sedge: G5. This is an arctic disjunct known from Labrador, Newfoundland, Manitoba to the Aleutian Islands, south to New Jersey, Michigan, northwest Montana and California, disjunct populations in Colorado (Larimer, Jackson and Park Counties) and Wyoming (outside SRM). It occurs in rich fens; graminoid dominated mineral-rich wetlands, floating mats and bogs, between 6,400-10,000 feet in elevation. Fruits mature in July-August. Leaves are only found on lower 1/3 of stem, deeply grooved, 1-4 mm wide, waxy bluish-green. Plant is strongly glaucous with single or loosely tufted, 10-40 cm tall stems, rhizomatous. This species is potentially threatened by road building, logging and associated activities.

<u>*Carex nelsonii (=C. estesiana),*</u> Nelson's Sedge: G3? This sedge is limited to Colorado, Montana, Utah, Wyoming, but it may be more of a Northern Rockies species. In Colorado and Utah it is an obligate wetland inhabitant, in Montana and Wyoming it is equally likely to occur in wetlands or non-wetlands habitat. Globally vulnerable.

<u>*Carex oreocharis,*</u> Grassyslope Sedge: G3. This species is limited to Arizona, Colorado (Gilpin, Conejos, Park, El Paso, Custer, Boulder, and Teller counties), New Mexico and Wyoming. SRM region populations may be in the minority. Occurs on dry grasslands, in granitic soils. Elevation for the entire range is 7,500 to 10,600 feet. In Colorado one specimen was found at 11,800 feet. Globally vulnerable.

<u>*Carex perglobosa,*</u> Globe Sedge: G3G4. Fairly widespread in the mountains of Colorado (at least 15 counties) and also known from the La Sal Mountains of Utah, although rare. Limited distribution outside of the SRM ecoregion. Globally vulnerable.

<u>*Carex viridula,*</u> (Little) Green Sedge: G5? Disjunct, peripheral. Found in Japan, from Newfoundland to Alaska, south to New Jersey, Indiana, New Mexico, Utah, California, Colorado (6 locations in Colorado, none large: Gunnison, Jackson, La Plata, Park and Summit (?) countes), and Wyoming (outside SRM). Occurs almost always under natural condition in wetlands. Infrequent in most of SRM ecoregion area, on borders of streams, ponds, and lakes and in marsh bogs, wet meadows, mostly with basic substrate, and riparian communities. pH ranges from 4.5 to 7.5. Occurs between 8,700-9,200 feet in elevation. High fire and salinity-tolerant. Has a staminate terminal spike and sessile or short peduncled female spikes. Fruits in early July through early October. Threats or management needs for this species are currently unknown. Until more is learned about this species hydrological modifications should be avoided.

<u>*Castilleja lineata,*</u> Marsh Meadow Indian-Paintbrush: G4? This species occurs in New Mexico and Colorado (Archuleta county, southcentral and southwestern Colorado). Usually occurs in wetlands, but occasionally found in non-wetlands. Elevation range is from 7,000 to 10,000 feet. It is found on moist slopes and meadows in the mountains, flowering form July through August. Endemic to the SRM ecoregion.

Castilleja puberula, Downy Indian-Paintbrush: G2G3. This species is only known from the alpine zone of Colorado (Park, and Larimer counties, northcentral and central Colorado). It is found on rocky tundra and high peaks of the Continental Divide from 8,000-13,000 feet. A perennial herb. Inflorescences have yellowish bracts and flowers that are distinct in having a lower corolla lip that is much longer than the upper lip. Its alpine habitat is well protected, so it is probably not threatened. Imperiled globally. Endemic to the SRM ecoregion.

Chondrophylla nutans (Gentiana n.), Tundra Gentian: G? This species is known from Colorado and Wyoming. Disjunct. Occurs in generally moist tundra at approximately 12,000 ft.

Cirsium perplexans, Rocky Mountain Thistle: G2. This species is limited to Colorado (Mesa, Montrose, Delta, Eagle, and Ouray counties). The corolla is pink or purplish. Occurs in mountains and plains from 4,500 to 7,000 feet. Found on barren gray shale slope above intermittent stream bed and adobe hills. Threats include non-native plants invasion, improper grazing, proximity to roads, and difficulty distinguishing it from a non-native thistle. Imperiled globally.

Cirsium scapanolepis (=c. spathulatus or c. spathulifolium), Mountain Slope Thistle: G1. This species is only known from Colorado. A perennial thistle 6-8 dm tall, the leaves densely white-woolly beneath; the inflorescences (flower heads) are usually 2-3 cm high, their bracts with an inconspicuous dorsal glutinous ridge, and the flowers are purple to white. Found in mountain parks and slopes at elevations of 7,500-8,500 feet. Critically imperiled globally. Endemic to the SRM ecoregion.

Cleome multicaulis, Many Stemmed Spiderflower: G2G3. Widespread. Historically, this species occurred in south-central Colorado and from southeastern Arizona east to western Texas and south to central Mexico, with a population in central Wyoming outside the SRM. However, the species is in apparent decline. The Arizona populations have not been confirmed since the 1940's and species has not been seen in New Mexico in recent times (historical collections are from Las Cruces Grant county). There are now over 25 documented occurrences in Colorado alone. This species occurs on wet saline or alkaline soils or on semi-moist, open saline banks of shallow ponds and lakes with baltic rush and bulrush, often in and around alkali sinks, alkaline meadows, or old lake beds. This annual herb flowers from June through August. Its stems are 20-70 cm high, and flowers pink. Many wetlands in the southwest have been destroyed and the few remaining continue to be seriously threatened by various human uses. The species appears highly threatened, especially by water projects, and it occurs in few protected areas. The fact that it is an annual, along with its habitat specificity, may make it more vulnerable to chance extinction in a string of bad years or due to other stochastic events. Globally imperiled and vulnerable.

Crataegus saligna, Willow Hawthorn: G2. This species is endemic to the ecoregion and is only known from Colorado (Upper Colorado and Gunnison River Basins). Shrub with long erect stems, hardly branched except for very short lateral shoots. Red or black fruits. Imperiled globally.

Cryptantha weberi (=oreocarya w.), Weber's Cats-Eye: G2. This endemic species is only known from Colorado (Saguache, Conejos, Hinsdale, and Mineral Counties). It occurs in the San Luis Hills and on volcanic ash on Cochetopa Pass. This delicate little *cryptantha* (less than 20 cm tall) is one of the most distinct in the entire subgenus and is not confused with any other species because of the narrow inflorescence, pubescence, and the very distinctive nutlets. Globally imperiled.

Cylactis arctica ssp. acaulis (=Rubus arcticus L. ssp acaulis), Northern Blackberry or Nagoon Berry (=dwarf raspberry): G5T5. Disjunct. Found in northern Europe, Asia, Alaska to Newfoundland, Canada, south to Montana, British Columbia and Minnesota, Wyoming and Colorado (Grand and Park counties). Disjunct from primary range known from one creek in Colorado. Nearest population in Bighorns in Wyoming occurrence is in several sub-populations. It occurs on willow carrs, mossy streamsides, boggy woods and marshes from 7,000-9,700 feet. It blooms in single flowers with dark pin or rose-purple petals and 5 sepals from late June to early July, however, this species seldom fruits in Colorado. Leaflets have toothed margins and are blunt-tipped. In some regions (as the Intermountain Region including Western Colorado) the nagoon berry is an obligate wetland species, in other regions (as Alaska and the Northwest, including western Wyoming) it is equally likely to occur in wetlands as in non-wetlands. Critically imperiled in CO, reported in WY.

Cystopteris montana (=Filix m.), Mountain Bladder-Fern, G5. Disjunct distribution. The species is known in Eurasia; Greenland; Canada; Alaska, Montana and Colorado (Pitkin, Chaffee, Conejos, Grand, Gunnison, Ouray, San Juan and Summit counties). In the SRM ecoregion it is found in perhaps 6 sites. The nearest populations are in Glacier National Park (MT). It likes moist, rich soil in shady spruce-fir forests. In Colorado it is equally likely to occur on wetlands or non-wetlands between 9,000-11,000 feet. Spore-producing period is June through October. Distinguished from other *Cystopteris* species by its broadly triangular fronds with three main branches. Some habitat for *Cystopteris montana* is threatened by development. Other threats to this species are unknown.

Delphinium alpestre, Colorado Larkspur: G3. This larkspur is only found in New Mexico (Taos County, Sangre de Cristo Mountains) and south-central Colorado. It occurs on alpine tundra and open meadows in subalpine coniferous forests from 11,500-13,000 feet. The remote and relatively inaccessible habitats of this species provide it with a large degree of protection from land use impacts. Globally vulnerable. Endemic to the SRM ecoregion.

Delphinium robustum, Wahatoya Creek Larkspur: G2? This larkspur occurs in south-central Colorado and New Mexico (Colfax, Rio Arriba, Sandoval and Taos counties, in the Jemez, San Pedro, San Antonio, and Sangre de Cristo mountains). Found in canyon bottoms and aspen groves in lower and upper montane coniferous forest from 7,200-11,200 feet in elevation. Appears to be sporadically distributed and population sizes have never been assessed. Its response to forest fire and grazing have not been studied. Some *Delphiniums* are poisonous to cattle, so the genus as a whole is sometimes targeted for poisonous weed control by the ranching industry. Globally imperiled. Endemic to the SRM ecoregion.

Delphinium sapellonis, Sapello Canyon Larkspur: G4?. This species is limited to New Mexico (Bernalillo, Los Alamos, Mora, Sandoval, San Miguel, Santa Fe counties in the Jemez, Sandia, and the southern Sangre de Cristo mountains). It is fairly common in the Sandia Mountains, but sporadically distributed and relatively rare elsewhere. It occurs on canyon bottoms and aspen groves in lower and upper montane coniferous forests from 8,000-11,500 feet. It is equally likely to occur in wetlands or non-wetlands. This is a tall larkspur with rather drab flowers. *Delphinium sapellonis* is closely related to *Delphinium novomexicanum* of the Sacramento-White mountains. They are sometimes not readily distinguishable, except by geographic range. Additional systematic research is needed, population size has never been assessed, and the species response to forest fire and grazing is unknown. Not imperiled. Endemic to the ecoregion.

Descurainia ramosissima, Villa Grove Tansy-Mustard: G3? This species is endemic to the ecoregion and occurs only in Colorado (South Park and San Luis Valley). Globally vulnerable?

Draba globosa (=D. apiculata, D. densifolia var. apiculata), Rockcress Draba: G3. Found in western Wyoming, northwestern Utah, southwestern Montana and central Colorado (Gunnison and Lake, Clear Creek and Pitkin counties). Occurs in moist, gravelly alpine meadows and granitic talus slopes, and often on limestone-derived soils, and rock crevices between 10,400-12,500 feet. It flowers bright yellow from June to August. Form very low dense cushions with many short caudices, each topped by a cluster of broad and short incurved glabrous or ciliate leaves, forming minute cabbage-like heads. Globally vulnerable. Limited.

Draba graminea, San Juan Whitlow-Grass: G2. Known only in Colorado (Hinsdale, La Plata, Ouray, San Juan, and San Miguel Counties), ranging from 11,800-13,500 feet in elevation. It occurs on bare ground, talus slopes, fell fields and in turf when conditions are apppropriate. This species is found on late snowmelt areas. *Draba graminea* is distinguished from other species of *Draba* in Colorado by the presence of bracts subtending most of the flowers in each inflorescence and by lack of any other stem leaves. As of 1980, some populations were threatened by erosion from nearby jeep trails. Most populations were fairly safe due to the relative inaccessibility and rockiness of the locations. Some populations are in currently designated wilderness areas. Imperiled globally. Endemic to CO.

Draba grayana, Gray's Peak Whitlow-Grass: G2. Limited to Colorado (Clear Creek, Gilpin, Grand, Lake, Larimer, Park and Summit, Chaffee, Saguache, Pitkin , Huerfano counties). Found in gravelly alpine slopes and fellfields from 11,500-14,000 feet. The clawed, yellow petals exceed the sepals. Petals and sepals are early deciduous. The plant has several stems, forming compact tufts. Leaves are ciliate with simple hairs. Stems are pilose with tangled pubescence, but siliques are glabrous. Impacts from off-trail hikers are most important threats. Most alpine areas are not heavily impacted in this way. Imperiled globally. Endemic to CO.

Draba porsildii var. porsildii, Porsild's Whitlow-Grass: G3G4T3T4. This species is known from Alaska, with disjunct populations inside the SRM ecoregion in Colorado (Boulder, Summit, Gilpin, Lake, Park, Clear Creek, San Juan, Pitkin, Chaffee, and Gunnison counties), and outside of the ecoregion in Wyoming. Range in elevation from 11,400 to 14,100 feet. Found in alpine areas on tundra and fellfields. Flowers and fruits in July. No threats known.

Draba rectifructa, Mountain Whitlow-Grass: G3?. Disjunct. Arizona, Colorado (Rio Grande, Mineral, Eagle, Saguache, Mesa, Gunnison, Summit, Huerfano, and Teller counties), New Mexico, Utah. It was formerly known as *Draba montana*. Small but well-developed rosette. Found between 7,500-10,000 feet in elevation. It occurs in the mountains on gravelly soil, in mixed conifer meadows and grasslands. Globally vulnerable.

Draba smithii, Smith Whitlow-Grass: G2. Found only in Colorado (Custer, Las Animas, Mineral and Saguache counties); many populations occur in USFS wilderness areas in the San Juan Mountains. Prefers talus slopes, in crevices and between rocks in shaded protected sites. Occurs between 8,000-11,000 feet. The whole plant is usually minutely and densely stellate-pubescent. Flowers are white and siliques are usually contorted. Stems have several stem leaves. Globally imperiled. Endemic to CO.

Draba spectabilis var. oxyloba, Showy Draba (S. whitlow-grass): G3T3Q. Found in Colorado (Conejos, San Juan, Gunnison, Delta, Montrose, Garfield, Pitkin, Hinsdale, Archuletta, Summit, and Dolores counties), Utah, Wyoming, New Mexico. Occurs in the mountains, often in meadows or forests between 8,000-10,000 feet in elevation. Globally vulnerable. Limited.

Draba streptobrachia, Colorado Divide Whitlow-Grass: G3. This species only occurs in Colorado (Hinsdale, Conejos, La Plata, Mineral, Ouray, Park, Pitkin, San Miguel, Clear Creek, Jackson, Lake, San Juan, Gunnison, Larimer, Summit, and Chaffee counties). A yellow-flowered alpine with fewer than 4 stem leaves. It is apparently restricted to areas above treeline in Colorado with an ranging between 11,500 to 14,000 feet in elevation. Grows on dry rocky sites, scree slopes, along the edge of talus slopes and sometimes in fellfields. The species was described as a new species in 1980 by Price. It may be protected by its high altitude habitat although some populations could be impacted by hiker use. One population occurs on a mine dump site near a road, but appears to be doing well. Globally vulnerable. Endemic to the SRM ecoregion.

Draba ventosa, Wind River Whitlow-Grass: G3. This species occurs in Alaska, Montana, Nevada, and Utah and has a limited distribution in Colorado (Gunnison, Pitkin, Lake and Chaffee counties), and Wyoming (outside SRM). Found between 11,000-14,00 feet in alpine tundra and talus habitat. Flowers from late July through August and sets fruit in mid August. Threatened by the impacts from hikers. Globally vulnerable.

Draba weberi, Weber's Draba, G1. Weber's draba is only known from Summit County in Colorado. It occurs in rock crevices at edges of streams at about 11,500 feet. It has clawed, yellow petals and leaves with simple and forked hairs. The pollen grains are sterile but ample viable seeds are produced through the process of agamospermy. Critically imperiled globally. Endemic to the SRM ecoregion.

Drosera rotundifolia, Round-Leaved Sundew: G5. This species is found in Eurasia; northeastern U.S. and Canada; south to Idaho, California, Florida, Nevada, and Montana, with disjunct populations in Colorado where it is only known from 3 counties (Grand, Gunnison and Jackson counties). Found on floating peat mats and on the margins of acidic ponds and fens between 9,100-9,800 feet in elevation. Blooms in July although its pinkish flowers seldom open in Colorado, making it appear perpetually in bud. The genus name, Greek for "dewy", refers to the moist, glistening drops on the leaves, to which small organisms stick. Longer-stalked glands near the edge of a leaf slowly bend inward, securing and placing an entrapped organism in the digestive area of stalkless glands. Leaves are oval to orbicular.

Dryopteris expansa (=d. assimilis; d. dilatata; d. spinulosa), Northern Wood Fern (=spreading woodfern): G5. This fern occurs from Alaska to California, in Wisconsin, Michigan, Minnesota, Montana with disjunct populations in Colorado(Larimer, Gilpin, Grand, Clear Creek counties) and Wyoming (outside SRM). It is found on both sides of the divide in Rocky Mountain National Park. There is an old record from near James Peak. The nearest populations are in Yellowstone National Park. Found in cool moist woods and rocky slopes between 9,000-10,000 feet in elevation. Colorado populations occur in organic matter in rock crevices *with Lycopodium sp. Cystopteris sp*, and mosses. Produces spores in August. Populations known to CNHP occur in relatively inaccessible areas in Rocky Mountain National Park so there are no immediate management concerns.

Ericameria microcephala (=haplopappus), Small Head Goldenweed: G3? Found only in New Mexico (eastern Rio Arriba and western Taos counties). This species occurs on granitic rock crevices in open ponderosa pine forests from 8,000-8,500 feet. It flowers from June to July with yellow disk flowers, inconspicuous rays and pappus of numerous white capillary bristles. This species is locally abundant within its limited range between Tres Piedres and Petaca, New Mexico. The generic affinities of the small-headed goldenweed need further clarification. The bare, rock face habitats of this species offer a great deal of protection from human and forest fire impacts. Globally vulnerable. Endemic to NM.

Erigeron lanatus, Woolly Fleabane: G3G4. The woolly fleabane is found in British Colombia, in southern Alberta, and in northwestern Montana with disjunct populations in Colorado (Chaffee, Gunnison and Pitkin counties) and Wyoming (outside the SRM ecoregion in Wind River Range in Sublette county). It occurs on steep alpine scree and subalpine limestone talus slopes. Usually it is found in non-wetlands, but occasionally it can be present on wetlands. Its elevation range is from 11,000-13,500 feet. It blooms in late July to August and is distinguished from other taxa by its apetiolate leaves, which narrow to the base with at least some of them 3-toothed at the apex. It has only one large flower head per stem, with numerous white, blue or pink ray flowers and white pappus bristles. Leaves and stems look wooly due to the long soft hairs.

Erigeron subglaber, Pecos Fleabane: G3. This is a narrowly endemic that is sporadically distributed on some high ridges and peaks of the Sangre de Cristo Mountains in New Mexico (northwestern San Miguel and central Taos counties). The largest known concentration of this species is on the Elk Mountain Ridge of the southern Pecos Wilderness. A specimen from Wheeler Peak (Taos county) is atypical and tentatively placed within this species. It occurs on rocky, open meadows in subalpine coniferous forest form 10,000-11,500 feet and flowers in August and early September. The ray flowers (25-35) are purplish or bluish, achenes are 2-nerved and somewhat hairy. Pappus is of sordid capillary bristles. A radio tower and associated road have slightly impacted one of the larger populations of this plant. Most other populations are in remote wilderness areas where there are no threats to its habitats. Globally vulnerable.

Eriogonum brandegeei, Brandegee Wild Buckwheat: G1G2. This buckwheat is endemic to south-central Colorado (Chaffee and Fremont counties). It lives in open sagebrush or pinyon-juniper stands; on white to grayish soils from limestone to shale of Dry Union Formation and lower members of the Morrison Formation. Elevation ranges from 5,700-7,600 feet. This species is distinguished from other *Eriogonum* species by its leaves, which are densely tomentose on both sides and by its unbranched flowering stalk. It flowers from July through August. Threatened by bentonite mining, recreational use, fossil excavation and residential development. Increased development for mountain homes around Salida could pose a significant threat to the species in the future. Critically imperiled globally.

Eriogonum coloradense, Colorado Wild Buckwheat: G2. Found only in Colorado (Gunnison, Park, Pitkin and Saguache counties). It occurs on gravelly or sandy soil, often subalpine and alpine slopes, some-times montane grasslands from 8,500-12,500 feet. Flowering season is July through August, white to pinkish flower. The leaf margins are rolled under. Leaves are less than 1 cm wide, green above, tomentose below. Plant is 6-10 cm tall. Globally imperiled. Endemic to the SRM ecoregion.

Eriogonum exilifolium, Dropleaf Buckwheat: G3. Limited to Colorado and Wyoming (Albany county). Globally vulnerable.

Eriogonum lachnogynum (=E. tetraneuris), Longroot Wild Buckwheat (woolycup w.b.): G4?. It occurs mainly in Arizona, Kansas, Oklahoma, and Texas. Disjunct populations of longroot wild buckwheat inside the ecoregion are found in New Mexico and Colorado. Limited populations on ridge north of Del Norte, dry windy north-south ridge.

Eriophorum altaicum var. neogaeum, Altai Cottongrass: G4T?. This widespread species is known from Alaska, British Columbia, Uinta Mountains in Utah, Montana, Wyoming and Colorado (Eagle, Gunnison, La Plata, Hinsdale, Pitkin, Mineral, Park and San Juan, San Miguel, and Saguache counties). It occurs in fens from 9,500-

14,000 feet. Altai Cottongrass has solitary heads with cottony white bristles and lacks well developed leaf blades. Plants are 5-35 cm tall. Fruiting period is late July to August. USFS Region II sensitive species.

Eriophorum gracile, Slender Cottongrass: G5. This species has significant boreal disjunct populations in the SRM ecoregion and is known in Eurasia; Alaska, east to Newfoundland, south to California, Nebraska, Illinois, Delaware, Wyoming (outside SRM). In Colorado it occurs in Gunnison, Huerfano, Jackson, Larimer, Las Animas and Park counties. Prefered habitats are sour fens, wet meadows, and pond edges (pH 4-6.5). This obligate wetland species is intolerant to shade and salinity. It occurs from 8,100-12,000 feet. Slender cottongrass often forms large uniform stands that are recognizable from a distance because of reddish leaf tips. There are several heads on distinct peduncles. Fruiting period is July to September.

Eutrema penlandii (=E. edwardsii ssp. penlandii), Penland Alpine Fen Mustard: G1G2. Endemic to the Mosquito Range and Hoosier Ridge in central Colorado (Park and Summit counties). This species occurs from 12,300-13,100 feet on alpine tundra, rooted in mosses on stream banks and in wetlands that remain wet year-round. It flowers from late June to early July. The species is known from few populations, most of which are threatened because of their proximity to active mines or mining claims. Mining activities that alter hydrologic regimes can destroy the fragile alpine wetlands required by the species. Critically imperiled globally.

Festuca hallii, Hall Fescue: G3G4. This widespread species is known from northern Alberta to Ontario, British Columbia, south to North Dakota, Montana, Wyoming (Bighorn, Absaroka and Medicine Bow mountains) and Colorado (Huerfano and Larimer county). It occurs on alpine tundra and dry subalpine grasslands, meadows, slopes, and open woods from 7,400-12,000 feet. It has broad reddish basal sheaths and flowers from May through August. Roots can reach a depth of 120 cm, however most are concentrated in the top 15 cm of the soil. It is a productive and highly palatable grass that developed under a winter grazing regime. Hall Fescue is sensitive to defoliation and its competitiveness declines when grazed during the growing season. The nutritional value is moderately high in the summer and is considered excellent winter forage because it retains a high nutrient level during dormancy. Light season-long grazing reduces its basal area and it is largely eliminated under heavy grazing. Plant should be grazed only once a year to a stubble height of 15 cm or more. It takes 20-40 years for overgrazed ranges of this *festuca* to recover. It tolerates grazing during dormancy. It evolved under fire frequency of 5-10 years. Hall Fescue should be burned periodically to reduce invasion of woody species. Spring burning, while plants are dormant will increase tillering more than burning during the summer or fall. It is an erratic seed producer, and several years may elapse without appreciable seed set. Germination is relatively high and stands typically take 3-4 years to establish. Globally vulnerable.

Gilia penstemonoides, Beardtonge Gilia (=Black Canyon g.): G3. This strong perennial herb is endemic to the ecoregion and only known from Colorado (Gunnison, Hinsdale, Mineral and Montrose counties). Beardtongue gilia occurs in cracks on vertical walls, narrow ledges and cliff rims. It grows in gneiss, schist and shale form 6,800-9,000 feet. It has attractive, trupet-shaped flowers on a 4-inch-long stem which arise from a dense basal rosette of leaves (these basal leaves are entire or irregularly pinnatisect). Flower color is blue, lavender, or tends toward purple, flowering June through August. Globally vulnerable.

Gilia sedifolia, Stonecrop Gilia (Uinta g.): G1. It resembles *Gilia leptomeria*. It is very narrowly distributed, known from 2 collected in Hinsdale County above 13,000 ft. Endemic to the ecoregion. Critically imperiled globally.

Grindelia acutifolia, Raton Gumweed: G3? Endemic? This species is narrowly restricted to the New Mexico-Colorado border region near Raton. It is known from Colfax county, Raton Mesa area in New Mexico and adjacent Las Animas county in Colorado. It occurs on dry slopes, open ground, roadsides in montane coniferous forest down to shortgrass prairie from 6,800-8,800 feet. Raton gumweed populations increase with soil disturbance and it is frequently found colonizing graded roadsides and coal mine waste piles. This narrow endemic often inhabits disturbed, anthropogenic habitats within its small geographic range. It is not threatened by the land uses within its natural and man-made habitats. Globally vulnerable.

Grindelia decumbens var. subincisa, Steyermark Reclined Gumweed: G4T3?. Found in Colorado and New Mexico. Imperiled. Possibly endemic to the SRM ecoregion.

Iliamna crandallii, Crandall's Wild-Hollyhock: GHQ. Only known from historical locations in Colorado (there are a total of five collections all before 1937 from the general area of Steamboat Spring, probably also on the east side of Park Range in North Park, Routt county). It is found in the same range as *I. grandiflora*. Habitat information was not reported with any of the collections of this species. Flowering and fruiting in late July. Imperiled. Endemic to the SRM ecoregion.

Iliamna grandiflora, Large-Flower Globe-Mallow: G3?Q. Occurs in New Mexico (Bernalillo, Santa Fe, and Taos counties), Arizona, Colorado, and Utah. Although it is widely distributed in the Four Corners states, this plant appears to occur in sporadic locations and with low population numbers. Damp montane meadows and stream courses from 7,000-11,000 feet. The effects of livestock grazing, timber harvest, and forest fire on this species have not been studied. Imperiled in CO, rare in NM.

Ipomopsis aggregata ssp. weberi, Weber's Scarlet Gilia: G5T1T2Q. Limited. northern Idaho and the Sierra Madre/Park Range in southeastern Wyoming and northern Colorado (Rabbit Ears Pass; Grand, Jackson and Routt counties). Openings in coniferous forests and scrub oak woodlands from 8,500 to 9,600 feet. From June through August it shows white, rarely pink flowers. Petals are fused into long, trumpet-like filiform corolla tubes, five lobed at tip. Leaves pinnately divided into numerous linear segments with loose white-wooly pubescence. Imperiled.

Ipomposis globularis (=Gilia g., Gilia spicata var. capitata), Globe Gilia (=Ballhead g. Hoosier Pass ipomopsis): G2. Found in central Colorado (Mosquito Rnage, adjacent Hoosier Ridge, and Boreas Pass). Its habitat is usually underlain with heavily mineralized Leadville limestone or Manitou dolomite. It is often interspersed with caespitose *Salix* spp. and *Dryas octopetala*. Densely woolly stems, pale green, deeply forked leaves. Globose, capitate, wooly inflorescence, flowers pale purple with heavy fragrance. Mining and four-wheel-drive recreation present the major threats to the species. Globally imperiled.

Ipomopsis polyantha (=Gilia polyantha), Pagosa Gilia: G1. Limited to Colorado (area immediately surrounding Pagosa Springs, Archuleta County). The few known populations have low population densities. It occurs on fine-textured soils derived from the Mancos Formation, on barren shale; or in ponderosa pine, pinyon-juniper or scrub oak communitie between 6,800-7,200 feet in elevation. Its flowers are white or with pink highlights bluming in late May to early August. Corolla is short tubular and stamens are strongly exserted. Threats include residential and commercial development in the Pagosa Springs area associated with airport expansion, increased recreational use of public lands by out-of-state vacationers, and two proposed ski facilities located nearby. Grazing may also impact the species. The species can apparently withstand some disturbance as it is occasionally seen growing on older road cutbanks. The effects of continual or catastrophic disturbance are not known. Critically imperiled globally. Endemic to CO.

Ipomopsis sancti-spiritus, Holy Ghost Ipomopsis: G1. Found in New Mexico (San Miguel county, found in only one canyon in the upper Pecos River drainage of the southern Sangre de Cristo Mountains). It grows on relatively dry, steep, west to southwest-facing slopes in open ponderosa pine or mixed conifer forest at 2,400-2,500 meters (7,730-8,220 ft). The geologic substrate is partly weathered Terrero limestone. This plant appears to grow best in bare mineral soils with its highest densities on disturbed sites such as road cuts. The sole location for this plant is along a road to a campground in a canyon developed for summer homes. Road maintenance, recreation, and catastrophic forest fire are immediate management concerns. In the long term, present land uses in the area influence management away from frequent disturbances that produce the early successional habitats to which this plant is best adapted. Critically imperiled globally. Endemic to the SRM ecoregion.

Ipomopsis spicata ssp. capitata, Globe Gilia (=spiked ipomopsis): G4?T2. This species is endemic to Mosquito Range, adjacent Hoosier Ridge and Boreas Pass and though to the SRM ecoregion. It only occurs in Colorado (Park, Summit, Lake counties). Occurs between 12,000-14,000 feet on alpine ridgetops, favoring west facing slopes, but it can be found on alls aspects. Often grows on gravely, calcareous soils derived from white limestone shales. This species prefers drier and drained areas. It appears able to move into disturbed areas although its dependence on disturbance is unknown. It flowers in July and early August and has a heavy fragrance. Mining and off-road vehicle, or four-wheel-drive recreational vehicles present the largest threat to this species. Imperiled.

Juncus tweedyi, Tweedy's Rush: G3Q. Tweedy's rush is known from Idaho, Montana, Utah, Colorado, and Wyoming. It may be best represented in the northern Rocky Mountains but has important disjunct populations in the

SRM ecoregion. Tweedy's rush is an obligate wetland species that is often associated with thermal areas, especially in areas with quite acid composition. Subsumed in *J. brevicaudatus* in Flora North American project, and if treatment is accepted, it would be a disjunct in the SRM. Imperiled due to loss of wetlands. Globally vulnerable.

Lesquerella alpina ssp. parvula (=L. parvula), Narrowleaved Bladderpod: G4T3?. This bladderpod is limited to Colorado, Utah and Wyoming. Imperiled.

Lesquerella pruinosa, Frosty Bladderpod (=Pagosa b.): G2. Only known form Colorado (around Pagosa Springs in Archuleta counties). It occurs on fine-textured soils derived from Mancos Formation shale from 6,800-8,300 feet, in barren areas surrounded by montane grasslands, open ponderosa pine stands with scrub oak, Douglas-fir, or Engelmann spruce communities. Fruits and yellow flowers are loosely racemose. Basal rosette with stellate pubescent leaves. Fruit is a spherical, inflated silicle. The area around Pagosa Springs is being increasingly impacted by residential and commercial development. Imperiled globally. Endemic to the SRM ecoregion.

Lomatium bicolor var. leptocarpum, Wasatch Biscuitroot (Oregon b. or Wasatch desert parsley): G4T? This species is known from Arizona, California, Idaho, Nevada, Oregon, and Washington, with disjunct populations in the SRM ecoregion in Colorado (Routt, Gunnison, Rio Blanco, Mesa counties), and Wyoming. The record from Mesa county needs verification. Found between 7,600-10,300 feet in elevation in clay soils of hills and plains. Flowers from late April through June. Imperiled.

Lupinus crassus, Payson Lupine: G2. Peripheral. Colorado Plateau endemic (occurs in the SRM ecoregion in Montrose county). Payson lupine occurs in pinyon-juniper woodlands and on fairly open ground beneath junipers. Soils are usually sandy and are derived from the Chinle Formation. Plants also occur on loamy to clayey soils and even on adobe hills and may also occur on Mancos Formation shales. They grow in draws and washes with sparse vegetation from 5,000-6,000 feet and flower in May with a white to pinkish bloom. The succulent herbage and prostrate habit are distinctive. Threats to the species include overgrazing, landfills, road construction, and oil and gas exploration and extraction. Imperiled globally.

Luzula subcapitata, Colorado Wood-rush: G3? This species is an obligate wetland species. Known from Colorado. Globally vulnerable. Endemic to the SRM ecoregion.

Machaeranthera coloradoensis (=Haplopappus coloradoensis), Colorado Tansy-Aster: G2?. This species has a limited distribution outside the ecoregion and is endemic to south central Wyoming (Albany and Carbon Counties) and western Colorado (Gunnison, Hinsdale, La Plata, Lake, Mineral, Park, Pitkin, Saguache and San Juan Counties). It occurs on gravelly areas in mountain parks, slopes and rock outcrops up to dry tundra and on sandstone/limestone outcrops between 8,400-12,500 feet in elevation. Flower heads are large, solitary, on short stalks. Stems are grayish-white pubescent. Ray flowers are pink, rose or purple and 1 cm long. Leaves are coarsely toothed. Two varieties are recognized in Colorado: var. *coloradoensis* and var. *brandegei*, though the distinguishing characteristics for each variety are not yet clear. Flowering July through early August. Imperiled globally.

Mentzelia chrysantha (Nuttallia ch.), Golden Blazing Star: G1G2. Limited distribution. Found in Colorado (Fremont and Pueblo counties) along the middle Arkansas River Valley in the Canon City/Pueblo area on shale barrens, where there are ten extant occurrences. Barren slopes of limestone, shale, or clay between and elevation of 5,120-5,700 feet. Most occurrences in the central shortgrass prairie and the Great Plains. Flower July to early September or late August to early September. Flowers open in the evening. Globally imperiled, possibly critically imperiled. Endemic to CO.

Mentzelia conspicua, Chama Blazing Star: G2. This is a narrow New Mexican endemic (Rio Arriba county, upper Rio Chama basin) with specific habitat requirements. It occurs on road cuts and barren hillsides, on gray to red shales and clays of the Mancos and Chinle formations in piñon-juniper woodland from 5,900-7,200 feet. Its large yellow flowers make it the most beautiful of New Mexico's blazing stars, and it is commercially offered for ornamental use. A Torrance county specimen of this species is either mislabeled or represents an introduced occurrence that no longer persists at the site of collection. *Mentzelia conspicua* is an early colonizer of disturbed areas (e.g., road cuts) and seems to be crowded out by invasive weeds such as *Melilotus*. Additional field surveys are needed to determine its abundance in natural areas. Imperiled globally.

Mentzelia densa (=Nuttallia d.), Royal Gorge Stickleaf (=Arkansas Canyon st.): G2. Only known from Colorado (Fremont county, Arkansas River Canyon between Canon City and Cotopaxi), where it occurs in washes, on naturally disturbed sites, and steep rocky slopes, steep igneous canyon walls in mountain shrub communities. It prefers dry open sites, often with pinyon-juniper, sagebrush, or mountain mahogany on precambrian granodiorite, gneiss, gravel, and scree from 5,800-7,200 feet. Royal Gorge stickleaf flowers from July to early August. Known localities are immediately adjacent to highways but other threats are not known. Livestock probably have little impact on the species because of its inaccessible habitat. Imperiled globally. Endemic to the SRM ecoregion.

Mentzelia multicaulis, Many Stem Stickleaf: G2G3. Limited distribution. It occurs in New Mexico, Colorado (Eagle county) and Utah and contains two varieties: var. *librina* and var. *multicaulis*. Occurs at elevations between 1,500-2550m. Flowers yellow, biennial, open hillside Globally vulnerable and imperiled.

Mentzelia springeri, Santa Fe Stickleaf: G?. This endemic species is known from approximately a 5 x 25 mile range in New Mexico (Los Alamos, northeastern Sandoval and northwestern Santa Fe counties, southern and eastern slopes of Jemez Mountains). Volcanic pumice and unconsolidated pyroclastic ash in piñon-juniper woodland and lower montane coniferous forest from 7,000-8,000 feet. Named for the paleontologist Frank Springer, who first collected this species. *Mentzelia springeri* was placed into synonymy with *M. multiflora* in 1934 by Darlington and, therefore, has not been adequately studied nor represented in the floristic literature. This bushy, yellow-flowered species is narrowly endemic to the loose volcanic substrates of the Jemez Mountains and is often seen where roads cut through pumice. It favorably responds to soil disturbance within its habitats.

Mimulus gemmiparus, Weber Monkey-Flower: G2. This species is known from four counties in Colorado (Grand, Jefferson, Larimer and Park Counties). Weber monkey-flower occurs in crevices of rock outcrops, often with dripping water, granitic seeps, slopes and alluvium in open sites within spruce-fir and aspen forests from 8,500-10,500 feet. It is the only *Mimulus* species that reproduces vegetatively. Its leaf petiole bases are modified to form pockets containing dormant embryonic shoots; its flowers are yellow, but usually absent and when formed often functionally sterile. Although rare and unusual, no threats are known for the species. Globally imperiled. Endemic to the SRM ecoregion.

Myriophyllum verticillatum, Water Miloil (=myriad leaf water milfoil, whorled water milfoil, whorl-leaf watermilfoil): G5. Found in most of the US from scattered locations in North Dakota, eastern South Dakota and north central Nebraska; (circumboreal, in North.America south to Maryland, New York, Indiana, northeast Texas, Nebraska, Utah and Brittish Columbia). Known from only one location in Colorado and is peripheral in Wyoming. Milfoils are obligate wetland inhabitants, submerged freshwater plants with whorls of feathery leaves and emergent, wind-pollinated flowers. Cultivated in pools and aquariums. The plant is quite similar to *M. exalbescens*, often more robust with stems 5-25 dm long. Leaves in whorls of 4-5, with 9-13 filiform segments along each side of the midrib, 1-4.5 cm long; lower and middle nodes mostly less than 1 cm apart; winter buds present fall to early spring, clavate, yellow-green. Flowering spikes 4-12 cm long, the floral bracts much smaller than the leaves, pectinate, mostly exceeding the flowers; bracteoles minute or absent, palmately 7-lobed. Flowers perfect or the lower female and the upper male; petals reduced in female flowers, otherwise spoon-shaped, obtuse, to ca. 2.5 mm long. Fruits brownish, subglobose, 2-3 mm long, the mericarps rounded on the back, smooth or somewhat roughened. Blooms June through September. Restricted to fresh water. Uncommon.

Neoparrya lithophila (=Aletes lithophilus), Rock-Loving Aletes (=Bill's neoparrya) : G3. This species is only known from Colorado (Chaffee, Conejos, Fremont, Huerfano, Rio Grande and Saguache counties). It occurs on igneous outcrops or sedimentary rock derived from extrusive volcanics, on north facing cliffs and ledges, within pinyon-juniper woodlands with Artemisia, Ribes, Symphoricarpos, and Pinus. Elevation range is 7,000-10,000 feet. It flowers from May to early July. Grazing does not impact this species because it grows on inaccessible rock outcrops with little forage value. Globally vulnerable. Endemic to the SRM ecoregion.

Opuntia viridiflora, Santa Fe Cholla: G1Q. This species is only found in New Mexico (Santa Fe County). Gravelly rolling hills in piñon-juniper woodland, from 5,800 to 7,200 feet. Despite this plant's name, the flowers are not very green. The Santa Fe cholla is known from only two areas, Fort Marcy Park in Santa Fe and Pojoaque, New Mexico. It is a questionable taxon and often it is held that *O. viridiflora* is a hybrid derived from *O. imbricata O. whipplei*. All plants produce full crops of fertile seed which when germinated show individual variation, never toward any supposed parent, but rather well within the norm for *O. viridiflora*. Grossly similar plants of *O. imbricata O.*

whipplei hybrid origin are known from areas where the species are sympatric, such as La Plata, Colorado; Thoreau, New Mexico; and the Petrified Forest National Monument, Arizona. Populations of this species are impacted by urban development and human activity. As with other opuntias, this species is subject to a fungal disease believed to be *Gleosporium lunatum*. *Opuntia viridiflora* is a popular "cold hardy" landscape cactus due to small shrubby habit, and its orangish flowers. There is little commercial trade in the species. It is easily propagated vegetatively and by seed, and collecting seems to offer no threat. The use of this plant as an ornamental may help with the survival and possible recovery of the species should it become extinct in its natural habitat. Critically imperiled globally. Endemic to the ecoregion.

Oreoxis alpina ssp. puberulenta, Alpine Oreoxis: G4T?. Slightly puberulent at least on the fruits. Only known from Colorado. Endemic.

Oreoxis bakeri (=Cymopterus bakeri), Baker's Alpine parsley G3G4. This plant has only a limited distribution outside of the ecoregion, as it occurs in Colorado, New Mexico, and Utah. These dwarf plants of the alpine tundra can be so numerous as to appear a grassy ground cover.[2] With broad, toothed, often purplish bractlets small bracts subtending the flowers. Globally vulnerable.

Oreoxis humilis, Pikes Peak Spring Parsley: G1. Found in Colorado (Pikes Peak, El Paso county) this species occurs on Pikes Peak granitic substrate above timberline (12,000-13,000 feet), and on alpine tundra. It flowers from June through August. Plants are glabrous, with yellow flowers. Bractlets subtending flowers are linear, entire and green. Doubtfully distinct from *O. alpina*. May be threatened by hiker use. The Pikes Peak highway affects this plant in numerous locations. The highway is dirt with high use and maintenance and is causing severe erosion problems. Critically imperiled globally. Endemic in CO.

Packera pauciflora (=Senecio discoideus or S. pauciflorus), Alpine Groundsel (Few/flowered ragwort): G4G5. Disjunct. Occurs from Washington to Colorado (restricted to the edges of calcareous fens in South Park), Wyoming (outside SRM), Michigan and Minnesota, California and Nevada. Wetland indicator status for every region: while it occurs usually in wetlands in California, it usually is a facultative upland plant in the north Central Region of the United States. Threatened by peat mining and draining of wetlands.

Papaver kluanensis (=P. lapponicum ssp. occidentale or P. radicatum ssp. kluanense.), Rooted Poppy (=Alpine poppy): G3?Q. Disjunct. Found Alaska to Greenland, Wyoming (outside SRM), south to New Mexico and in Colorado (Boulder, Chaffee, Clear Creek, El Paso, Gilpin, Grand, Gunnison, Lake Park and Summit counties). Occurs in dry alpine tundra meadows, gravelly slopes, talus, scree, and fellfields between 11,500-14,000 feet. Flowers late June to August solitary flowers with yellowish petals and numerous stamens. Leaves deeply lobed, the divisions usually toothed to cleft. Globally vulnerable.

Paronychia pulvinata, Rocky Mountain Nailwort: G3. This species is an alpine plant essentially limited to the SRM from southeastern Wyoming, through Colorado south to northern New Mexico, with a few populations in northeast Utah. Globally vulnerable.

Parthenium tetraneuris (Bolophyta tetraneuris, Parthenium alpinum var. *tetraneuris*), Barnbey's Feverfew (=Arkansas River f.): G3. This species grows in Colorado and New Mexico; there are only a few occurrences outside the central shortgrass prairie. It occurs on tops of cliffs and bluffs in a variety of rock types, often in open pinyon-juniper stands. Most known occurrences are from the Canon City/Pueblo area with disjuncts in Chaffee, Costilla, and Las Animas counties. There is some question as to the validity of this species: it may just be a southern race of *P. alpinum*; if so, this would expand the range of *P. alpinum* and would be a call for review of the rank. Many populations are threatened by residentail expansion, mining of limestone for cement production and off-road vehicles. The effects of grazing are not known. Globally vulnerable. Limited.

Pedicularis scopulorum (=P. sudetica ssp. scopulorum), Sudetic Lousewort: G5T?. This endemic species is found in Wyoming, Colorado, and New Mexico.

Penstemon brandegeei (P. glaber ssp. Brandegeei), Brandegee's Penstemon: G5T?. Occurs in Colorado and New Mexico (possibly outside the ecoregion in New Mexico as well as in ecoregion). Endemic.

Penstemon crandallii var. glabrescens, Crandall's Beardtongue: G4. This variety occurs in Colorado and New Mexico. *Penstemon crandallii* as a whole species is widespread beyond the ecoregion, but the variety *glabrescens* should be targeted. Endemic to the SRM ecoregion.

Penstemon cyathophorus, Middle Park Penstemon: G3G4. Found in southern Wyoming and Colorado (Grand and Jackson counties). Rocky clay loam soils of sagebrush hills and flats. Range between 7,000-8,500 feet in elevation. Flowers late May-June. Fleshy, entire leaves, pink to pinklilac flowers, 4 stamens exserted. Endemic.

Penstemon degeneri, Degener Beardtongue: G2. Found in central Colorado (Fremont and Custer counties). Pinyon-juniper woodlands and montane grasslands; coarse gravelly or rocky reddish soil with igneous bedrock, in disturbed rocky areas, near rim of canyons. Also in cracks of large rock slabs, in deep grasy meadows with full sun or shade. Elevation range between 6,000-9,500 feet. Flowers from June to mid July. Stems short-pubescent with long stem leaves. Slender perennial with several, puberlent stems rising from a root crown basal leaves more or less petioled, lance shaped, entire and not forming a well-defined rosette. Upper leaves becoming narrower, sessile and more pubescent, inflorescence, glandular with 2-10 blue to blue violet flowers. The known populations are concentrated in the area of Royal Gorge, with one outlying population found in a similar habitat in Sheep Basin. Found on mixed private and public land. One population occurs on BLM lands grazed by domestic livestock. Other populations are in Royal Gorge. Ranked by the Forest Service as sensitive. Imperiled globally. Endemic in CO.

Penstemon glaber var. alpinus, Alpine Western Penstemon (=Alpine sawsepal p.): G5T?. This species occurs in Nebraska, Wyoming (outside SRM) and Colorado. Found in the foothills to montane regions with coarse soils. Pale blue flowers. Imperiled.

Penstemon hallii, Hall's Beardtongue: G3G4. This species is endemic to the SRM ecoregion and occurs only in Colorado. Flowers with distinct pedicels, in loose infls. corolla 17-30 cm long, purple. Found in alpine, high rocky tundra near the Continental Divide.

Penstemon harbourii, Harbour's Beardtongue: G3G4. This species occurs only in Colorado. Harbour's beardtongue has long flexible branched caudices, growing in loose alpine scree sopes. Low, with a few flowers from the axils of unmodified leaves at the stem apex. The flowers are a peculiar powder-blue. Endemic to the SRM ecoregion.

Penstemon harringtonii, Harrington Beardtongue: G3. This species is only found in Colorado (Eagle, Grand, Pitkin, Garfield, Routt, and historically Summit counties). It occurs typically on loams and clay loams derived from coarse calcareous parent materials, especially Pleistocene gravels, but also limey shales, limestones, and other parent rocks. It is most often found on open sagebrush or, less commonly, pinyon-juniper habitats stands on moderate slopes between 6,700-9,200 feet in elevation. Harrington's beardtongue flowers from early to late June and has deep blue to pinkish lavender flowers in loose spikes. There are 40 known occurrences. Primary threats are development (ski areas, residential development) and overgrazing. Fire suppression increases the chance for catastrophic fire with increased competition from perennial herbaceous plants and graminoids. Ranked as sensitive by BLM and USFS. Globally vulnerable. Endemic to the SRM ecoregion.

Penstemon mensarum, Tiger Beardtongue: G3. Limited distribution outside of the SRM. *Penstemon mensarum* is known from approximately 30 occurrences in Garfield, Mesa, Delta, and Gunnison counties. Road maintenance activities threaten this species. A vast majority of the occurrences are documented on or near USFS land. Found on montane to subalpine mountain slopes of Grand Mesa. Blue corolla glabrous inside the throat. Globally vulnerable. Endemic to CO.

Penstemon penlandii, Penland Beardtongue: G1. Known only from a very small area (about 2.4 km long by 0.8 km wide) just northeast of Kremling (Middle Park, Troublesome Creek in Grand counties). It is not likely to be confused with other *Penstemon* species in the region. It occurs disjunct from nearest relatives by nearly 150 miles on strongly seleniferous clay-shales of the Troublesome Formation; on steep barrens with sparse plant cover, and sagebrush badlands. Alkaline clays containing selenium, which is toxic to most plants. Where erosion has mixed the selenium clays with less toxic materials, this species disappears and sagebrush becomes common. Optimum habitat appears to be in runoff channels, shaded by the deeply cut banks. The species' deep root structure secures it to the underlying shales so that it is not dislodged by subsequent torrents. Associated species include sagebrush, bitterbrush, rabbitbrush. The elevation range is 7,500- 7,700 feet. It flowers from June to July. A perennial herb, up to 2.5 dm tall, with a clump-forming habit, linear leaves, and flowers with blue lobes at the opening of a violet-colored throat. One of two known populations is immediately adjacent to a refuse dump and the other occurs adjacent to a county road. The effects of grazing on the species are not known. The effects of increased recreational use of the area should a proposed reservoir be built nearby are also not known. The steep topography and nature of the soils make this species' habitat vulnerable to destruction by off-road vehicles. Listed as endangered species by the USFWS. Critically imperiled globally. Endemic to CO.

Penstemon saxosorum, Upland Beardtongue: G3G4. This species is endemic to the SRM ecoregion and Globally vulnerable. Limited to WY and CO.

Phacelia denticulata, Rocky Mountain Phacelia: G3? This species is reported from Colorado, New Mexico and Wyoming. Limited range in New Mexico. Globally vulnerable.

Phacelia formosula, North Park Phacelia: G1. Limited to Colorado (North Park in Jackson County). 8 populations are known (only 2 of them substantial) with a total of less than 8,000 individuals and annually fluctuating populations sizes. The species is restricted to outcrops of the Coalmont Formation – a coal-bearing substrate that is very susceptible to erosion. It occurs on barren, raw rusty-colored sandy substrate. The species grows most abundantly on the steepest, most sparsely vegetated, eroding slopes, such as on the sides of deeply cut ravines. It is associated with species of sagebrush and rabbitbrush. Monitoring and recovery efforts are being undertaken by cooperating agencies including the BLM and the USFWS. Elevation range from 8,000-8,500 feet. It flowers from late June through October and fruits from July to November. Flowers are purple, stamen and style exerted. Plants appear somewhat grayish as they are glandular and hirsute. In addition to being rare and local, the species is threatened by domestic livestock grazing, coal extraction, habitat modification for hay production and off-road vehicle recreational activities. Listed as endangered by the USFWS. Critically imperiled globally. Endemic to CO.

Phacelia scopulina var. submutica (=P. submutica, P. lutea var. submutica), Debeque Phacelia: G4T2. Found in Colorado (Garfield and Mesa counties). It occurs on erosive, sparsely vegetated, steep slopes; in chocolate-brown or gray clay; on Atwell Gulch and Shire Members of the Wasatch Formation. Soils often have large cracks because of the high shrink-swell potential of the clays. Seeds of the species are “self planted” by falling into these cracks; cracks close, thus covering the seeds, when wet. Elevation range is from 4,700-6,200 feet. Plants have a small rosette of reddish leaves, minute cream flowers, and specific habitat. It flowers from late April to June. Late in the summer, it shrivels up and may be washed or blown away. It is an annual plant with extremely variable population numbers. Threats include oil and gas exploration and extraction, off-road-vehicle use, trampling by livestock, and road construction and improvement. Increased visitor use in the Debeque area is expected if Roan Creek Reservoir is built. The Debeque site is the only extant locality known in the world for *P. submutica*. Plants cannot tolerate trampling. Grazing of domestic livestock occurs in the area and the BLM and USFS have established policies to regulate livestock number and seasons of use. Parcels of private land have no such management constraints. Fire suppressioon has been practiced in the past and is likely to continue. The area has recently seen increased activity associated with oil and gas exploration and extraction. The Roan Creek Reservoir is planned for the area north of confluence of the Dry Fork of Roan Creek and the main fork. Populations along county roads should not be sprayed with herbicides. Imperiled. Endemic to CO.

Phippsia algida, Snow Grass: G5. Snow grass is found in northern Asia, Scandinavia, Greenland, Canada, Alaska, Montana, with disjunct populations in northwestern Wyoming and in Colorado (Boulder, Clear Creek, Park and Summit counties). It occurs on cold gravels of snowmelt streamlets; saturated sand at inlets to alpine lakes from 11,700-14,000 feet. Fruits from mid-July through September. It has soft smooth leaves with boat tips. Culms are 1-3 cm high and densely tufted. They have tiny one-flowered spikelets.

Phlox caryophylla, Pagosa Phlox: G4. Questionable taxon. This species is known from two counties in New Mexico and three counties in Colorado (Archuleta and La Plata and Montezuma counties). P. caryophylla occurs on Mancos Shale clays, with sagebrush or pinyon-juniper communities and grassy meadows. There seems to be a slight preference for disturbed conditions. The species does well in communities in mild disclimax but it is also found on pristine sites. Often occurs along roads. It is locally abundant and is probably an insect pollinated obligate outbreeder. The USFS and the BLM are aware of the presence of this species on their lands, and have considered it in their planning activities. In the past grazing has been practiced throughout the area. The land is also subject to a variety of other uses including water management and manipulation projects. Several of the populations could be subject to mining or prescribe burning, and some areas could be affected by wood cutting and highway maintenance. Threats from increased residential and recreational use associated with nearby proposed ski areas, an improved airport, and increase popularity of the area will probably not greatly impact the species because of its wide occurrence in its area of endemism and because the taxon can tolerate mild disturbance. Spraying of roadsides with herbicides, however, should be discontinued where the species occurs. Endemic to the SRM ecoregion.

Phlox condensata (=Phlox caespitosa ssp. *condensata)*, Dwarf Phlox: G3G5. Limited to Colorado (Near Continental Divide) and New Mexico. Alpine tundra plants. Tightly cushioned with short cilate, erect leaves. Flowers white, tube 7 mm, lobes 3 mm long. Globally vulnerable.

Phlox kelseyi ssp. salina, Marsh Phlox (=Saline p.): G4T3. Disjunct, Widespread. Known from Colorado (South Park county), Idaho, and Nevada. In Colorado this subspecies is rare and local, on sedge hummocks in alkaline flats; now believed likely to be a lower altitude occurrence of *P. sibirica ssp. pulvinata* (Weber and Wittmann 1996). Not tracked by the Nevada and Idaho Heritage Programs. Blooming period in late spring. Imperiled.

Physaria alpina, Avery Peak Twinpod: G2? This species is endemic to the SRM ecoregion and occurs only on elevations over 3,350 m in the high mountains of west-central Colorado (the northeastern Gunnison Basin and the Mosquito Range, Park county). Rocky, open alpine tundra, Limestone ridge. A perennial herb with silvery leaves that form a dense rosette. Prostrate flowering stems, 3-8 cm long, radiate from the rosette and bear clusters of bright yellow flowers. Blooms June and July, fruits in August. Globally imperiled.

Physaria bellii, Bell's Twinpod (=Front Range t.): G2. This species is known from Colorado (Boulder, Jefferson and Larimer counties; northern Front Range foothills) with a limited distribution. There are 25 extant documented occurrences with a total of approximately one million individual plants. Limestones and limey shales of the Niobrara and Pierre formations. Often found where the rock has been exposed by road cuts, and along natural outcrops, such as ridge crests. Also described as loose, gray shale washes, slopes of hogbacks, sloping down to grassy meadows containing some scattered seeps. Restricted to outcrops of the Niobrara and Pierre formations in northcentral Colorado. The elevation range is 5,200-5,800 feet. *P. bellii* flowers from March to May. Flowers are yellow, and the rosette consists of basal leaves, silvery pubescent with flat stellate hairs. The species faces variety of threats including mining, suburban expansion along the Front Range, road construction and maintenance, and invasion of its habitat by noxious weeds such as diffuse knapweed (*Centaurea diffusa*). Although not threatened everywhere in its range, threats to individual populations can be significant. Mining for cement products could impact the populations near Laporte. The effects of grazing are not known. Globally imperiled. Endemic to CO.

Physaria rollinsii, Rollin's Twinpod: G2. This twinpod is and is only found in Colorado (Grand Mesa and Gunnison Basin, known from approximately 14 locations in four counties). Rollin's twinpod is found in granitic talus, open knolls, limestone, steep slopes, clay banks, near granite bolders (Rollins 1993), and sagebrush (Weber and Wittmann 1996). *P. rollinsii* is a yellow flowered perennial mustard that blooms in May and June. Eendemic to the SRM ecoregion. Globally imperiled. Limited in CO.

Platanthera sparsiflora var. ensifolia (=Limnorchis ensifolia), Canyon Bog-Orchid (=sparse-flowered bog-orchid): G4G5T3?. Known from Arizona, Colorado, Nevada, New Mexico, Oregon, and Utah. Limited distribution. Vulnerable.

Podistera eastwoodiae, Eastwood's Podistera: G4. This species is only found outside the ecoregion in the La Sal Mountains of Utah, but common within the SRM ecoregion. Known in Colorado (Pitkin, Lake, Costilla, Garfield, Mesa, La Plata, Hinsdale, Gunnison, San Juan, Dolores, Rio Blanco, Ouray, Las Animas, Conejos, Saguache counties), New Mexico and Utah. Small umbells are frequently overlooked. Subalpine and low alpine, zone of thinning willows and in the open stretches above. Found in meadows, woodlands from 9,500 to 12,000 feet. *Podistera eastwoodiae* can be so abundant, especially in sub-alpine spruce forests, that it carpets the ground in shiny, lacy greenery. Even so, *P. eastwoodiae* is not well-known and is usually passed by. It flowers in June and

July, it becomes a bit more conspicuous but even then might be taken for a small Mountain Parsley. The ribs of the fruit are filiform and not at all winged. Limited distribution. Globally vulnerable.

Polemonium confertum (P. grayanum), Rocky Mountain Jacobs Ladder: G4. This species is endemic to the SRM ecoregion and is only known from Colorado.

Polypodium saximontanum, Rocky Mountain Polypody: G3?. Rocky Mountain polypody is sporadically scattered throughout its range in the mountains of extreme northern New Mexico, Colorado, eastern Wyoming, and extreme western South Dakota. The species is found along the Front Range as well as farther west. Globally vulnerable. Endemic to the SRM ecoregion.

Potentilla ambigens, Southern Rocky Mountain Cinquefoil: G3. This species is limited to Colorado (El Paso, Mineral, Larimer, Jefferson counties), New Mexico, and Wyoming (historical) and is almost endemic to the SRM ecoregion. This species occurs very disjunctly throughout three states. It appears most common in New Mexico, although it is not well documented in collections at the University of New Mexico herbarium. In Colorado, the species has a very patchy distribution, and it has not been recorded in Wyoming since 1900. Taxonomic and field research is needed. These may be large individuals of *P. hippiana*. The only two collections inside the ecoregion of New Mexico are historical, and the more recent ones from the Sacramento Mts. (outside ecoregion) grade into *P. hippiana*. This cinquefoil occurs from 8,500 to 9,000 feet. *Potentilla ambigens* may occur in montane woods, although most Colorado populations are on grassy or colluvium slopes. Flowers in mid-late July. Threats are currently unknown. Globally vulnerable. Possibly extirpated in WY, critically imperiled in CO, reported but population unknown in NM.

Potentilla effusa var. rupincola (=P. r.), Rocky Mountain Cinquefoil (=Rock c.): G5?T2Q. Limited to Colorado. It is known from sixteen occurrences with a total population size estimated to be near 7,000 individuals (probably more). The Rocky Mountain cinquefoil, which grows among granitic rocks from 2,100 to 3,000 meters in elevation, apparently occurs infrequently from Virginia Dale to Empire. The populations do not seem to be extremely threatened, although grazing and mining might be a threat to some. Because it grows in inaccessible habitats, the species is probably not threatened. Imperiled. Imperiled in CO.

Primula egaliksensis, Greenland Primrose: G4. Occurs in northeast Asia, Alaska, Yukon, east to Labrador and Greenland, south to British Columbia; disjuncts in Wyoming (Park and Sublette counties). and Colorado (Park county). This facultative wetland species occurs on wet meadows along streams, streambanks, willow carrs and rich fens, on hummocks and calcareous montane bogs from 6,600-9,800 feet. Red-purple pendicels and entire leaves that are green on both sides. It flowers form May through July. Ranked as sensitive by the Forest Service. Several populations are threatened by peat mining and cattle grazing. These activities should be modified and/or carefully monitored so as not to harm populations of Greenland primrose. Critically imperiled in WY, imperiled in CO.

Ptilagrostis mongholica ssp. porteri (=P. porteri, Stipa p.), G2. Porter Feathergrass (Porter's false needlegrass): G3G5T2. This species is only found only within a limited range in the mountains and fens within and around South Park in Colorado. It grows in fens and peatlands with *Deschampsia*, *Salix*, and *Pentaphylloides.* The species is found on small microhabitats on the tops of hummocks in fens and peat bogs, which elevate the species a few centimeters above the water table. Elevations range from 9,200-12,000 feet. Leaf blades are very narrow and involute. Plants are 20-35 cm tall with conspicuous feathery awns. Only 1 of 17 known occurrences is currently protected. Threats include peat mining, ditching, and draining of wetlands. The Geneva Park population was apparently extirpated by peat mining. The effects of grazing are not known, but trampling by livestock may disturbs the species' fragile microhabitat. Endemic to the SRM ecoregion. Globally vulnerable. Imperiled in CO.

Ribes coloradense (=R. laxiflorum), Colorado Currant (trailing black currant): G?. Known from Alaska, California, Colorado, Idaho, New Mexico, Oregon, Utah, and Washington. Endemic.

Ribes niveum, Snow Gooseberry (=S. currant): G3? This species occurs in Idaho, Nevada, Oregon, Washington with disjunct populations in Colorado (northwest of Canon City). Along drainages of cottonwood and Currant Creeks. Globally vulnerable. Critically imperiled in CO.

Salix arizonica, Arizona Willow: G3. A distinct species in a genus of about 500 species widely distributed throughout the north temperate and arctic zones and a few in the American tropics and Southern Hemisphere. In the United States known from southern Utah and a few small populations in northern Arizona and recently found in New Mexico (San Pedro Parks, Pecos) and Colorado. Found in riparian corridors and wet meadows above 2,500 meters in elevation. A shrub with a growth habit that ranges from a large hedge to a prostrate mat. Leaves are shiny, about 3½-4 cm long. Threats to the species include cattle and elk grazing, timber harvest, and off-road vehicles, are being managed and reduced through multi-agency and White Mountain Apache Tribe conservation and management plans. The species remains vulnerable, however, due to its narrow geographic range and limited, fragile habitat it is more protected. Over-grazing in particular could easily and permanently degrade the cienega habitat through soil compaction and alteration of the local hydrology. In New Mexico this species is threatened by overgrazing by elk in the spring and cattle in the summer. Individuals are grazed down to two inches above the ground. Globally vulnerable. Critically imperiled in NM.

Salix calcicola (=S. c. var. glandulosior and var. nicholsiana, S. lanata ssp. calcicola, S. richardsonii var. *macouniana)*, Limestone Willow (Wooly w., Hoary w.): G4. This arctic species is mainly found in Canada (Labrador, Newfoundland, Onterio, Quebec, North West Territory) with disjunct populations in Colorado. Forming small thickets, about 0.5 m tall, on calcareous substrate, this shrub usually occurs in wet, stony or gravely places, rubble above high tide, and stream margins; but also on sandy and silty shores of brooks, low dunes, and clay frost boils. Limestone willow is a low, erect shrub. The leaves are usually broad to subcircular, the margins are usually minutely toothed, the stipules are small and usually ovate, the catkins are sessile, the ovaries are glabrous, and the stipes and styles long. Young twigs are densely wooly. Critically imperiled in CO.

Salix candida, Sage Willow (sageleaf w.): G5. Occurs across the northern United States and Canada from Alaska, Yukon and North West Territory, south to New Jersey, Minnesota, North Dakota, South Dakota, Washington, Idaho, Montana, Wyoming and Colorado (Gunnison, Hinsdale, La Plata, Larimer and Park counties). In Colorado, sage willow is restricted to calcareous peatlands, mostly in South Park. On hummocks in nutrient-rich fens, and thickets at edges of ponds and on river terraces; often growing with other *Salix* species and *Carex* species. This obligate wetland species ranges from 8,800-10,600 feet. These shrubs have revolute leaves, which are very dark shining green on the upper surfaces and densely white-wooly below. Flowering period is May through June. Threatened by peat mining and draining of wetlands Limited. Imperiled in CO and WY.

Salix myrtillifolia (S. lingulata, S. novae-angliae var. myrtillifolia, S. pseudocordata), Blueberry Willow: G5. Eastern Alaska and Southern Yukon, east to Newfoundland, south to British Columbia, Alberta, Montana disjunct in populations in northwest Wyoming (Park county) and Colorado (Park County, known from fewer than 5 locations in Colorado, all in calcareous peatlands of South Park). This species occurs in calcareous fens, on lake and stream banks, flood plain thickets, bogs, and moist white spruce forests. It is classified as facultative wetland species and occurs from 6,600-9,300 feet. Its catkins mature late June to mid-July. The shrubs are less then 1 meter tall. Young twigs are sparsely short-pubescent and leaves are finely serrate, glabrous, with less than 5 mm long petioles. Threatened by peat mining and draining of wetlands. Critically imperiled in WY.

Salix serissima, Autumn Willow: G4. Autumn willow is a widespread species which is found from eastern Canada to Alberta, in Massachusetts, New Jersey, Indiana, Montana, with disjunct populations in the South Dakota Black Hills, in southeastern Wyoming (Albany county), and northern Colorado (Larimer, Park and Routt counties). This obligate wetland species occurs in marshes or fens, montane swamps and bogs with other Salix and Carex species. Its elevation range is 7,800- 9,300 feet. Autumn willow flowers from May to July and catkins mature late July to early September, later than most other willow species. Trunks have a light gray bark, branches are light tan, leaf bearing twigs are a lustrous reddish-brown. Globally vulnerable.

Saussurea weberi, Weber saussurea: G3Q. This species is known from western Montana, and northern Wyoming (outside the SRM ecoregion in Fremont and Sublette counties), with disjuncts in Colorado (Hoosier Ridge and the Mosquito Range, Park and Summit Counties). It occurs on gravelly tundra or scree slopes, alpine talus and gravel fields, often on limestone. *S. weberi* is found on exposed sites with poorly developed soils derived from Leadville limestone and Manitou dolomite from 10,200-14,300 feet in elevation. Weber saussurea flowers from late July through August. The plants are 8-20 cm tall. Upper leaves are sessile, lower are petioled. Flower heads are densely clustered, appearing as one large head, 2-4 cm wide. Disk flowers are purple and ray flowers are absent. Involucres are 1 cm high, purplish with long white hairs. In Colorado some populations are threatened by hard-rock mining in its mineral–rich area of endemism. Globally vulnerable.

Scirpus rollandii *(=S. pumilus, Trichophorum pumilum*), Little bulrush (=Rolland's bulrush): G3Q. Circumboreal. Occurs in Alberta, British Columbia and Quebec, Alaska, Idaho, Colorado, Montana, Wyoming (outside SRM), and California. Little bulrush occurs on calcareous montane bogs. In some regions (including western Colorado) it is an obligate in others a facultative wetland inhabitant. In Wyoming it occurs around 6,600 feet. It is a tufted perennial herb with slender rhizomes that flowers from June through July. Stems are 5-10 cm tall, round, green, tipped with a single oval spikelet. Globally vulnerable.

Senecio crocatus (=*Packera crocata*), Saffron Groundsel (s. ragwort): G3. This species is typically uncommon and probably restricted largely to the SRM ecoregion (although it is also in the mountains of northeast Utah and Montana). It has a limited distribution outside of the SRM ecoregion. Occurs in mountain valleys and meadows, at 8,000 – 13,000 feet. In Colorado and Utah usually found in wetlands; in Wyoming and Montana equally likely to occur on wetland or on upland. Perennial plants with rather stout rootstocks, stems 20-70 cm tall. Flowers with orange-red saffron, varying somewhat to yellowish rays. Globally vulnerable. Possibly exterpated in WY.

Senecio dimorphophyllus var. intermedius (=Packera dimorphophylla var. *intermedia)*, Different Groundsel (=splitleaf g. or twoleaf g.): G4T2. Limited to Colorado (Uncompahgre Plateau in Mesa, Montrose, Montezuma, Conejos, Hinsdale, Summit, Mineral, Delta and Ouray counties) and Utah (La Sal Mountains in Grand and San Juan, Sanpete counties). In Colorado the species grows in wet meadows, often with Pentaphylloides and Veratrum, at elevations of 8,800 to 10,700 feet. Surrounding vegetation is Engelmann spruce and aspen. The species is apparently infrequent and threats have not been identified. The effects of livestock grazing are not known. Questionable taxonomy. Imperiled. Unranked in CO.

Senecio soldanella (=Ligularia s.), Colorado Ragwort: G?. Colorado ragwort is endemic to the SRM ecoregion. It occurs in Colorado and is fairly common in alpine areas in New Mexico. This scree dweller with nearly sessile golden suns has deep purple leaves. Imperiled.

Senecio taraxacoides (=Ligularia t.), Greene Dandelion Ragwort: G3G4. This species is endemic to the SRM ecoregion It occurs in the high alpine zone of Colorado and New Mexico. The plant is fleshy, toothed basal, has somewhat dandelion-like leaves and bear nodding yellow solitary flowers.

Sisyrinchium pallidum, Pale Blue-Eyed Grass: G3. This species is found in southeastern Wyoming (Albany and Carbon counties, in Wyoming Basins ecoregion) and Colorado (Jackson, Larimer, Park and Saguache counties), where it occurs from 7,000-9,500 feet of elevation. Its habitat includes margins of streams, wet meadows with rich organic soils and fens, stream banks, roadside ditches, and irrigated meadows. This perennial herb has single or tufted stems that are less than 30 cm high. S. pallidum flowers from late June to July and fruits until end of August. Petals and sepals are pale blue with a yellow base. The species is locally abundant within this relatively small geographic area and is actually increasing in Wyoming due to the creation of suitable habitat from flood-irrigation of hay meadows. In other areas, habitat is threatened by alterations to wetland hydrology. There are over 20 extant populations currently known. Primarily threatened by development of habitat and the cessation of irrigated agriculture (which is maintaining or creating suitable habitat). The impact of herbicides is unknown, but could be a potential threat. In Colorado, threatened by modifications to wetland hydrology, peat mining and water diversion and degradation of habitat by cattle. The species is globally vulnerable.

Sphaeromeria simplex (=Tanacetum s.), Laramie False Sagebrush: G2. Limited distribution outside of the SRM ecoregion, Laramie false sagebrush is known to occur at least 12 occurrences with nearly 20 subpopulations in southeastern Wyoming (Albany and Carbon counties, but also reported for Converse and Natrona counties). Cushion plant communities on rocky limestone ridges and gentle slopes. Occurs between 7,500-8,600 feet in elevation. Flowers May through August. The plant is less than 12 cm tall, with silvery-hairy leaves that are mostly basal, linear, entire or 2-3 toothed at tip. Flower heads one per stem, with numerous yellow disk flowers. At least one of the limestone outcrops where this species occurs is being quarried (although the species' immediate habitat is protected with an easement). Globally imperiled.

Spiranthes diluvialis, Ute Ladies' Tresses (=diluvim ladies'-tresses): G2. It is known from lower-elevation wet meadow habitats in the interior western United States and has a widespread distribution. The Ute ladies' tresses was federally listed as threatened under the Endangered Species Act in 1992, when it was only known from Colorado (Boulder and Jefferson counties), Utah, and Nevada. Since that time, it has been found in Nebraska, Wyoming, Montana, Washington, and Idaho. Currently the largest documented population is in Colorado. Several populations in Utah and Colorado are presumed extirpated. S. diluvialis is a rare riparian species that occurs in wet or sub-irrigated meadows, moist streambanks, and abandoned stream channels or in abandoned stream meanders that still retain ample ground water and can also be found near springs, seeps, and lakeshores. The species blooms mainly from late July through September. The flowers are white to ivory-colored, arranged in a spike at the top of the stem. Leaves are linear, mostly basal, reduced to bracts above, present at flowering time. The riparian habitats where this species occurs has been drastically modified by urbanization and stream channelization for agriculture and development. Most surviving populations are small and appear to be relict in nature. Plants are threatened by development and grazing. The disjunct pattern of distribution indicates that the taxon may be found in suitable habitat in intervening areas. Imperiled globally.

Stellaria irrigua, Altai Chickweed (Colorado Starwort): G4? This populations are disjunctly distributed through Colorado (Gunnison, Mineral, San Juan, San Miguel, Hinsdale, La Plata, and Custer counties) and New Mexico. Locally common on scree at high altitudes. Stellaria irrigua occurs on talus slopes, hard packed soils on gravelly talus slopes at 12,000 feet elevation, often associated with Ligularia soldanella. Flowers from late June to late July, fruiting in early August. None of the populations are known to be threatened because of the high and inaccessible habitat on talus slopes. All mineral operation plans should be closely evaluated for possible conflict prior to approval. Management of domestic sheep ranges in the alpine should be coordinated to prevent use of possible critical habitat. Examination should be made periodically of known populations to determine changes in use patterns. Endemic to the SRM region. Imperiled in CO and NM.

Sullivantia hapemanii var. purpusii, Purpus' Sullivantia: G3T3. This species has a limited distribution outside of the SRM ecoregion, occuring mainly in Colorado (Garfield, Gunnison, Montrose, Pitkin and Rio Blanco counties). Found in hanging gardens, wet cliffs of various geology including lime-stone, shale, and quartzite. It is an obligate wetland species that occurs from 7,000-10,000 feet and flowers in June and July. Flowers are white in open panicles with 5 stamens. Leaves are 1-8 cm long. Category 2 by USFWS. Globally vulnerable. Endemic to CO.

Telesonix jamesii (=Boykinia j. or Saxifraga j.), James' Telesonix: G4. Disjunct populations in Idaho, Colorado (Rocky Montain National Park to Pikes Peak, El Paso, Teller counties), and New Mexico. Usually on limestone or scattered sporadically on granite outcrops from alpine to Ponderosa pine forest between 8,000-12,000 feet in elevation. Large, showy, rose-pink flowers on short stems above toothed, round leaves in basal clusters.

Thelypodium paniculatum (=Thelypodium sagittatum var. crassicarpum), Northwestern Thelypody: G2G3. Limited to Colorado (1 or 2 known sites), Idaho, Montana (one historical occurrence), and Wyoming (7 known extant occurrences, with 9 only historical). This species is found in boggy flats, wet sedge meadows and wet stream banks and on hills. The genus is often on alkaline soils and chiefly in desert areas. Flowers are densely clustered on ascending stalks in cylindric inflorescences that expand greatly when in fruit. Four separate, lavender to purple petals (greater than 2.5 mm wide). Questionable taxon, difficult to differentiate from *T. sagittatum*. Globally imperiled and vulnerable.

Townsendia gypsophila, Gypsum Townsend's Aster: G2. Endemic to Sandoval county extending 30 kilometers north from White Mesa near San Ysidro in a narrow band along the western margin of the Nacimiento Mountains stopping short of Cuba, New Mexico. Weathered gypsum outcrops of the Jurassic Todilto and overlying Morrison formations. The largest populations occur on highly gypsiferous soils (rather than pure gypsum) derived from the Todilto, and the basal member of the Morrison Formation. Smaller populations grow on Todilto gypsite, a highly pure, crustose form of gypsum. A narrowly distributed endemic that is moderately abundant to scattered on gypsum or highly gypseous soils. It shares the gypsum habitats with two undescribed gypsophilic species of *Phacelia* and *Mentzelia*. Not observed to occur on a non-gypseous substrate, hence the choice of the specific epithet. It is a low-growing, taprooted perennial herb. Leaves are 8/20 mm long, 1/3 mm wide, densely hairy. Flower heads are solitary with white ray flowers, 4/7.5 mm long, and yellow disk flowers. Blooms throughout summer and fall after rains. This species occurs on tribal, State Trust, and Federal lands. The White Mesa gypsum beds on a portion of tribal lands are actively strip-mined by Centex Gypsum Corporation. Populations on mineable gypsum are endangered. Fortunately, the largest populations occur on non-commercially viable gypsum and are not endangered. Grazing could affect populations by trampling. Imperiled globally.

Townsendia rothrockii, Rothrock Townsend-Daisy: G2?. This plant is restricted to high elevations in Colorado (9 counties) New Mexico reports are apparently false[3]. This species occurs in areas above timberline that retain snow into summer. Also high plateau ridgetops in openings in Ponderosa pineforest. Range between 2,440-4,115 meters elevation. It is a perennial herb that forms low tufts of thick leaves. Large, showy flower heads with pale blue rays surrounding the yellow disk begin to bloom as the snow melts in early summer. Leaves are 1-3½ cm long. Imperiled globally. Endemic to the SRM ecoregion.

Trifolium attenuatum (=T. bracteolatum, T. dasyphyllum var. stenolobum, T lilacinum, T. petraeum T. stenolobum), Rocky Mountain Clover: G3G4. This species is found in southern Colorado and New Mexico. In the subalpine zone and rocky ledges at timberline. Thick mounds of green pointed, trefoil leaves (usually forming loose mats) are exceeded by stems of fat bright pink clovers (over 10 cm tall). Endemic to the SRM ecoregion.

Trifolium dasyphyllum var anemophilum (=T. scariosum, T. anemophilum), Windloving Alpine Clover: G4G5T?. This is a lowland taxon known only from an ellipse of about 20 miles in Albany County, Wyoming. The taxon is locally common, but its taxonomic status is questioned in Wyoming (maybe should be dropped?). White-purple-red clovers in heads of 10-30 flowers. Endemic.

Trifolium dasyphyllum var dasyphyllum (=T. lividum), Alpine Clover: G4G5T?. Limited to Wyoming and Colorado. Occurs on dry tundra. Fine pointed, gray-green, vetch leaves form close low mats with large pink and white clovers on short stems. Found in high mountains at 9,500 to 13,000 feet. Globally vulnerable.

*Trifolium salictorum (=T. parryi ssp. salictoru*m), Parry's Clover: G4T?. Only found in very wet tundra of high mountains in Colorado. Large purple-red clovers just above mats of trilobed pointy leaves. According to Weber and Wittmann (1996a) *T. parryi* is diploid with 16 chromosomes, and *T. salictorum* is tetraploid with 32 chromosomes (hybrids are rare and sterile). Endemic.

Utricularia ochroleuca (=U. occidentalis), Yellowish White Bladderwort (=northern b.): G4?. Disjunct, Peripheral. Found in the U.S. and Canada, where it is reported in Alaska, California, Colorado, Illinois, Michigan, Minnesota, New York, Ohio, Oregon and Washington. Known from only a few locations in Colorado (High Creek Fen, upper Arkansas drainage and South Park, but to be expected on the western slope, Chaffee county). Little is known about the distribution of this and other aquatic species.

APPENDIX 20

WIDE-RANGING SPECIES SUMMARIES (by Bill Merkle)

American marten (*Martes americana*)

Natural history

American martens prefer late-successional stands of closed canopy coniferous forests with large amounts of coarse woody debris that support microtine and sciurid prey (Carroll et al. 1999; New Mexico Game & Fish, 2000). Older growth or mixed age spruce-fir stands with greater than 30% canopy cover are thought to be necessary as suitable marten habitat, with 40-60% canopy cover viewed as optimal for foraging and resting (Fitzgerald et al. 1994). Studies have shown that marten abundance is reduced with increasing habitat loss and fragmentation, and that martens are absent from small, isolated habitat patches (Carroll et al. 1999). Martens avoid large openings and may not travel across open areas (New Mexico Game & Fish, 2000; Fitzgerald et al. 1994). Habitat loss and fragmentation, largely due to logging, and trapping are the main threats to marten populations (New Mexico Game & Fish, 2000; Fitzgerald et al. 1994).

Historic distribution

The American marten is found from the spruce-fir forests of northern New Mexico to the northern limit of trees in Alaska. In the western United States, martens are limited to mountainous areas that provide preferred spruce-fir habitat (Buskirk and Ruggerio 1994). Martens persist in most of these areas except areas where suitable habitat has been modified or overtrapping has led to local extirpations (New Mexico Game & Fish, 2000).

Current distribution and status

The American marten is listed G5 globally (Colorado Natural Heritage Program). In Wyoming, the species is listed as S4 (Wyoming Natural Diversity Database 2001). Two subspecies occur in Wyoming; *Martes americana origenes* occurs in the portion of Wyoming encompassed by the SRM Ecoregion and is the subspecies found in Colorado and New Mexico, while *Martes americana vulpina* occurs in the western and northwestern mountains of the state (Clark and Stromberg 1987). In Colorado, the marten is listed as S4 (Colorado Natural Heritage Program) and ranges in abundance from rare to common by county (Colorado Natural Diversity Information Source 2000). The state of New Mexico lists the marten as Endangered (group2 "Threatened"), and the New Mexico Natural Heritage Program lists the marten as S2 "imperiled" (New Mexico Natural History Program 1999). The marten is considered a rare resident in New Mexico (New Mexico Game & Fish 2000).

Habitat model

- Spruce-fir and montane mixed conifer habitats were separately selected from the SRM ecological systems database. [(srmcovty = "spruce-fir forest")] and [(srmcovty = "montane mixed conifer forest")] from the srmsystems.shp file; saved respectively as the shapefiles spfir.shp and monmixconifer.shp.
- Contiguous polygons of spruce-fir were merged and polygon areas based on the new polygons were calculated; saved as sprucefirmerge.shp. The same procedure was applied to the montane mixed conifer polygons; saved as mixedmonconmerge.shp.
- Spruce-fir polygons >=30,000 acres were selected as suitable American marten habitat. [(Area_acres >= 30,000)] from the sprucefir.shp file; saved as the shapefile spfir30.shp. Montane mixed conifer polygons >= 30,000 acres were also selected as suitable American marten habitat. [(Area_acres >= 30,000)] from the mixedmonconmerge.shp file; saved as the shapefile monmixconmg30000.shp.
- Suitable (>=30,000 acres) spruce-fir and montane mixed conifer habitat was mapped, as well as all other spruce-fir and montane mixed conifer habitat. In addition, marten element occurrences for Wyoming and New Mexico (no marten occurrence data for Colorado was found), urban areas, and state and county boundaries were also mapped.

30,000 acres was utilized as the size criteria for suitable marten habitat because martens are known to be negatively affected by habitat loss and fragmentation (Carroll et al. 1999). Rondeau (2000) used 30,000 acres as the size threshold between C and D rated spruce-fir habitats (and mixed conifer habitats) because "occurrences smaller than 30,000 acres are subject to edge effects and total destruction from a catastrophic event (e.g., a crown fire" and "there is little opportunity for a mosaic of disturbance patterns"). Based on density estimates of 0.7-1.7 martens per square kilometer (New Mexico Game & Fish, 2000), a habitat patch of 30,000 acres would probably support between 84 and 206 martens.

Recommendations

Spruce-fir and montane mixed conifer habitats were kept separate in this analysis (spruce-fir and montane mixed conifer polygons were not merged when they were contiguous). The only location in the SRM that this methodology substantially affects selection of suitable marten habitat is in the Sangre de Cristo mountains in northern New Mexico. Inclusion of lodgepole pine as potential marten habitat could add suitable areas in northern Colorado and in Wyoming.

Data on canopy cover, stand age, and amounts of CWD would enhance this model. More information on marten populations specific to the SRM ecoregion, including population locations and measures of abundance, as well as their responses to habitat fragmentation and disturbance, should be gathered before proceeding with management plans for this species.

LITERATURE CITED

Buskirk, S. W. and L. F. Ruggerio. 1994. American marten. Pages 7-37 in L. F. Ruggerio, K. B. Aubry, S. W. Buskirk, J. L. Lyon and W. J. Zielinski, technical editors. The Scientific basis for conserving forest carnivores: American marten, fisher, lynx, and wolverine in the western United States. General Technical Report RM-254. USDA Forest Service Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO. 184 pp.

Colorado Natural Diversity Information Source. 2000. http://ndis.nrel.colostate.edu/.

Colorado Natural Heritage Program. Vertebrate Characterization Abstract for Colorado, *Martes americana* American marten.

Carroll, C., P. C. Pacquet, and R. F. Noss. 1999. Modeling carnivore habitat in the Rocky Mountain region: a literature review and suggested strategy. World Wildlife Fund Canada, Toronto, Ontario, Canada. 101 pp.

Clark, T. W. and M. R. Stromberg. 1987. Mammals in Wyoming. University of Kansas Museum of Natural History, Lawrence, KS. 314 pp.

Fitzgerald, J. P., C. A. Meaney, and D. M. Armstrong. 1994. Mammals of Colorado. Denver Museum of Natural History, University Press of Colorado, Niwot, CO.

New Mexico Game & Fish. 2000. Biota Information System of New Mexico, American marten. http://151.199.74.229/states/nm.htm.

New Mexico Natural Heritage Program. 1999. Rankings for tracked species. http://nmnhp.unm.edu/nmnhp/rareanml.dbm

Rondeau, R. 2000. Southern Rocky Mountains ecoregion ecological systems descriptions: Spruce-fir moist and dry mesic forest and mixed conifer mesic-dry and moist-mesic forests. The Nature Conservancy.

Wyoming Natural Diversity Database. 2001. http://uwadmnweb.uwyo.edu/wyndd/Mammals/mammals.htm

Bighorn Sheep (*Ovis canadensis*)

Note that this species account only deals with the Rocky Mountain bighorn (*Ovis canadensis canadensis*) and not the desert bighorn (*Ovis canadensis mexicana*).

Natural history

Bighorn sheep are typically associated with the precipitous terrain of high mountains and steep canyons (Fitzgerald et al. 1994). Their diets consist of forbs, grasses and sedges, and browse (Fitzgerald et al. 1994, Krausman and Shackleton 2000, New Mexico Game & Fish 2000). Bighorn sheep make short migrations between summer and winter ranges, as well as potentially shifting the composition of their forage (Fitzgerald et al. 1994). Disease is a significant mortality factor, in addition to nutrition, and predation, especially on young of the year (Fitzgerald et al. 1994). Hunting, especially of trophy rams, is another source of mortality. In a study of bighorn sheep (presumably both Rocky Mountain and desert bighorns) in the southwest, Berger (1990) found that 100% of populations with fewer than 50 individuals went extinct within 50 years, while all populations with greater than 100 individuals persisted for up to 70 years. Thus, 100 individuals should be the minimum viable population target for the Southern Rocky Mountain bighorn populations.

Historic distribution

Bighorn sheep formerly occurred throughout Wyoming, except for the arid lowlands of eastern Wyoming (Long 1965). In Colorado, bighorns were previously more widely distributed in the upper elevations and even extended out onto the eastern plains in areas adjacent to the foothills (Fitzgerald et al. 1994). In New Mexico, bighorns were common in the Sangre de Cristo and San Juan Mountains (Bailey 1931).

Current distribution and status

In terms of heritage rankings, the bighorn sheep is listed as G5 globally and S4 in Wyoming (Wyoming Bioinformation Node). In Colorado, bighorn populations are apparently secure (Fitzgerald et al. 1994). Bighorn sheep are listed S1 in New Mexico (New Mexico Game & Fish 2000). *Ovis canadensis canadensis* was thought to have been extirpated from New Mexico, but reintroductions using stock from the central and northern Rockies have led to viable herds in several parts of the state (New Mexico Game & Fish 2000).

Habitat model

- Primary and secondary cover for bighorn sheep in Wyoming was downloaded from the Wyoming Bioinformation Node. This data was reprojected (UTM, Zone 13, Meters, NAD 27, and False Easting 500000) and saved as the shapefile projwybhsheep.shp. Primary and secondary cover was not distinguished in determining suitable bighorn habitat.
- Suitable habitat for bighorn sheep in Colorado was downloaded from the ftp section of the Colorado Natural Diversity Information Source website and saved as the shapefile cobhsheep.shp.
- Suitable bighorn habitat for Wyoming and Colorado was mapped as well as the outline of the Southern Rocky Mountain ecoregion (er_crm_new_buff.shp). In addition, urban areas, state, and county boundaries were also mapped.

Recommendations

The bighorn suitable habitat models from Wyoming and Colorado should be field verified before proceeding with management plans for this species.

In addition, the following information should be incorporated into any bighorn management plans for New Mexico. **"**Bighorn rams were observed moving across the Bull-Of-The-Woods saddle between the Wheeler Peak area and the Hondo-Columbine Wilderness Study Area to the north. Rams move from the Wheeler Peak area north to the Hondo-Columbine area and back, each fall for the rutt. Most of this saddle is private land at risk of development associated with Taos Ski Valley. The saddle is likely a critical movement corridor for some species such as bighorn, bears, mountain lions, possibly lynx & wolverine (if they become re-established in NM) and perhaps other species" (personal communication, Jon T. Klingel, December 1999).

LITERATURE CITED

Bailey, V. 1931. Mammals of New Mexico. North American Fauna No. 53. U.S. Dept. of Agriculture, Bureau of Biological Survey, Washington, D.C. 412 pp.

Berger, J. 1990. Persistence of different-sized populations: an empirical assessment of rapid extinctions in bighorn sheep. Conservation Biology 4(1):91-98.

Colorado Natural Diversity Information Source. 2000. http://ndis.nrel.colostate.edu/

Fitzgerald, J. P., C. A. Meaney, and D. M. Armstrong. 1994. Mammals of Colorado. Denver Museum of Natural History, University Press of Colorado, Niwot, CO.

Krausman, P.R. and D.M. Shackleton. 2000. Bighorn sheep. Pages 517-544 in S. Demarais and P. R. Krausman, editors. Ecology and management of large mammals in North America . Prentice-Hall, Inc., Upper Saddle River

Long, C. A. 1965. The mammals of Wyoming. University of Kansas Publications Museum of Natural History, Lawrence.

New Mexico Game & Fish. 2000. Biota Information System of New Mexico, Rocky Mountain Bighorn Sheep. http://151.199.74.229/states/nm.htm.

Wyoming Bioinformation Node. North American Bighorn Sheep species account. http://www.sdvc.uwyo.edu/wbn/atlas/

Gray wolf (*Canis lupus*)

Natural history

Wolves are social animals that typically live in packs and depend on areas that support large ungulate populations (Fitzgerald et al. 1994, Phillips et al. 2000). Wolves utilize a variety of habitats, but may dependt on valley bottoms, especially in rugged landscapes or during the winter (Carroll et al. 1999). In addition, wolves may avoid areas that are steep, icy, or covered by deep snow because of difficulty of movement and lack of prey (Carroll et al. 1999). Wolves are highly vagile and are capable of long distance dispersal (Carroll et al. 1999). Wolves have large home ranges, 500-2,000 km^2, and low population densities in the Rocky Mountains (Carroll et al. 1999). Based on density estimates of 50-1,300 km^2/wolf (Fitzgerald et al. 1994), 50 wolves would require habitat between 250,000 ha and 6,500,000 ha. In addition, the U.S. Fish and Wildlife Service considers recovery for wolves in the Northern Rockies to be populations of 10 breeding pairs (approximately 100 wolves) for three consecutive years in three recovery areas in the region: northwestern Montana, central Idaho, and the Yellowstone National Park area (U.S. Fish and Wildlife Service 2000). Human persecution is the major threat to wolf populations. Hunting, trapping, and predator control efforts led to the extirpation of wolves from much of the Rocky Mountains (Fitzgerald et al. 1994, Carroll et al. 1999). Thus, reintroduction efforts for gray wolves should focus on areas of low human population density and low road densities.

Genetics

Historically, four subspecies of wolves potentially occupied the SRM: *C. l. irremotus* in the northern 2/3 of Wyoming; *C. l. nubilus* on the northern plains west to the Continental Divide; *C. l. youngi* throughout much of SRM and west of Continental Divide in Colorado; and *C. l. baileyi* (Mexican wolf) in the south (Long 1965, Fitzgerald et al. 1994, New Mexico Game & Fish, 2000a,b). *C.l. occidentalis* from Canada was the subspecies reintroduced to Yellowstone National Park and may be an appropriate source stock for the northern part of the SRM (Phillips et al. 2000). The subspecies *C.l. youngi*, which probably occurred over much of the SRM, is thought to be extinct (New Mexico Game & Fish, 2000a). Researchers have suggested that *C. l. baileyi* may be the most appropriate wolf for reintroduction to the SRM due to similarity of habitat and prey base, as well as geographic proximity to extant populations (Phillips et al. 2000). In comparison, *C. l. nubilus* populations are currently well established in Minnesota; however, these populations are ecologically divergent from wolves that historically occurred in the SRM, as well as being geographically isolated from the SRM (Phillips et al. 2000).

Historic distribution

In Wyoming, wolves (*C. l. irremotus*, *C. l. nubilus*, and *C. l. youngi*) occurred throughout the state (Long 1965), but were nearly exterminated by 1940 (Clark and Stromberg 1987). In Colorado, wolves (*C. l. nubilus* and *C. l. youngi*) occupied every county; however, no verified records exist past 1935 (Fitzgerald et al. 1994). Wolves (*C. l. nubilus*, *C. l. youngi*, and *C. l. baileyi*) also occurred throughout New Mexico, but their numbers were greatly reduced by 1938 (Findley et al. 1975).

Current distribution and status

The gray wolf is listed G4 globally and S2 in Wyoming, due to the reintroduction efforts (Wyoming Natural Diversity Database 2001). Wolves are considered extirpated from Colorado (Fitzgerald et al. 1994). The Mexican wolf, *C. l. baileyi*, is extant in New Mexico and listed T1, while all other subspecies are considered extirpated (New Mexico Game & Fish, 2000b).

Habitat model

No habitat model was developed for the gray wolf; however, results from a spatially explicit population model run for Colorado (Phillips et al. 2000) are presented (Figure 1). Based on this model, in which 20 breeding pairs were released from Vermejo Park Ranch, three major core habitats for wolves were identified: the greater San Juans, Central Rockies (Maroon Bells), and the Flattops. In addition, the Gunnison Valley was identified as a critical dispersal corridor between the San Juans and other two core areas to the north.

Recommendations

More extensive modeling for the entire SRM ecoregion should be undertaken before proceeding with management plans for this species. In the current modeling effort, road density was used as a surrogate for potential mortality risk, but no consideration was given to either the type of road or road use levels.

LITERATURE CITED

Carroll, C., P. C. Pacquet, and R. F. Noss. 1999. Modeling carnivore habitat in the Rocky Mountain region: a literature review and suggested strategy , pp. 101. World Wildlife Fund Canada, Toronto, Ontario, Canada.

Clark, T. W. and M. R. Stromberg. 1987. Mammals in Wyoming. University of Kansas Museum of Natural History, Lawrence, KS.

Findley, J. S., A. H. Harris, D. E. Wilson, and C. Jones. 1975. Mammals of New Mexico. University of New Mexico Press, Albuquerque.

Fitzgerald, J. P., C. A. Meaney, and D. M. Armstrong. 1994. Mammals of Colorado. Denver Museum of Natural History, University Press of Colorado, Niwot, CO.

Long, C. A. 1965. The mammals of Wyoming. University of Kansas Publications Museum of Natural History, Lawrence.

New Mexico Game & Fish. 2000a. Biota Information System of New Mexico, Gray Wolf. http://151.199.74.229/states/nm.htm.

New Mexico Game & Fish. 2000a. Biota Information System of New Mexico, Mexican Gray Wolf. http://151.199.74.229/states/nm.htm.

Phillips, M., N. Fascione, P. Miller, and O. Byers. 2000. Wolves in the Southern Rockies. A population and habitat viability assessment: final report. IUCN/SSC Conservation Breeding Specialist Group: Apple Valley, MN.

Wyoming Natural Diversity Database. 2001. Mammal species of concern. http://uwadmnweb.uwyo.edu/wyndd/Mammals/mammals.htm

U.S. Fish and Wildlife Service. 2000. Summary of the proposal to reclassify/delist the gray wolf. http://midwest.fws.gov/wolf/proposal/propsum.htm

Grizzly Bear (*Ursus arctos*)

Natural history

Grizzly bears utilize a wide variety of habitats that provide seasonally, locally abundant food resources (Fitzgerald et al. 1994). The main characteristics of suitable habitat for grizzly bears include high levels of habitat interspersion or cover type diversity, locally abundant food resources, large ungulate populations that provide a source of carrion, low road densities (>1 km / 6.4 km^2 is considered suboptimal), and protection from human disturbance and persecution (Carroll et al. 1999). In Colorado, important food resources probably included grasses, sedges, roots, succulent forbs, small mammals, ungulate and other carrion, fruits such as choke cherry or currants, insects (miller moths), and occasional ungulate prey, especially calves (Fitzgerald et al. 1994). In addition, den sites for hibernation are a critical resource for the over-winter survival of grizzly bears. Characteristics of den sites include the following: steep slopes where deep snows accumulate and do not melt during warm periods, high elevation sites, and areas removed from development and human disturbance (U.S. Fish and Wildlife Service 1993).

In terms of population viability, island populations of 100-300 grizzly bears have been shown to persist with occasional immigration; however, isolated populations require at least 1,000 bears to persist (Carroll et al. 1999). Long distance dispersal between populations has not been recorded for grizzly bears (Carroll et al. 1999). Thus, grizzly bears in the SRM will be isolated from populations in the Northern Rockies. Grizzly bear density estimates from the North Cascades, Greater Yellowstone Ecosystem, and Cabinet/Yaak Ecosystem average 76 km^2 / bear (U.S. Fish and Wildlife Service 1993). Based on these density estimates, a population of 100 bears would require 760,000 hectares. Human persecution through hunting, trapping, and predator control efforts led to the extirpation of the grizzly bear from much of the Rocky Mountains (U.S. Fish and Wildlife Service 1993, Carroll et al. 1999). Although suitable habitat for grizzlies does still exist in the SRM, whether humans will restrict their activities to allow for coexistence with a large, wide-ranging predator with the potential to kill humans remains to be determined.

Historic distribution

In Wyoming, grizzly bears were once abundant throughout the state (Long 1965). In Colorado, grizzly bears were once common statewide (Fitzgerald et al. 1994). Similarly, the grizzly bear was widespread and very common throughout New Mexico until the turn of the century (Findley et al. 1975).

Current distribution and status

The grizzly bear is federally listed as threatened (U.S. Fish and Wildlife Service 1993). In terms of heritage rankings, the grizzly bear is listed G4 globally and S2 in Wyoming (Wyoming Natural Diversity Database 2001), with populations occurring in the Greater Yellowstone ecosystem. The grizzly bear is listed as endangered by the state of Colorado (Fitzgerald et al. 1994). Presently no known populations of grizzly bears exist in Colorado (Fitzgerald et al. 1994), but periodically reports of individuals surface. The grizzly bear is considered extirpated from New Mexico (New Mexico Game & Fish 2000).

Habitat model

No habitat model was developed for the grizzly bear due to a lack of a tight habitat association in the SRM. However, the grizzly bears' habitat needs are probably similar to those for wolves and wolverines -- large ungulate populations and protection from human persecution. Thus, core areas identified for wolves and wolverines may also be suitable for grizzly bears.

Recommendations

Modeling specific to the grizzly bear needs to be undertaken before proceeding with management plans for this species.

LITERATURE CITED

Carroll, C., P. C. Pacquet, and R. F. Noss. 1999. Modeling carnivore habitat in the Rocky Mountain region: a literature review and suggested strategy , pp. 101. World Wildlife Fund Canada, Toronto, Ontario, Canada.

Findley, J. S., A. H. Harris, D. E. Wilson, and C. Jones. 1975. Mammals of New Mexico. University of New Mexico Press, Albuquerque.

Fitzgerald, J. P., C. A. Meaney, and D. M. Armstrong. 1994. Mammals of Colorado. Denver Museum of Natural History, University Press of Colorado, Niwot, CO.

Long, C. A. 1965. The mammals of Wyoming. University of Kansas Publications Museum of Natural History, Lawrence.

New Mexico Game & Fish. 2000. Biota Information System of New Mexico, Grizzly Bear. http://151.199.74.229/states/nm.htm.

United States Fish and Wildlife Service. 1993. Grizzly bear recovery plan. Missoula, MT 181 pp.

Wyoming Natural Diversity Database. 2001. Mammal species of concern. http://uwadmnweb.uwyo.edu/wyndd/Mammals/mammals.htm

Lynx (*Felis lynx*)

Natural history

The lynx is typically associated with northern coniferous forests (Fitzgerald et al. 1994). Lynx populations are closely associated with their major prey item, the snowshoe hare (*Lepus americanus*). Lynx also prey upon pine (red) squirrels, ground squirrels, ptarmigan, and mice, in addition to feeding upon carrion (Fitzgerald et al. 1994). Early-seral stands (15-40 year old conifer stands) provide optimal foraging habitat for the lynx (Carroll et al. 1999). In contrast, the lynx requires mature forest with large amounts of coarse woody debris for denning (Carroll et al. 1999). Thus, suitable lynx habitat includes a combination of forest stands in both early and late seral stages. Lynx have been observed to disperse long distances (300-500 km), however they avoid open areas and openings more than 100 m in width may disrupt their movement patterns (Carroll et al. 1999). Lynx mortality, especially for kittens, is largely influenced by the abundance of snowshoe hares (Fitzgerald et al. 1994, Koehler and Aubrey 1994). Roads may negatively affect lynx populations by increasing mortality from roadkill and by increasing competition with coyotes (*Canis latrans*) and bobcats (*Felis rufus*) through allowing them winter access to areas of deep snow (Carroll et al. 1999). Lynx populations at southern latitudes apparently do not go through irruptive cycles, but rather remain at relatively low densities (Ruggerio et al. 2000). Southern lynx populations exhibit life history characteristics similar to lynx populations in boreal forests during hare population lows (Koehler and Aubrey 1994). Based on density estimates of 50 km^2 / lynx (Koehler and Aubrey 1994), 50 lynx would require 250,000 ha of suitable habitat.

Historic distribution

In Wyoming, lynx formerly occurred at high elevations along the Rocky Mountain chain (Long 1965). In Colorado, lynx occurred at low densities above 2,700 m in the Park, Gore, San Juan, and La Plata Mountains, as well as the White River Plateau (Fitzgerald et al. 1994). Lynx are believed to have occurred in New Mexico in the San Juan and Sangre de Cristo Mountains, but no specimens or verified records exist for the state (New Mexico Game & Fish 2000).

Current distribution and status

The lynx is federally listed as threatened (New Mexico Game & Fish 2000).
The lynx is listed globally as G5 and S1 in Wyoming (Wyoming Natural Diversity Database 2001). In Colorado, the lynx is listed as S1 (Colorado Natural Heritage Program 2000). The lynx was apparently extirpated from Colorado, but the Colorado Division of Wildlife reintroduced lynx to the state. As of December 2000, 67 of 96 reintroduced lynx were thought to still be alive, but no reproduction has been observed (Shenk 2000). Most lynx remain in the core research area which includes New Mexico north to Gunnison, west as far as Taylor Mesa and east to Monarch Pass (Shenk 2000). Although lynx are considered extirpated from New Mexico (New Mexico Game & Fish 2000), some of the individuals that were reintroduced to Colorado may have moved into northern New Mexico (Shenk 2000).

Habitat model

- Suitable lynx habitat for Wyoming (ranked on the basis on a habitat quality index) was obtained from the Wyoming Natural Diversity Database (Beauvais 2000). This data was projected (UTM, Zone 13, Meters, NAD27, and False Easting 500000) and saved as the shapefile reprogwylynx.shp.
- Suitable habitat for lynx in Colorado was downloaded from the ftp section of the Colorado Natural Diversity Information Source website and saved as the shapefile colynxsuit.shp.
- Suitable lynx habitat for Wyoming and Colorado was mapped, as well lynx element occurrences and the outline of the Southern Rocky Mountain ecoregion (er_crm_new_buff.shp). In addition, county and state boundaries were also mapped.

Recommendations

More extensive modeling for the entire SRM ecoregion, including modeling snowshoe hare populations, should be undertaken before proceeding with management plans for this species.

LITERATURE CITED

Beauvais, G.B. 2000. Initial map of habitat quality for Canada lynx in Wyoming. Wyoming Natural Diversity Database (prepared for the Wyoming Field Office of the USDI Bureau of Land Management).
Carroll, C., P. C. Pacquet, and R. F. Noss. 1999. Modeling carnivore habitat in the Rocky Mountain region: a literature review and suggested strategy, pp. 101. World Wildlife Fund Canada, Toronto, Ontario, Canada.
Colorado Natural Diversity Information Source. 2000. http://ndis.nrel.colostate.edu/
Colorado Natural Heritage Program. 2000. Statewide element occurrences. http://www.cnhp.colostate.edu/ftp.htm
Fitzgerald, J. P., C. A. Meaney, and D. M. Armstrong. 1994. Mammals of Colorado. Denver Museum of Natural History, University Press of Colorado, Niwot, CO.
Koehler, G. M. and K. B. Aubry. 1994. Lynx. Pages 74-98 in L. F. Ruggerio, K. B. Aubry, S. W. Buskirk, J. L. Lyon and W. J. Zielinski, editors. The Scientific basis for conserving forest carnivores: American marten, fisher, lynx, and wolverine in the western United States. Gen. Tech. Report RM-254. USDA Forest Service Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO.
Long, C. A. 1965. The mammals of Wyoming. University of Kansas Publications Museum of Natural History, Lawrence.
New Mexico Game & Fish. 2000. Biota Information System of New Mexico, Lynx. http://151.199.74.229/states/nm.htm.
Ruggerio, L. F., K. B. Aubry, S. W. Buskirk, G. M. Koehler, C. J. Krebs, K. S. McKelvey, and J. R. Squires. 2000. Ecology and conservation of the lynx in the United States. University Press of Colorado, Boulder, CO.
Shenk, T. 2000. Lynx update. Colorado Division of Wildlife. Denver, CO.
Wyoming Bioinformation Node. North American lynx species account. http://www.sdvc.uwyo.edu/wbn/atlas/
Wyoming Natural Diversity Database. 2001. Mammal species of concern. http://uwadmnweb.uwyo.edu/wyndd/Mammals/mammals.htm

APPENDIX 21

DEFINITIONS

Aquatic macrohabitat: macrohabitats are the fine-scale biophysical classification units used in the analysis of aquatic conservation targets in this report. Segments of a stream or lake that are relatively homogenous with respect to its size, hydrologic regime, gradient, and other key factors.

Aquatic ecological system: dynamic assemblage of ecological communities that occur together in an aquatic landscape with similar geomorphological patterns, are tied together by similar ecological processes, and form a robust, cohesive, and distinguishable unit on a hydrography map.

Area of biological significance: generalized area of importance for biodiversity during ecoregional planning. The boundaries and target occurrences contained within these areas are first approximations that will be dealt with in more detail during site conservation planning.

Conservation goal: number and spatial distribution of on-the-ground occurrences of species, communities and ecological systems that are needed to adequately conserve the targets in the ecoregion.

Conservation area: area that maintains the targets species, communities and ecological systems and their supporting ecological processes within their natural range of variability (boundaries need to be refined during site conservation planning).

Disjunct: a species or community found a significant distance from its primary range.

Ecological drainage unit: aggregates of watersheds that share ecological and biological characteristics. They contain sets of aquatic systems with similar patterns of hydrologic regime, gradient, drainage density and species distribution. Used to spatially stratify ecoregions.

Ecological land unit: mapping units used in large scale conservation planning projects that are typically defined by two or more environmental variables such as elevation, geological type, and landform (e.g., cliff, stream, summit). Biophysical or environmental analyses such as ELUs combined with land cover types and satellite imagery can be useful tools for predicting locations of communities or systems when information is lacking and capturing ecological variation based on environmental factors.

Endemic: species that are restricted to an ecoregion (or small geographic area within an ecoregion), depend entirely on a single area for survival, and are therefore ofen more vulnerable to extinction.

Exurban: low-density residential development, exurban densities range from 0.025 to 0.1 units per acre (1 unit per 10 to 40 acres).

Fragmentation: process by which habitats are increasingly subdivided into smaller units, resulting in increased insularity as well as losses of total habitat area.

Functional landscapes: sites where it may still be possible to conserve a large number of ecological systems, communities, and species at all scales below regional. The targets are intended to represent many other ecological systems, communities and species (i.e., all biodiversity).

Functional network: an integrated set of functional sites and landscapes designed to conserve regional species. Portfolios of sites in regions of the country that still support wide-ranging species like the grizzly bear should be based on functional networks of sites.

Large patch: communities that form large areas of interrupted cover. Individual occurrences of this patch type typically range from 50-2,000 hectares. Associated with environmental conditions that are more specific and less common than matrix communities.

Linear: communities or systems that occur as linear strips, and are often ecotonal between terrestrial and aquatic systems. Similar to small patch communities, linear communities occur in specific conditions, and the aggregate of all linear communities covers only a small percentage of the natural vegetation of the ecoregion.

Limited: a species or community that occurs in the ecoregion and within a few other adjacent ecoregions.

Matrix-forming or matrix communities: communities that form extensive and contiguous cover, occur on the most extensive landforms, and typically have wide ecological tolerances.

Minimum dynamic area: the area needed to insure survival or re-colonization of a site following disturbance that removes most or all individuals. This is determined by the ability of some number of individuals or patches to survive, and the size and severity of stochastic events.

Network of sites: collection of sites identified through ecoregional planning considering need for linkages, connections, and/or juxtaposition among sites.

Portfolio of sites: collection or set of sites identified through ecoregional planning with little consideration about need for linkages, connections, or juxtaposition among sites.

SITES: software consisting of computerized algorithms designed specifically to aid Conservancy users in ecoregional planning select conservation sites.

Small patch: communities or systems that form small discrete areas of vegetation cover

Suburban: suburban densities are defined as from 0.1 to 0.5 units per acre (1 unit per 2 to 10 acres), lower-density subdivisions.

Urban: urban densities are typically defined as areas with greater than 1,000 people per square mile (1.6 people per acre).

Viability: the ability of a species to persist for many generations or an ecological community or system to persist over some time period.

Vulnerable: vulnerable species are usually abundant, may or may not be declining, but some aspect of their life history makes them especially vulnerable (e.g., migratory concentration or rare/endemic habitat).

Widespread: a species or community typically found in the ecoregion, but common in other ecoregions; bulk of distribution elsewhere.

APPENDIX 22

PLANT SPECIES VIABILITY GUIDELINES (Spackman et al. 2000)

Aletes humilis 9/20/2000

EOSPECS:

Any naturally occurring population that is separated by a sufficient distance or barrier from a neighboring population. As a guideline, EOs are separated by either: 1 mile or more across unsuitable habitat or altered and unsuitable areas; or 2 miles or more across apparently suitable habitat not known to be occupied. Justification: The rationale for this large a separation distance across suitable but apparently unoccupied habitat is that it is likely additional research will find this habitat to be occupied. It can often be assumed that apparently unconnected populations will eventually be found to be more closely connected; these are best regarded as suboccurrences. No information on mobility of pollen and propagules is available on which to base the separation distance for this species.

ARANKSPECS:

Size: 500 or more individuals (based on available EOR data). Area of occupancy may be five or more acres for A-ranked occurrences, but high quality occurrences may justifiably be A-ranked even if they occupy a smaller area. Condition: the occurrence has an excellent likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. This occurrence should be in a high-quality site with less than 1% cover of exotic plant species and/or no significant anthropogenic disturbance. The best sites are likely to be rock outcrops that are fairly inaccessible, with numerous cracks for the plants to colonize; however, plants in some high quality occurrences are found in duff on the forest floor. Landscape Context: the occurrence is surrounded by an area that is unfragmented and includes the ecological processes needed to sustain this species. Justification: Large populations in high quality sites are presumed to contain a high degree of genetic variability, to have a low susceptibility to the effects of inbreeding depression, and to be relatively resilient.

BRANKSPECS:

Size: 200 or more individuals (based on available EOR data). Condition: the occurrence should have a good likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. Anthropogenic disturbance within the occurrence is minimal. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: the surrounding landscape should contain the ecological processes needed to sustain the occurrence but may be fragmented and/or impacted by humans.

CRANKSPECS:

Size: 10 to 200 individuals (based on available EOR data). Condition: The occurrence may be less productive than the above situations, but is still viable, with multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of anthropogenic disturbance). Landscape Context: there may be significant human disturbance, but the ecological processes needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival.

DRANKSPECS:

Size: Less than 10 individuals (based on available EOR data). Condition: little or no evidence of successful reproduction is observed (poor seedling recruitment, no flowering or fruiting observed, or poor age class distribution). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance. Landscape context: the surrounding area is fragmented with many ecological processes no longer intact. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

Angelica grayi 9/20/2000

EOSPECS:

Any naturally occurring population that is separated by a sufficient distance or barrier from a neighboring population. As a guideline, EOs are separated by either: 1 mile or more across unsuitable habitat or altered and unsuitable areas; or 2 miles or more across apparently suitable habitat not known to be occupied. Justification: The rationale for this large a separation distance across suitable but apparently unoccupied habitat is that it is likely additional research will find this habitat to be occupied. It can often be assumed that apparently unconnected populations will eventually be found to be more closely connected; these are best regarded as suboccurrences. No information on mobility of pollen and propagules is available on which to base the separation distance for this species.

ARANKSPECS:

Size: No quantitative information is available on population size at this time for *Angelica grayi*. Condition: the occurrence has an excellent likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. This occurrence should be in a high-quality site with less than 1% cover of exotic plant species and/or no significant anthropogenic disturbance. Landscape Context: the occurrence is surrounded by an area that is unfragmented and includes the ecological processes needed to sustain this species. Justification: No quantitative information is available on population size for this species at this time. Large populations in high quality sites are presumed to contain a high degree of genetic variability, to have a low susceptibility to the effects of inbreeding depression, and to be relatively resilient. When more information is acquired, the eospecs should be reassessed.

BRANKSPECS:

Size: No quantitative information is available on population size at this time for *Angelica grayi*. Condition: the occurrence should have a good likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. Anthropogenic disturbance within the occurrence is minimal. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: the surrounding landscape should contain the ecological processes needed to sustain the occurrence but may be fragmented and/or impacted by humans.

CRANKSPECS:

Size: No quantitative information is available on population size at this time for *Angelica grayi*. Condition: The occurrence may be less productive than the above situations, but is still viable, with multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of anthropogenic disturbance). Landscape Context: there may be significant human disturbance, but the ecological processes needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival. We estimate that the effects of inbreeding depression would become severe over time in an isolated population of less than 10 individuals, although there is no data available on the population biology of this species or on the sizes of known populations at this time.

DRANKSPECS:

Size: Less than 10 individuals. Condition: little or no evidence of successful reproduction is observed (poor seedling recruitment, no flowering or fruiting observed, or poor age class distribution). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance. Landscape context: the surrounding area is fragmented with many ecological processes no longer intact. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

EOSPECS:

Any naturally occurring population that is separated by a sufficient distance or barrier from a neighboring population. As a guideline, EOs are separated by either: 1 mile or more across unsuitable habitat or altered and unsuitable areas; or 2 miles or more across apparently suitable habitat not known to be occupied. Justification: The rationale for this large a separation distance across suitable but apparently unoccupied habitat is that it is likely additional research will find this habitat to be occupied. It can often be assumed that apparently unconnected populations will eventually be found to be more closely connected; these are best regarded as suboccurrences. No information on mobility of pollen and propagules is available on which to base the separation distance for this species.

ARANKSPECS:

Size: 500 or more individuals (based on available EOR data). Condition: The occurrence has an excellent likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. This occurrence should be in a high-quality site with less than 1% cover of exotic plant species and/or no significant anthropogenic disturbance. Landscape Context: The occurrence is surrounded by an area that is unfragmented and includes the ecological processes needed to sustain this species. Justification: Large populations in high quality sites are presumed to contain a high degree of genetic variability, to have a low susceptibility to the effects of inbreeding depression, and to be relatively resilient.

BRANKSPECS:

Size: 100 or more individuals (based on available EOR data). Condition: The occurrence should have a good likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. Anthropogenic disturbance within the occurrence is minimal. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: The surrounding landscape should contain the ecological processes needed to sustain the occurrence but may be fragmented and/or impacted by humans.

CRANKSPECS:

Size: 10 to 100 individuals (based on available EOR data). Condition: The occurrence may be less productive than the above situations, but is still viable, with multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of anthropogenic disturbance). Landscape Context: There may be significant human disturbance, but the ecological processes needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival.

DRANKSPECS:

Size: Less than 10 individuals (based on available EOR data). Condition: Little or no evidence of successful reproduction is observed (poor seedling recruitment, no flowering or fruiting observed, or poor age class distribution). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance. Landscape context: The surrounding area is fragmented with many ecological processes no longer intact. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

Astragalus anisus 9/21/2000

ELDESCRIP

Colorado endemic in Gunnison and Saguache Counties. Racemes of 3 to 7 flowers, pink-purple, corolla 15-20 mm long. Ovoid strigose pods, 15 to 20 mm in length. Dwarf plants, 5 to 10cm in height. Leaves with 9 to 15 leaflets, each 4 to 10 mm in length, tomentose, and silvery.

EOSPECS

Any naturally occurring population that is separated by a sufficient distance or barrier from a neighboring population. As a guideline, EOs are separated by either: 1 mile or more across unsuitable habitat or altered and unsuitable areas; or 2 miles or more across apparently suitable habitat not known to be occupied. Justification: The rationale for this large a separation distance across suitable but apparently unoccupied habitat is that it is likely additional research will find this habitat to be occupied. It can often be assumed that apparently unconnected populations will eventually be found to be more closely connected; these are best regarded as suboccurrences. No information on mobility of pollen and propagules is available on which to base the separation distance for this species.

ARANKSPECS

Size: 500 or more individuals (based on available EOR data). Condition: The occurrence has an excellent likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. This occurrence should be in a high-quality site with less than 1% cover of exotic plant species and/or no significant anthropogenic disturbance. Landscape Context: The occurrence is surrounded by an area that is unfragmented and includes the ecological processes needed to sustain this species. This species may depend on the presence of a natural fire regime in the sagebrush shrubland matrix community in which it is found. Justification: There is sparse information on abundance for this species. The specification guidelines are based on EO specs for other rare species in this genus. Large populations in high quality sites are presumed to contain a high degree of genetic variability, have a low susceptibility to the effects of inbreeding depression, and to be relatively resilient. When more information is acquired, the EO specs should be reassessed.

BRANKSPECS:

Size: 100 or more individuals (based on available EOR data). Condition: The occurrence should have a good likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. Anthropogenic disturbance within the occurrence is minimal. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: The surrounding landscape should contain the ecological processes needed to sustain the occurrence but may be fragmented and/or impacted by humans.

CRANKSPECS

Size: 20 to 200 individuals (based on available EOR data). Condition: The occurrence may be less productive than the above situations, but is still viable, with multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of anthropogenic disturbance). Landscape Context: There may be significant human disturbance, but the ecological processes needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival.

DRANKSPECS

Size: Less than 20 individuals (based on available EOR data). Condition: Little or no evidence of successful reproduction is observed (poor seedling recruitment, no flowering or fruiting observed, or poor age class distribution). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance. Landscape context: The surrounding area is fragmented with many ecological processes no longer intact. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

Astragalus cerussatus

ELDESCRIP

A clumped perennial, with several short leafy stems from a stout taproot; leaves narrowly oblong; pods sessile (Weber and Wittmann 1996).

EOSPECS

Any naturally occurring population. EOs are separated by either: 1 mile or more across unsuitable habitat or altered and unsuitable areas; or 2 miles or more across apparently suitable habitat that is not known to be occupied. Justification: The rationale for this large a separation distance across suitable but apparently unoccupied habitat is that it is likely that additional research will find this habitat to be occupied. It can often be assumed that apparently unconnected populations will eventually be found to be more closely connected; these are best regarded as suboccurrences.

ARANKSPECS

Size: 1000 or more individuals. Condition: occurrences with an excellent likelihood of long-term viability (various age classes and evidence of flowering and fruiting are represented indicating that the reproductive mechanisms are intact). This occurrence should be in a high-quality site (i.e. less than 1% cover exotic plant species and/or no significant human disturbances). Landscape Context: the occurrence is surrounded by an area that is unfragmented and includes the ecological processes needed to sustain this species. There is sparse information on abundance for this species. The specification guidelines are based on specs for other rare species in this genus. Large populations in high quality sites are presumed to contain a high degree of genetic variability, have a low susceptibility to the effects of inbreeding depression, and to be relatively resilient. When more information is acquired, the eospecs should be reassessed.

BRANKSPECS

Size: 500 or more individuals. Condition: the occurrence should have a good likelihood of long-term viability (various age classes and evidence of flowering and fruiting are represented indicating that the reproductive mechanisms are intact) with little human disturbance. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: the surrounding landscape should contain the ecological processes needed to sustain the occurrence but may be fragmented and/or impacted by humans.

CRANKSPECS

Size: 100 or more individuals. Condition: The occurrence may be less productive than the above situations, but is still viable (with various age classes and evidence of flowering and fruiting indicating that the reproductive mechanisms are intact). The occupied habitat is somewhat degraded (exotic plant *Astragalus cerussatus* species make up between 10-50% of the total ground cover and/or there is a moderate level of human disturbance). Landscape Context: there may be significant human disturbance, but the ecological processes needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to *Astragalus cerussatus* natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival.

DRANKSPECS

Size: Less than 100 individuals. Condition: little or no evidence of successful reproduction is observed (poor seedling recruitment, no flowering or fruiting observed, or poor age class distribution). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance. Landscape context: the surrounding area is fragmented with many ecological processes no longer intact. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

EOSPECS

Any naturally occurring population that is separated by a sufficient distance or barrier from a neighboring population. As a guideline, EOs are separated by either: 1 mile or more across unsuitable habitat or altered and unsuitable areas; or 2 miles or more across apparently suitable habitat not known to be occupied. Justification: The rationale for this large a separation distance across suitable but apparently unoccupied habitat is that it is likely additional research will find this habitat to be occupied. It can often be assumed that apparently unconnected populations will eventually be found to be more closely connected; these are best regarded as suboccurrences. No information on mobility of pollen and propagules is available on which to base the separation distance for this species.

ARANKSPECS

Size: 500 or more individuals (based on available EOR data). Condition: the occurrence has an excellent likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. This occurrence should be in a high-quality site with less than 1% cover of exotic plant species and/or no significant anthropogenic disturbance. Landscape Context: the occurrence is surrounded by an area that is unfragmented and includes the ecological processes needed to sustain this species. This includes the presence of the appropriate, very specific edaphic requirements of this species in a matrix of pinyon-juniper woodlands and/or desert shrublands. This species requires seleniferous, and apparently saline soils of the Wasatch Formation-Atwell Gulch Member (Welsh 1985), in barren outcrops of dark clay. Justification: Large populations in high quality sites are presumed to contain a high degree of genetic variability, to have a low susceptibility to the effects of inbreeding depression, and to be relatively resilient.

BRANKSPECS

Size: 100 or more individuals (based on available EOR data). Condition: the occurrence should have a good likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. Anthropogenic disturbance within the occurrence is minimal. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: the surrounding landscape should contain the ecological processes needed to sustain the occurrence but may be fragmented and/or impacted by humans.

CRANKSPECS

Size: 20 to 100 individuals (based on available EOR data). Condition: The occurrence may be less productive than the above situations, but is still viable, with multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of anthropogenic disturbance). Landscape Context: there may be significant human disturbance, but the ecological processes needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival.

DRANKSPECS

Size: Less than 20 individuals (based on available EOR data). Condition: little or no evidence of successful reproduction is observed (poor seedling recruitment, no flowering or fruiting observed, or poor age class distribution). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance. Landscape context: the surrounding area is fragmented with many ecological processes no longer intact. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

Astragalus microcymbus 9/19/2000

EOSPECS:

Any naturally occurring population that is separated by a sufficient distance or barrier from a neighboring population. As a guideline, EOs are separated by either: 1 mile or more across unsuitable habitat or altered and unsuitable areas; or 2 miles or more across apparently suitable habitat not known to be occupied. Justification: The rationale for this large a separation distance across suitable but apparently unoccupied habitat is that it is likely additional research will find this habitat to be occupied. It can often be assumed that apparently unconnected populations will eventually be found to be more closely connected; these are best regarded as suboccurrences. No information on mobility of pollen and propagules is available on which to base the separation distance for this species.

ARANKSPECS:

Size: 1000 or more individuals (based on available EOR data). Condition: the occurrence has an excellent likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. This occurrence should be in a high-quality site with less than 1% cover of exotic plant species and/or no significant anthropogenic disturbance. Landscape Context: the occurrence is surrounded by an area that is unfragmented and includes the ecological processes needed to sustain this species. A suitable natural disturbance regime (which may include fire), suitable soil chemistry and nutrient levels, and a lack of unnatural flooding is required by this species to persist. Justification: Large populations in high quality sites are presumed to contain a high degree of genetic variability, to have a low susceptibility to the effects of inbreeding depression, and to be relatively resilient.

BRANKSPECS:

Size: 100 to 1000 individuals (based on available EOR data). Condition: the occurrence should have a good likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. Anthropogenic disturbance within the occurrence is minimal. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: the surrounding landscape should contain the ecological processes needed to sustain the occurrence but may be fragmented and/or impacted by humans.

CRANKSPECS:

Size: 20 to 100 individuals (based on available EOR data). Condition: The occurrence may be less productive than the above situations, but is still viable, with multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of anthropogenic disturbance). Landscape Context: there may be significant human disturbance, but the ecological processes needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival.

DRANKSPECS:

Size: Less than 20 individuals (based on available EOR data). Condition: little or no evidence of successful reproduction is observed (poor seedling recruitment, no flowering or fruiting observed, or poor age class distribution). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance. Landscape context: the surrounding area is fragmented with many ecological processes no longer intact. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

Astragalus micromerius 9/20/2000

EOSPECS:

Any naturally occurring population that is separated by a sufficient distance or barrier from a neighboring population. As a guideline, EOs are separated by either: 1 mile or more across unsuitable habitat or altered and unsuitable areas; or 2 miles or more across apparently suitable habitat not known to be occupied. Justification: The rationale for this large a separation distance across suitable but apparently unoccupied habitat is that it is likely additional research will find this habitat to be occupied. It can often be assumed that apparently unconnected populations will eventually be found to be more closely connected; these are best regarded as suboccurrences. No information on mobility of pollen and propagules is available on which to base the separation distance for this species.

ARANKSPECS:

Size: No population size information is available for this species at this time. Condition: the occurrence has an excellent likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. This occurrence should be in a high-quality site with less than 1% cover of exotic plant species and/or no significant anthropogenic disturbance. Landscape Context: the occurrence is surrounded by an area that is unfragmented and includes the ecological processes needed to sustain this species. This species is probably dependent on the maintenance of a natural fire regime in its pinyon-juniper habitat. Justification: Large populations in high quality sites are presumed to contain a high degree of genetic variability, to have a low susceptibility to the effects of inbreeding depression, and to be relatively resilient. When more information is acquired, the eospecs should be reassessed for this species.

BRANKSPECS:

Size: No population size information is available for this species at this time. Condition: the occurrence should have a good likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. Anthropogenic disturbance within the occurrence is minimal. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: the surrounding landscape should contain the ecological processes needed to sustain the occurrence but may be fragmented and/or impacted by humans.

CRANKSPECS:

Size: No population size information is available for this species at this time. Condition: The occurrence may be less productive than the above situations, but is still viable, with multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of anthropogenic disturbance). Landscape Context: there may be significant human disturbance, but the ecological processes needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival. We estimate that the effects of inbreeding depression would become severe over time in an isolated population of less than 10 individuals, although there is no data available on the population biology of this species or on the sizes of known populations at this time.

DRANKSPECS:

Size: Less than 10 individuals. Condition: little or no evidence of successful reproduction is observed (poor seedling recruitment, no flowering or fruiting observed, or poor age class distribution). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance. Landscape context: the surrounding area is fragmented with many ecological processes no longer intact. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

EOSPECS:

Any naturally occurring population that is separated by a sufficient distance or barrier from a neighboring population. As a guideline, EOs are separated by either: 1 mile or more across unsuitable habitat or altered and unsuitable areas; or 2 miles or more across apparently suitable habitat not known to be occupied. Justification: The rationale for this large a separation distance across suitable but apparently unoccupied habitat is that it is likely additional research will find this habitat to be occupied. It can often be assumed that apparently unconnected populations will eventually be found to be more closely connected; these are best regarded as suboccurrences. No information on mobility of pollen and propagules is available on which to base the separation distance for this species.

ARANKSPECS:

Size: 1000 or more individuals (based on available EOR data). Condition: the occurrence has an excellent likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. This occurrence should be in a high-quality site with less than 1% cover of exotic plant species and/or no significant anthropogenic disturbance. Landscape Context: the occurrence is surrounded by an area that is unfragmented and includes the ecological processes needed to sustain this species. A suitable natural disturbance regime (which may include fire), suitable soil chemistry and nutrient levels, and a lack of unnatural flooding is required by this species to persist. Justification: Large populations in high quality sites are presumed to contain a high degree of genetic variability, to have a low susceptibility to the effects of inbreeding depression, and to be relatively resilient.

BRANKSPECS:

Size: 100 to 1000 individuals (based on available EOR data). Condition: the occurrence should have a good likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. Anthropogenic disturbance within the occurrence is minimal. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: the surrounding landscape should contain the ecological processes needed to sustain the occurrence but may be fragmented and/or impacted by humans.

CRANKSPECS:

Size: 20 to 100 individuals (based on available EOR data). Condition: The occurrence may be less productive than the above situations, but is still viable, with multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of anthropogenic disturbance). Landscape Context: there may be significant human disturbance, but the ecological processes needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival.

DRANKSPECS:

Size: Less than 20 individuals (based on available EOR data). Condition: little or no evidence of successful reproduction is observed (poor seedling recruitment, no flowering or fruiting observed, or poor age class distribution). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance. Landscape context: the surrounding area is fragmented with many ecological processes no longer intact. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

EOSPECS

Any naturally occurring population that is separated by a sufficient distance or barrier from a neighboring population. As a guideline, EOs are separated by either: 1 mile or more across unsuitable habitat or altered and unsuitable areas; or 2 miles or more across apparently suitable habitat not known to be occupied. Justification: The rationale for this large a separation distance across suitable but apparently unoccupied habitat is that it is likely additional research will find this habitat to be occupied. It can often be assumed that apparently unconnected populations will eventually be found to be more closely connected; these are best regarded as suboccurrences. No information on mobility of pollen and propagules is available on which to base the separation distance for this species.

ARANKSPECS

Size: 500 or more individuals (based on available EOR data). Condition: the occurrence has an excellent likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. This occurrence should be in a high-quality site with less than 1% cover of exotic plant species and/or no significant anthropogenic disturbance. Landscape Context: the occurrence is surrounded by an area that is unfragmented and includes the ecological processes needed to sustain this species. Periodic fire may be necessary to maintain appropriate tree and shrub density in the matrix community in which this species is found. Justification: Large populations in high quality sites are presumed to contain a high degree of genetic variability, to have a low susceptibility to the effects of inbreeding depression, and to be relatively resilient.

BRANKSPECS

Size: 100 to 500 individuals (based on available EOR data). Condition: the occurrence should have a good likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. Anthropogenic disturbance within the occurrence is minimal. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: the surrounding landscape should contain the ecological processes needed to sustain the occurrence but may be fragmented and/or impacted by humans.

CRANKSPECS

Size: 20 to 100 individuals (based on available EOR data). Condition: The occurrence may be less productive than the above situations, but is still viable, with multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of anthropogenic disturbance). Landscape Context: there may be significant human disturbance, but the ecological processes needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival.

DRANKSPECS

Size: Less than 20 individuals (based on available EOR data). Condition: little or no evidence of successful reproduction is observed (poor seedling recruitment, no flowering or fruiting observed, or poor age class distribution). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance. Landscape context: the surrounding area is fragmented with many ecological processes no longer intact. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

EOSPECS

Any natural occurrence of one or more plants. The number of aboveground stems does not necessarily indicate the number of plants in the population, however, because a root base may not send up a stem every year. An Element Occurrence is therefore described by the highest number of aboveground plants in the population over a five-year period (this number may still not provide an accurate estimate of the total population size). Because little genetic variability exists within *Botrychium* species, the number of genetic individuals is not a factor in ranking element occurrences.

ARANKSPECS

Size: The population numbers 100 or more above ground plants at some point during a 5-year period (based on available EOR data). Condition: The occurrence should have an excellent likelihood of long-term viability (successful sporophore production is observed indicating that the reproductive mechanisms are intact). This occurrence should be in a high-quality site (i.e. less than 1% cover exotic plant species and/or no significant human disturbances). Landscape Context: the occurrence is surrounded by an area that is unfragmented and includes the ecological processes and natural disturbance regime needed to sustain this species. The presence of an appropriate disturbance regime and the lack of a closed canopy are requirements for this species. Justification: Very little is known about the population biology of this species (and all other *Botrychium* species). Large populations in high quality sites are presumed to contain a high degree of genetic variability, have a low susceptibility to the effects of inbreeding depression, and to be relatively resilient. Because *Botrychium* species do not produce aboveground biomass every year, the EO rank is based on the highest number of individuals observed within a 5-year period.

BRANKSPECS

Size: The population numbers 10 to 99 above ground plants at some point during a 5-year period (based on available EOR data). Condition: The occurrence should have a good likelihood of long-term viability (successful sporophore production is observed indicating that the reproductive mechanisms are intact) with little human disturbance. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: the surrounding landscape should contain the ecological processes and natural disturbance regime needed to sustain this species but may be fragmented and/or impacted by humans.

CRANKSPECS

Size: The population numbers up to 9 above ground plants at some point during a 5-year period (based on available EOR data). Condition: the occupied habitat may be a small area not yet invaded by successional species, or it may be a larger area with sections of significant overgrowth and shading. The occurrence may be less productive than the above situations, but is still viable (with successful sporophore production observed indicating that the reproductive mechanisms are intact). The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of human disturbance). Landscape Context: there may be significant human disturbance, but the ecological processes and natural disturbance regime needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival.

DRANKSPECS

Size: Only 1 or 2 above ground plants (based on available EOR data). Condition: the habitat is degraded by human activities or overgrown by successional plant species that shade out *Botrychium echo*. Little or no evidence of successful reproduction is observed (poor sporophore production or herbivory resulting in sporophore removal). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance. Landscape context: the surrounding area is fragmented with many ecological processes or the necessary natural disturbance regime no longer intact. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

EOSPECS

Any natural occurrence of one or more plants. The number of aboveground stems does not necessarily indicate the number of plants in the population, however, because a root base may not send up a stem every year. An Element Occurrence is therefore described by the highest number of aboveground plants in the population over a five-year period. (This number may still not provide an accurate estimate of the total population size.) Because little genetic variability exists within *Botrychium* species, the number of genetic individuals is not a factor in ranking element occurrences.

ARANKSPECS

Size: The population numbers 100 or more aboveground plants at some point during a 5-year period (based on available EOR data). Condition: the occupied habitat is a large, open field or wood edge that has not been invaded by successional plant species. Occurrences with an excellent likelihood of long-term viability (successful sporophore production is observed indicating that the reproductive mechanisms are intact). This occurrence should be in a high-quality site (i.e. less than 1% cover exotic plant species and/or no significant human disturbances). Landscape Context: the occurrence is surrounded by an area that is unfragmented and includes the ecological processes and natural disturbance regime needed to sustain this species. Justification: Very little is known about the population biology of this species (and all other *Botrychium* species). Large populations in high quality sites are presumed to contain a high degree of genetic variability, have a low susceptibility to the effects of inbreeding depression, and to be relatively resilient. Because *Botrychium* species do not produce aboveground biomass every year, the EO rank is based on the highest number of individuals observed within a five year period.

BRANKSPECS

Size: The population numbers 10 to 99 aboveground plants at some point during a 5-year period (based on available EOR data). Condition: the occupied habitat is a moderate, open field or wood edge that has likely been invaded by successional plant species in a few small areas. The occurrence should have a good likelihood of long-term viability (successful sporophore production is observed indicating that the reproductive mechanisms are intact) with little human disturbance. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: the surrounding landscape should contain the ecological processes and natural disturbance regime needed to sustain this species but may be fragmented and/or impacted by humans.

CRANKSPECS

Size: The population numbers up to 9 aboveground plants at some point during a 5-year period (based on available EOR data). Condition: The occupied habitat may be a small, open field or wood edge not yet invaded by successional species, or it may be a larger area with sections of significant overgrowth and shading. The occurrence may be less productive than the above situations, but is still viable (with successful sporophore production observed indicating that the reproductive mechanisms are intact). The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of human disturbance). Landscape Context: There may be significant human disturbance, but the ecological processes and natural disturbance regime needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival.

DRANKSPECS

Size: Only 1 or 2 aboveground plants (based on available EOR data). Condition: the habitat is a field or wood edge of any size, but much of the area has been overgrown by successional plant species that shade out *Botrychium lineare*. Little or no evidence of successful reproduction is observed (poor sporophore production or herbivory resulting in sporophore removal). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance. Landscape context: the surrounding area is fragmented with many ecological processes or the necessary natural disturbance regime no longer intact. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

EOSPECS

Any natural occurrence of one or more plants. The number of above ground stems does not necessarily indicate the number of plants in the population, however, because a root base may not send up a stem every year. An Element Occurrence is therefore described by the highest number of aboveground plants in the population over a five-year period. (This number may still not provide an accurate estimate of the total population size.) Because little genetic variability exists within *Botrychium* species (Farrar pers. comm. 1995), the number of genetic individuals is not a factor in ranking Element Occurrences. *Botrychium pallidum*, in particular, reproduces both sexually and vegetatively via minute gemmae that are clustered densely at the root bases.

ARANKSPECS

Size: The population numbers 100 or more aboveground plants at some point during a 5-year period (based on available EOR data). Condition: The habitat is generally a large, open, grassy field maintained by a disturbance element, such as fire or erosion. Successional plant species have not invaded these open areas. The occurrence should have an excellent likelihood of long-term viability (successful sporophore production is observed indicating that the reproductive mechanisms are intact). This occurrence should be in a high-quality site (i.e. less than 1% cover exotic plant species and/or no significant human disturbances). Landscape Context: the occurrence is surrounded by an area that is unfragmented and includes the ecological processes and natural disturbance regime needed to sustain this species. The presence of an appropriate disturbance regime and the lack of a closed canopy are requirements for this species. Justification: Very little is known about the population biology of this species (and all other *Botrychium* species). Large populations in high quality sites are presumed to contain a high degree of genetic variability, have a low susceptibility to the effects of inbreeding depression, and to be relatively resilient. Because *Botrychium* species do not produce aboveground biomass every year, the EO rank is based on the highest number of individuals observed within a five year period.

BRANKSPECS

Size: The population numbers 10 to 99 aboveground plants at some point during a 5-year period (based on available EOR data). Condition: The habitat is generally a moderate-to-large, open, grassy field maintained by a disturbance element, such as fire, an eroding slope, or a few cattle. Successional overgrowth may have invaded small portions of the open area. The occurrence should have a good likelihood of long-term viability (successful sporophore production is observed indicating that the reproductive mechanisms are intact) with little human disturbance. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: the surrounding landscape should contain the ecological processes and natural disturbance regime needed to sustain this species but may be fragmented and/or impacted by humans.

CRANKSPECS

Size: The population consists of a few (generally less than 10) aboveground stems each year (based on available EOR data). Condition: The habitat is a fairly-open, grassy area partially maintained by a disturbance element, such as fire, an eroding slope, or cattle. Successional overgrowth may have shaded significant sections of the open area. The occurrence may be less productive than the above situations, but is still viable (with successful sporophore production observed indicating that the reproductive mechanisms are intact). The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of human disturbance). Landscape Context: there may be significant human disturbance, but the ecological processes and natural disturbance regime needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival.

DRANKSPECS

Size: Only 1 or 2 above ground plants (based on available EOR data). Condition: The habitat is a previously-open area now succeeding to woody vegetation, which shades out *Botrychium pallidum*. Or, the habitat may be an open area but over-trampled by more cattle than are necessary to maintain the open field. Little or no evidence of successful reproduction is observed (poor sporophore production or herbivory resulting in sporophore removal). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance. Landscape context: the surrounding area is fragmented with many ecological processes or the necessary natural disturbance regime no longer intact. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

Carex oreocharis 9/27/2000

ELDESCRIP:

Plants are not rhizomatous, leaf blades 1.5-2 mm wide, culms stout, often rough above, lowest scale awned. Spikes one to a culm, spikes narrow and elongate with a distinct elongate narrow staminate portion, only a few carpellate flowers at the base, perigynium beaked, The spike is thick and smooth owing to the broadly overlapping and clasping scales (Weber and Wittmann 1996).

EOSPECS:

Any naturally occurring population that is separated by a sufficient distance or barrier from a neighboring population. As a guideline, EOs are separated by either: 1 mile or more across unsuitable habitat or altered and unsuitable areas; or 2 miles or more across apparently suitable habitat not known to be occupied. Justification: The rationale for this large a separation distance across suitable but apparently unoccupied habitat is that it is likely additional research will find this habitat to be occupied. It can often be assumed that apparently unconnected populations will eventually be found to be more closely connected; these are best regarded as suboccurrences. No information on mobility of pollen and propagules is available on which to base the separation distance for this species.

ARANKSPECS:

Size: There is very little quantitative information on population size for this species. The largest known occurrences report "thousands of individuals." Condition: the occurrence has an excellent likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. This occurrence should be in a high-quality site with less than 1% cover exotic plant species and/or no significant anthropogenic disturbance. Landscape Context: the occurrence is surrounded by an area that is unfragmented and includes the ecological processes needed to sustain this species. Justification: Large populations in high quality sites are presumed to contain a high degree of genetic variability, have a low susceptibility to the effects of inbreeding depression, and to be relatively resilient. When more information is acquired, the eospecs should be reassessed.

BRANKSPECS:

Size: Estimated populations in the hundreds (based on available EOR data). There is very little quantitative information on population size for this species. Condition: the occurrence should have a good likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. Anthropogenic disturbance within the occurrence is minimal. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: the surrounding landscape should contain the ecological processes needed to sustain the occurrence but may be fragmented and/or impacted by humans.

CRANKSPECS:

Size: 20 to 200 individuals (based on available EOR data). Condition: The occurrence may be less productive than the above situations, but is still viable, with multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of anthropogenic disturbance). Landscape Context: there may be significant human disturbance, but the ecological processes needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival. When more information is acquired, the eospecs should be reassessed. We estimate that the effects of inbreeding depression would become severe over time in an isolated population of less than 20 individuals, although there is no data available on the population biology of this species or on the sizes of known populations at this time.

DRANKSPECS:

Size: Less than 20 individuals. Condition: little or no evidence of successful reproduction is observed (poor seedling recruitment, no flowering or fruiting observed, or poor age class distribution). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance. Landscape context: the surrounding area is fragmented with many ecological processes no longer intact. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

Castilleja puberula 9/21/2000

EOSPECS:

Any naturally occurring population. EOs are separated by either: 1 mile or more across unsuitable habitat or altered and unsuitable areas; or 2 miles or more across apparently suitable habitat not known to be occupied. Justification: The rationale for this large a separation distance across suitable but apparently unoccupied habitat is that it is likely additional research will find this habitat to be occupied. It can often be assumed that apparently unconnected populations will eventually be found to be more closely connected; these are best regarded as suboccurrences.

ARANKSPECS:

Size: No population size information is available for this species at this time. Condition: The occurrence has an excellent likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. This occurrence should be in a high-quality site with less than 1% cover of exotic plant species and/or no significant anthropogenic disturbance. Landscape Context: The occurrence is surrounded by an area that is unfragmented and includes the ecological processes needed to sustain this species. Justification: Large populations in high quality sites are presumed to contain a high degree of genetic variability, to have a low susceptibility to the effects of inbreeding depression, and to be relatively resilient. When more information is acquired, the eospecs should be reassessed for this species.

BRANKSPECS:

Size: No population size information is available for this species at this time. Condition: The occurrence should have a good likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. Anthropogenic disturbance within the occurrence is minimal. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: The surrounding landscape should contain the ecological processes needed to sustain the occurrence but may be fragmented and/or impacted by humans.

CRANKSPECS:

Size: No population size information is available for this species at this time. Condition: The occurrence may be less productive than the above situations, but is still viable, with multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of anthropogenic disturbance). Landscape Context: there may be significant human disturbance, but the ecological processes needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival. We estimate that the effects of inbreeding depression would become severe over time in an isolated population of less than 10 individuals, although there is no data available on the population biology of this species or on the sizes of known populations at this time.

DRANKSPECS:

Size: Less than 10 individuals. Condition: little or no evidence of successful reproduction is observed (poor seedling recruitment, no flowering or fruiting observed, or poor age class distribution). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance. Landscape context: the surrounding area is fragmented with many ecological processes no longer intact. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

Cirsium perplexans 9/19/2000

EOSPECS:

Any naturally occurring population that is separated by a sufficient distance or barrier from a neighboring population. As a guideline, EOs are separated by either: 1 mile or more across unsuitable habitat or altered and unsuitable areas; or 2 miles or more across apparently suitable habitat not known to be occupied. Justification: The rationale for this large a separation distance across suitable but apparently unoccupied habitat is that it is likely additional research will find this habitat to be occupied. It can often be assumed that apparently unconnected populations will eventually be found to be more closely connected; these are best regarded as suboccurrences. No information on mobility of pollen and propagules is available on which to base the separation distance for this species.

ARANKSPECS:

Size: 200 or more individuals (based on available EOR data). Condition: the occurrence has an excellent likelihood of long-term viability as evidenced by the presence of both rosettes and flowering individuals with successful fruiting, indicating that the reproductive mechanisms are intact. This occurrence should be in a high-quality site with less than 1% cover of exotic plant species and/or no significant anthropogenic disturbance. Landscape Context: the occurrence is surrounded by an area that is unfragmented and includes the ecological processes needed to sustain this species. Justification: Large populations in high quality sites are presumed to contain a high degree of genetic variability, to have a low susceptibility to the effects of inbreeding depression, and to be relatively resilient.

BRANKSPECS:

Size: 100 to 200 or more individuals (based on available EOR data). Condition: the occurrence should have a good likelihood of long-term viability as evidenced by the presence of both rosettes and flowering individuals with successful fruiting, indicating that the reproductive mechanisms are intact. Anthropogenic disturbance within the occurrence is minimal. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: the surrounding landscape should contain the ecological processes needed to sustain the occurrence but may be fragmented and/or impacted by humans.

CRANKSPECS:

Size: 25 to 100 individuals (based on available EOR data). Condition: The occurrence may be less productive than the above situations, but is still viable, with both rosettes and flowering individuals present and successfully fruiting, indicating that the reproductive mechanisms are intact. The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of anthropogenic disturbance). Landscape Context: there may be significant human disturbance, but the ecological processes needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival.

DRANKSPECS:

Size: Less than 25 individuals (based on available EOR data). Condition: little or no evidence of successful reproduction is observed (poor seedling recruitment or no flowering or fruiting observed). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance. Landscape context: the surrounding area is fragmented with many ecological processes no longer intact. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

EOSPECS:

Any naturally occurring population that is separated by a sufficient distance or barrier from a neighboring population. As a guideline, EOs are separated by either: 1 mile or more across unsuitable habitat or altered and unsuitable areas; or 2 miles or more across apparently suitable habitat not known to be occupied. Because this species is an annual, population size may vary greatly from year to year. Justification: The rationale for this large a separation distance across suitable but apparently unoccupied habitat is that it is likely additional research will find this habitat to be occupied. It can often be assumed that apparently unconnected populations will eventually be found to be more closely connected; these are best regarded as suboccurrences. No information on mobility of pollen and propagules is available on which to base the separation distance for this species.

ARANKSPECS:

Size: 10,000 or more individuals occupying five to thousands of acres, at some time during a 5 year period (based on available EOR data). Condition: the occurrence has an excellent likelihood of long-term viability as evidenced by flowering and fruiting, indicating that the reproductive mechanisms are intact. This occurrence should be in a high-quality site with less than 1% cover of exotic plant species and/or no significant anthropogenic disturbance. Landscape Context: the occurrence is surrounded by an area that is unfragmented and includes the ecological processes needed to sustain this species. A-ranked occurrences of *Cleome multicaulis* should occur in an area with a natural hydrologic regime, often fed by groundwater, in saline or alkaline soils. *Distichlis spicata* is a common associated species in high ranked occurrences. Justification: Large populations in high quality sites are presumed to contain a high degree of genetic variability, to have a low susceptibility to the effects of inbreeding depression, and to be relatively resilient.

BRANKSPECS:

Size: 1000 or more individuals occupying 1/2 acre or more; may occupy a much larger area depending on the condition. These conditions must be met at some time during a 5 year period (based on available EOR data). Condition: the occurrence should have a good likelihood of long-term viability as evidenced by flowering and fruiting, indicating that the reproductive mechanisms are intact. Anthropogenic disturbance within the occurrence is minimal. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: the surrounding landscape should contain the ecological processes needed to sustain the occurrence but may be fragmented and/or impacted by humans.

CRANKSPECS:

Size: 50 to 1000 individuals occupying a small (less than 1/2 acre) area or a larger somewhat degraded area within a five year period (based on available EOR data). Condition: The occurrence may be less productive than the above situations, but is still viable, with evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of anthropogenic disturbance). Landscape Context: there may be significant human disturbance, but the ecological processes needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival.

DRANKSPECS:

Size: Less than 50 individuals, with no observations exceeding 50 individuals within a 5 year period (based on available EOR data). Condition: little or no evidence of successful reproduction is observed (poor seedling recruitment, no flowering or fruiting observed). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance. Heavy grazing is often occurring in D-ranked occurrences of this species. Landscape context: the surrounding area is fragmented with many ecological processes no longer intact. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

EOSPECS:

Any naturally occurring population that is separated by a sufficient distance or barrier from a neighboring population. As a guideline, EOs are separated by either: 1 mile or more across unsuitable habitat or altered and unsuitable areas; or 2 miles or more across apparently suitable habitat not known to be occupied. Justification: The rationale for this large a separation distance across suitable but apparently unoccupied habitat is that it is likely additional research will find this habitat to be occupied. It can often be assumed that apparently unconnected populations will eventually be found to be more closely connected; these are best regarded as suboccurrences. No information on mobility of pollen and propagules is available on which to base the separation distance for this species.

ARANKSPECS:

Size: There is no quantitative information on population size for this species. Condition: The habitat should be a high quality riparian area. The occurrence has an excellent likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. This occurrence should be in a high-quality site with less than 1% cover of exotic plant species and/or no significant anthropogenic disturbance. Landscape Context: the occurrence is surrounded by an area that is unfragmented and includes the ecological processes needed to sustain this species. A natural flood regime is presumed to be necessary for this species. Justification: Large populations in high quality sites are presumed to contain a high degree of genetic variability, to have a low susceptibility to the effects of inbreeding depression, and to be relatively resilient.

BRANKSPECS:

Size: There is no quantitative information on population size for this species. Condition: the occurrence should have a good likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. Anthropogenic disturbance within the occurrence is minimal. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: the surrounding landscape should contain the ecological processes needed to sustain the occurrence but may be fragmented and/or impacted by humans.

CRANKSPECS:

Size: There is no quantitative information on population size for this species. Condition: The occurrence may be less productive than the above situations, but is still viable, with multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of anthropogenic disturbance). Landscape Context: there may be significant human disturbance, but the ecological processes needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival. We estimate that the effects of inbreeding depression would become severe over time in an isolated population of less than 10 individuals, although there is no data available on the population biology of this species or on the sizes of known populations at this time.

DRANKSPECS:

Size: Less than 10 individuals. Condition: little or no evidence of successful reproduction is observed (poor seedling recruitment, no flowering or fruiting observed, or poor age class distribution). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance. Landscape context: the surrounding area is fragmented with many ecological processes no longer intact. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

Cryptantha weberi

ELDESCRIP:

An endemic perennial of volcanic ash deposits. Stout, stiffly erect stems are usually less than 20 cm tall. Inconspicuous pubescence of appressed, pustulate hairs. Inflorescence a tight spike with flowers greater than 5mm in diameter. Nutlets are not smooth (Weber and Wittmann 1996).

EOSPECS:

Any naturally occurring population that is separated by a sufficient distance or barrier from a neighboring population. As a guideline, EOs are separated by either: 1 mile or more across unsuitable habitat or altered and unsuitable areas; or 2 miles or more across apparently suitable habitat not known to be occupied. Justification: The rationale for this large a separation distance across suitable but apparently unoccupied habitat is that it is likely additional research will find this habitat to be occupied. It can often be assumed that apparently unconnected populations will eventually be found to be more closely connected; these are best regarded as suboccurrences. No information on mobility of pollen and propagules is available on which to base the separation distance for this species.

ARANKSPECS

Size: 1000 or more individuals (based on available EOR data). Condition: The occurrence has an excellent likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. This occurrence should be in a high-quality site with less than 1% cover of exotic plant species and/or no significant anthropogenic disturbance. Landscape Context: The occurrence is surrounded by an area that is unfragmented and includes the ecological processes needed to sustain this species. Justification: Human impacts (development, grazing, ORV recreation) have negatively impacted many occurrences of this species. Large, undisturbed populations of this species (many of which occur on mesa tops where they are relatively inaccessible) deserve conservation action.

BRANKSPECS:

Size: 250 or more individuals (based on available EOR data). Condition: The occurrence should have a good likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. Anthropogenic disturbance within the occurrence is minimal. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: The surrounding landscape should contain the ecological processes needed to sustain the occurrence but may be fragmented and/or impacted by humans.

CRANKSPECS

Size: 20 or more individuals (based on available EOR data). Condition: The occurrence may be less productive than the above situations, but is still viable (with various age classes and evidence of flowering and fruiting indicating that the reproductive mechanisms are intact). The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of human disturbance). Landscape Context: there may be significant human disturbance, but the ecological processes needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival. Small but naturally protected populations may arguably deserve a "C"-rank if they are not vulnerable to human impacts.

DRANKSPECS

Size: Less than 20 individuals (based on available EOR data). Condition: little or no evidence of successful reproduction is observed (poor seedling recruitment, no flowering or fruiting observed, or poor age class distribution). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance. Landscape context: the surrounding area is fragmented with many ecological processes no longer intact. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

EOSPECS:

Any naturally occurring population that is separated by a sufficient distance or barrier from a neighboring population. As a guideline, EOs are separated by either: 1 mile or more across unsuitable habitat or altered and unsuitable areas; or 2 miles or more across apparently suitable habitat not known to be occupied. Justification: The rationale for this large a separation distance across suitable but apparently unoccupied habitat is that it is likely additional research will find this habitat to be occupied. It can often be assumed that apparently unconnected populations will eventually be found to be more closely connected; these are best regarded as suboccurrences. No information on mobility of pollen and propagules is available on which to base the separation distance for this species.

ARANKSPECS:

Size: No population size information is available for this species at this time. Condition: The occurrence has an excellent likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. This occurrence should be in a high-quality site with less than 1% cover of exotic plant species and/or no significant anthropogenic disturbance. Landscape Context: The occurrence is surrounded by an area that is unfragmented and includes the ecological processes needed to sustain this species. Justification: Large populations in high quality sites are presumed to contain a high degree of genetic variability, to have a low susceptibility to the effects of inbreeding depression, and to relatively resilient. When more information is acquired, the eospecs should be reassessed for this species.

BRANKSPECS:

Size: No population size information is available for this species at this time. Condition: The occurrence should have a good likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. Anthropogenic disturbance within the occurrence is minimal. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: The surrounding landscape should contain the ecological processes needed to sustain the occurrence but may be fragmented and/or impacted by humans.

CRANKSPECS:

Size: No population size information is available for this species at this time. Condition: The occurrence may be less productive than the above situations, but is still viable, with multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of anthropogenic disturbance). Landscape Context: There may be significant human disturbance, but the ecological processes needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival. We estimate that the effects of inbreeding depression would become severe over time in an isolated population of less than 10 individuals, although there is no data available on the population biology of this species or on the sizes of known populations at this time.

DRANKSPECS:

Size: Less than 10 individuals. Condition: Little or no evidence of successful reproduction is observed (poor seedling recruitment, no flowering or fruiting observed, or poor age class distribution). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance. Landscape context: The surrounding area is fragmented with many ecological processes no longer intact. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

Delphinium robustum 9/19/2000

EOSPECS:

Any naturally occurring population that is separated by a sufficient distance or barrier from a neighboring population. As a guideline, EOs are separated by either: 1 mile or more across unsuitable habitat or altered and unsuitable areas; or 2 miles or more across apparently suitable habitat not known to be occupied. Justification: The rationale for this large a separation distance across suitable but apparently unoccupied habitat is that it is likely additional research will find this habitat to be occupied. It can often be assumed that apparently unconnected populations will eventually be found to be more closely connected; these are best regarded as suboccurrences. No information on mobility of pollen and propagules is available on which to base the separation distance for this species.

ARANKSPECS:

Size: No quantitative information is available on population size at this time for *Delphinium robustum*. Condition: the occurrence has an excellent likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. This occurrence should be in a high-quality site with less than 1% cover of exotic plant species and/or no significant anthropogenic disturbance. Landscape Context: the occurrence is surrounded by an area that is unfragmented and includes the ecological processes needed to sustain this species. In subalpine meadows, this species may depend on the maintenance of snow glades or a natural fire regime for its persistence. Justification: No quantitative information is available on population size for this species at this time. Large populations in high quality sites are presumed to contain a high degree of genetic variability, to have a low susceptibility to the effects of inbreeding depression, and to be relatively resilient. When more information is acquired, the eospecs should be reassessed.

BRANKSPECS:

Size: No quantitative information is available on population size at this time for *Delphinium robustum*. Condition: the occurrence should have a good likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. Anthropogenic disturbance within the occurrence is minimal. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: the surrounding landscape should contain the ecological processes needed to sustain the occurrence but may be fragmented and/or impacted by humans.

CRANKSPECS:

Size: No quantitative information is available on population size at this time for *Delphinium robustum*. Condition: The occurrence may be less productive than the above situations, but is still viable, with multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of anthropogenic disturbance). Landscape Context: there may be significant human disturbance, but the ecological processes needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival. We estimate that the effects of inbreeding depression would become severe over time in an isolated population of less than 10 individuals, although there is no data available on the population biology of this species or on the sizes of known populations at this time.

DRANKSPECS:

Size: Less than 10 individuals. Condition: Little or no evidence of successful reproduction is observed (poor seedling recruitment, no flowering or fruiting observed, or poor age class distribution). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance. Landscape context: the surrounding area is fragmented with many ecological processes no longer intact. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

Descurainia ramosissima

EOSPECS:

Any naturally occurring population that is separated by a sufficient distance or barrier from a neighboring population. As a guideline, EOs are separated by either: 1 mile or more across unsuitable habitat or altered and unsuitable areas; or 2 miles or more across apparently suitable habitat not known to be occupied. Justification: The rationale for this large a separation distance across suitable but apparently unoccupied habitat is that it is likely additional research will find this habitat to be occupied. It can often be assumed that apparently unconnected populations will eventually be found to be more closely connected; these are best regarded as suboccurrences. No information on mobility of pollen and propagules is available on which to base the separation distance for this species.

ARANKSPECS:

Size: No population size information is available for this species at this time. Condition: The occurrence has an excellent likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. This occurrence should be in a high-quality site with less than 1% cover of exotic plant species and/or no significant anthropogenic disturbance. Landscape Context: The occurrence is surrounded by an area that is unfragmented and includes the ecological processes needed to sustain this species. Justification: Large populations in high quality sites are presumed to contain a high degree of genetic variability, to have a low susceptibility to the effects of inbreeding depression, and to relatively resilient. When more information is acquired, the eospecs should be reassessed for this species.

BRANKSPECS:

Size: No population size information is available for this species at this time. Condition: The occurrence should have a good likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. Anthropogenic disturbance within the occurrence is minimal. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: The surrounding landscape should contain the ecological processes needed to sustain the occurrence but may be fragmented and/or impacted by humans.

CRANKSPECS:

Size: No population size information is available for this species at this time. Condition: The occurrence may be less productive than the above situations, but is still viable, with multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of anthropogenic disturbance). Landscape Context: There may be significant human disturbance, but the ecological processes needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival. We estimate that the effects of inbreeding depression would become severe over time in an isolated population of less than 10 individuals, although there is no data available on the population biology of this species or on the sizes of known populations at this time.

DRANKSPECS:

Size: Less than 10 individuals. Condition: Little or no evidence of successful reproduction is observed (poor seedling recruitment, no flowering or fruiting observed, or poor age class distribution). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance. Landscape context: The surrounding area is fragmented with many ecological processes no longer intact. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

EOSPECS:

Any naturally occurring population that is separated by a sufficient distance or barrier from a neighboring population. As a guideline, EOs are separated by either: 1 mile or more across unsuitable habitat or altered and unsuitable areas; or 2 miles or more across apparently suitable habitat not known to be occupied. Justification: The rationale for this large a separation distance across suitable but apparently unoccupied habitat is that it is likely additional research will find this habitat to be occupied. It can often be assumed that apparently unconnected populations will eventually be found to be more closely connected; these are best regarded as suboccurrences. No information on mobility of pollen and propagules is available on which to base the separation distance for this species.

ARANKSPECS:

Size: 500 or more individuals (based on available EOR data). Condition: the occurrence has an excellent likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. This occurrence should be in a high-quality site with less than 1% cover of exotic plant species and/or no significant anthropogenic disturbance. Landscape Context: the occurrence is surrounded by an area that is unfragmented and includes the ecological processes needed to sustain this species. Depth and longevity of snowpack, stability of the soil, and presence or absence of appropriate pollinators affect the long-term persistence of this species. Justification: Large populations in high quality sites are presumed to contain a high degree of genetic variability, to have a low susceptibility to the effects of inbreeding depression, and to be relatively resilient.

BRANKSPECS:

Size: 200 or more individuals (based on available EOR data). Condition: the occurrence should have a good likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. Anthropogenic disturbance within the occurrence is minimal. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: the surrounding landscape should contain the ecological processes needed to sustain the occurrence but may be fragmented and/or impacted by humans.

CRANKSPECS:

Size: 20 to 200 individuals (based on available EOR data). Condition: The occurrence may be less productive than the above situations, but is still viable, with multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of anthropogenic disturbance). Landscape Context: there may be significant human disturbance, but the ecological processes needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival.

DRANKSPECS:

Size: Less than 20 individuals (based on available EOR data). Condition: little or no evidence of successful reproduction is observed (poor seedling recruitment, no flowering or fruiting observed, or poor age class distribution). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance. Landscape context: the surrounding area is fragmented with many ecological processes no longer intact. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

Draba globosa

ELDESCRIP:

Plants forming cushions with many short caudices, each topped by a cluster of broad, short, incurved glabrous or ciliate leaves, forming minute cabbage-like heads. Styles are very short (0.15 mm or less) and seeds are small (less than 1mm).

EOSPECS:

Any naturally occurring population that is separated by a sufficient distance or barrier from a neighboring population. As a guideline, EOs are separated by either: 1 mile or more across unsuitable habitat or altered and unsuitable areas; or 2 miles or more across apparently suitable habitat not known to be occupied. Justification: The rationale for this large a separation distance across suitable but apparently unoccupied habitat is that it is likely additional research will find this habitat to be occupied. It can often be assumed that apparently unconnected populations will eventually be found to be more closely connected; these are best regarded as suboccurrences. No information on mobility of pollen and propagules is available on which to base the separation distance for this species.

ARANKSPECS:

Size: No population size information is available for this species at this time. Condition: The occurrence has an excellent likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. This occurrence should be in a high-quality site with less than 1% cover of exotic plant species and/or no significant anthropogenic disturbance. Landscape Context: The occurrence is surrounded by an area that is unfragmented and includes the ecological processes needed to sustain this species. Justification: Large populations in high quality sites are presumed to contain a high degree of genetic variability, to have a low susceptibility to the effects of inbreeding depression, and to be relatively resilient. When more information is acquired, the eospecs should be reassessed for this species.

BRANKSPECS:

Size: No population size information is available for this species at this time. Condition: The occurrence should have a good likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. Anthropogenic disturbance within the occurrence is minimal. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: The surrounding landscape should contain the ecological processes needed to sustain the occurrence but may be fragmented and/or impacted by humans.

CRANKSPECS:

Size: No population size information is available for this species at this time. Condition: The occurrence may be less productive than the above situations, but is still viable, with multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of anthropogenic disturbance). Landscape Context: There may be significant human disturbance, but the ecological processes needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival. We estimate that the effects of inbreeding depression would become severe over time in an isolated population of less than 10 individuals, although there is no data available on the population biology of this species or on the sizes of known populations at this time.

DRANKSPECS:

Size: Less than 10 individuals. Condition: Little or no evidence of successful reproduction is observed (poor seedling recruitment, no flowering or fruiting observed, or poor age class distribution). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance. Landscape context: The surrounding area is fragmented with many ecological processes no longer intact. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

Draba graminea 9/19/2000

EOSPECS:

Any naturally occurring population that is separated by a sufficient distance or barrier from a neighboring population. As a guideline, EOs are separated by either: 1 mile or more across unsuitable habitat or altered and unsuitable areas; or 2 miles or more across apparently suitable habitat not known to be occupied. Justification: The rationale for this large a separation distance across suitable but apparently unoccupied habitat is that it is likely additional research will find this habitat to be occupied. It can often be assumed that apparently unconnected populations will eventually be found to be more closely connected; these are best regarded as suboccurrences. No information on mobility of pollen and propagules is available on which to base the separation distance for this species.

ARANKSPECS:

Size: 500 or more individuals (based on available EOR data). Condition: the occurrence has an excellent likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. This occurrence should be in a high-quality site with less than 1% cover of exotic plant species and/or no significant anthropogenic disturbance. Landscape Context: the occurrence is surrounded by an area that is unfragmented and includes the ecological processes needed to sustain this species. Depth and longevity of snowpack, stability of the soil, and presence or absence of appropriate pollinators affect the long-term persistence of this species. This species seems to prefer rather open, well drained, rocky or gravelly sites with little other vegetation. Justification: Large populations in high quality sites are presumed to contain a high degree of genetic variability, to have a low susceptibility to the effects of inbreeding depression, and to be relatively resilient.

BRANKSPECS:

Size: 200 or more individuals (based on available EOR data). Condition: the occurrence should have a good likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. Anthropogenic disturbance within the occurrence is minimal. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: the surrounding landscape should contain the ecological processes needed to sustain the occurrence but may be fragmented and/or impacted by humans.

CRANKSPECS:

Size: 20 to 200 individuals (based on available EOR data). Condition: The occurrence may be less productive than the above situations, but is still viable, with multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of anthropogenic disturbance). Landscape Context: there may be significant human disturbance, but the ecological processes needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival.

DRANKSPECS:

Size: Less than 20 individuals (based on available EOR data). Condition: little or no evidence of successful reproduction is observed (poor seedling recruitment, no flowering or fruiting observed, or poor age class distribution). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance. Landscape context: the surrounding area is fragmented with many ecological processes no longer intact. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

Draba grayana 9/19/2000

EOSPECS:

Any naturally occurring population that is separated by a sufficient distance or barrier from a neighboring population. As a guideline, EOs are separated by either: 1 mile or more across unsuitable habitat or altered and unsuitable areas; or 2 miles or more across apparently suitable habitat not known to be occupied. Justification: The rationale for this large a separation distance across suitable but apparently unoccupied habitat is that it is likely additional research will find this habitat to be occupied. It can often be assumed that apparently unconnected populations will eventually be found to be more closely connected; these are best regarded as suboccurrences. No information on mobility of pollen and propagules is available on which to base the separation distance for this species.

ARANKSPECS:

Size: 500 or more individuals (based on available EOR data). Condition: the occurrence has an excellent likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. This occurrence should be in a high-quality site with less than 1% cover of exotic plant species and/or no significant anthropogenic disturbance. Landscape Context: the occurrence is surrounded by an area that is unfragmented and includes the ecological processes needed to sustain this species. Depth and longevity of snowpack, stability of the soil, and presence or absence of appropriate pollinators affect the long-term persistence of this species. This species seems to prefer rather open, well drained, rocky or gravelly sites with little other vegetation. Justification: Large populations in high quality sites are presumed to contain a high degree of genetic variability, to have a low susceptibility to the effects of inbreeding depression, and to be relatively resilient.

BRANKSPECS:

Size: 200 or more individuals (based on available EOR data). Condition: the occurrence should have a good likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. Anthropogenic disturbance within the occurrence is minimal. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: the surrounding landscape should contain the ecological processes needed to sustain the occurrence but may be fragmented and/or impacted by humans.

CRANKSPECS:

Size: 20 to 200 individuals (based on available EOR data). Condition: The occurrence may be less productive than the above situations, but is still viable, with multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of anthropogenic disturbance). Landscape Context: there may be significant human disturbance, but the ecological processes needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival.

DRANKSPECS:

Size: Less than 20 individuals (based on available EOR data). Condition: little or no evidence of successful reproduction is observed (poor seedling recruitment, no flowering or fruiting observed, or poor age class distribution). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance. Landscape context: the surrounding area is fragmented with many ecological processes no longer intact. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

Draba rectifructa 9/27/2000

ELDESCRIP:

Plants are not rhizomatous, leaf blades 1.5-2 mm wide, culms stout, often rough above, lowest scale awned. Spikes one to a culm, spikes narrow and elongate with a distinct elongate narrow staminate portion, only a few carpellate flowers at the base, perigynium beaked, The spike is thick and smooth owing to the broadly overlapping and clasping scales (Weber and Wittmann 1996).

EOSPECS:

Any naturally occurring population that is separated by a sufficient distance or barrier from a neighboring population. As a guideline, EOs are separated by either: 1 mile or more across unsuitable habitat or altered and unsuitable areas; or 2 miles or more across apparently suitable habitat not known to be occupied. Justification: The rationale for this large a separation distance across suitable but apparently unoccupied habitat is that it is likely additional research will find this habitat to be occupied. It can often be assumed that apparently unconnected populations will eventually be found to be more closely connected; these are best regarded as suboccurrences. No information on mobility of pollen and propagules is available on which to base the separation distance for this species.

ARANKSPECS:

Size: There is very little quantitative information on population size for this species. Condition: the occurrence has an excellent likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. This occurrence should be in a high-quality site with less than 1% cover exotic plant species and/or no significant anthropogenic disturbance. Landscape Context: the occurrence is surrounded by an area that is unfragmented and includes the ecological processes needed to sustain this species. Justification: Large populations in high quality sites are presumed to contain a high degree of genetic variability, have a low susceptibility to the effects of inbreeding depression, and to be relatively resilient. When more information is acquired, the eospecs should be reassessed.

BRANKSPECS:

Size: Estimated populations in the hundreds. There is very little quantitative information on population size for this species. Condition: the occurrence should have a good likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. Anthropogenic disturbance within the occurrence is minimal. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: the surrounding landscape should contain the ecological processes needed to sustain the occurrence but may be fragmented and/or impacted by humans.

CRANKSPECS:

Size: 10 to 200 individuals. Condition: The occurrence may be less productive than the above situations, but is still viable, with multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of anthropogenic disturbance). Landscape Context: there may be significant human disturbance, but the ecological processes needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival. When more information is acquired, the eospecs should be reassessed.

DRANKSPECS:

Size: Less than 10 individuals. Condition: little or no evidence of successful reproduction is observed (poor seedling recruitment, no flowering or fruiting observed, or poor age class distribution). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance. Landscape context: the surrounding area is fragmented with many ecological processes no longer intact. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts. When more information is acquired, the eospecs should be reassessed.

EOSPECS:

Any naturally occurring population that is separated by a sufficient distance or barrier from a neighboring population. As a guideline, EOs are separated by either: 1 mile or more across unsuitable habitat or altered and unsuitable areas; or 2 miles or more across apparently suitable habitat not known to be occupied. Justification: The rationale for this large a separation distance across suitable but apparently unoccupied habitat is that it is likely additional research will find this habitat to be occupied. It can often be assumed that apparently unconnected populations will eventually be found to be more closely connected; these are best regarded as suboccurrences. No information on mobility of pollen and propagules is available on which to base the separation distance for this species.

ARANKSPECS:

Size: 500 or more individuals (based on available EOR data). Condition: the occurrence has an excellent likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. This occurrence should be in a high-quality site with less than 1% cover of exotic plant species and/or no significant anthropogenic disturbance. Landscape Context: the occurrence is surrounded by an area that is unfragmented and includes the ecological processes needed to sustain this species. Disturbance by natural movement of the talus in which this species grows is probably necessary for the long term persistence of populations. Justification: Large populations in high quality sites are presumed to contain a high degree of genetic variability, to have a low susceptibility to the effects of inbreeding depression, and to be relatively resilient.

BRANKSPECS:

Size: 200 or more individuals (based on available EOR data). Condition: the occurrence should have a good likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. Anthropogenic disturbance within the occurrence is minimal. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: the surrounding landscape should contain the ecological processes needed to sustain the occurrence but may be fragmented and/or impacted by humans.

CRANKSPECS:

Size: 20 to 200 individuals (based on available EOR data). Condition: The occurrence may be less productive than the above situations, but is still viable, with multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of anthropogenic disturbance). Landscape Context: there may be significant human disturbance, but the ecological processes needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival.

DRANKSPECS:

Size: Less than 20 individuals (based on available EOR data). Condition: little or no evidence of successful reproduction is observed (poor seedling recruitment, no flowering or fruiting observed, or poor age class distribution). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance. Landscape context: the surrounding area is fragmented with many ecological processes no longer intact. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

EOSPECS:

Any naturally occurring population that is separated by a sufficient distance or barrier from a neighboring population. As a guideline, EOs are separated by either: 1 mile or more across unsuitable habitat or altered and unsuitable areas; or 2 miles or more across apparently suitable habitat not known to be occupied. Justification: The rationale for this large a separation distance across suitable but apparently unoccupied habitat is that it is likely additional research will find this habitat to be occupied. It can often be assumed that apparently unconnected populations will eventually be found to be more closely connected; these are best regarded as suboccurrences. No information on mobility of pollen and propagules is available on which to base the separation distance for this species.

ARANKSPECS:

Size: 5000 or more individuals on 40 or more acres (based on available EOR data). Condition: The occurrence has an excellent likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. This occurrence should be in a high-quality site with less than 1% cover of exotic plant species and/or no significant anthropogenic disturbance. Quarrying, off-road vehicle use, and other human activities should be minimal in the area. Very low incidence of leaf rust or other disease should be evident in the population. Landscape Context: The occurrence is surrounded by an area that is unfragmented and includes the ecological processes needed to sustain this species. The presence of a natural fire regime is presumed to be beneficial to this species, and a natural disturbance regime, possibly erosion, may also benefit the species. Justification: Large populations in high quality sites are presumed to contain a high degree of genetic variability, to have a low susceptibility to the effects of inbreeding depression, and to be relatively resilient.

BRANKSPECS:

Size: 1000 or more individuals (based on available EOR data). Condition: The occurrence should have a good likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. Anthropogenic disturbance within the occurrence is minimal. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: The surrounding landscape should contain the ecological processes needed to sustain the occurrence but may be fragmented and/or impacted by humans.

CRANKSPECS:

Size: 20 to 1000 individuals (based on available EOR data). Condition: The occurrence may be less productive than the above situations, but is still viable, with multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of anthropogenic disturbance). Landscape Context: There may be significant human disturbance, but the ecological processes needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival.

DRANKSPECS:

Size: Less than 20 individuals (based on available EOR data). Condition: Little or no evidence of successful reproduction is observed (poor seedling recruitment, no flowering or fruiting observed, or poor age class distribution). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance and the habitat is probably not recoverable. Landscape context: The surrounding area is fragmented with many ecological processes no longer intact. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

EOSPECS:

Any naturally occurring population that is separated by a sufficient distance or barrier from a neighboring population. As a guideline, EOs are separated by either: 1 mile or more across unsuitable habitat or altered and unsuitable areas; or 2 miles or more across apparently suitable habitat not known to be occupied. Justification: The rationale for this large a separation distance across suitable but apparently unoccupied habitat is that it is likely additional research will find this habitat to be occupied. It can often be assumed that apparently unconnected populations will eventually be found to be more closely connected; these are best regarded as suboccurrences. No information on mobility of pollen and propagules is available on which to base the separation distance for this species.

ARANKSPECS:

Size: There is no quantitative information on population size available for this species at this time. Only three of the 17 known occurrences have information on population size, qualifying them as "scarce," "few," and "abundant" (Colorado Natural Heritage Program 2000). Condition: The occurrence has an excellent likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. This occurrence should be in a high-quality site with less than 1% cover of exotic plant species and/or no significant anthropogenic disturbance. Landscape Context: The occurrence is surrounded by an area that is unfragmented and includes the ecological processes needed to sustain this species. Justification: Large populations in high quality sites are presumed to contain a high degree of genetic variability, to have a low susceptibility to the effects of inbreeding depression, and to be relatively resilient. When more information is acquired, the eospecs should be reassessed for this species.

BRANKSPECS:

Size: No population size information is available for this species at this time. Condition: The occurrence should have a good likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. Anthropogenic disturbance within the occurrence is minimal. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: The surrounding landscape should contain the ecological processes needed to sustain the occurrence but may be fragmented and/or impacted by humans.

CRANKSPECS:

Size: No population size information is available for this species at this time. Condition: The occurrence may be less productive than the above situations, but is still viable, with multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of anthropogenic disturbance). Landscape Context: There may be significant human disturbance, but the ecological processes needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival. We estimate that the effects of inbreeding depression would become severe over time in an isolated population of less than 10 individuals, although there is no data available on the population biology of this species or on the sizes of known populations at this time.

DRANKSPECS:

Size: Less than 10 individuals. Condition: Little or no evidence of successful reproduction is observed (poor seedling recruitment, no flowering or fruiting observed, or poor age class distribution). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance. Landscape context: The surrounding area is fragmented with many ecological processes no longer intact. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

EOSPECS

Any naturally occurring population that is separated by a sufficient distance or barrier from a neighboring population. As a guideline, EOs are separated by either: 1 mile or more across unsuitable habitat or altered and unsuitable areas; or 2 miles or more across apparently suitable habitat not known to be occupied. Justification: The rationale for this large a separation distance across suitable but apparently unoccupied habitat is that it is likely additional research will find this habitat to be occupied. It can often be assumed that apparently unconnected populations will eventually be found to be more closely connected; these are best regarded as suboccurrences. No information on mobility of pollen and propagules is available on which to base the separation distance for this species.

ARANKSPECS

Size: 1000 or more individuals in an area greater than one hectare (based on available EOR data). Condition: The occurrence has an excellent likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. This occurrence should be in a high-quality site with less than 1% cover of exotic plant species and/or no significant anthropogenic disturbance. Landscape Context: The occurrence is surrounded by an area that is unfragmented and includes the ecological processes (very low disturbance, flowing surface water with dense moss, appropriate temperature regime, and probably acidic to neutral pH soil) needed to sustain this species. Justification: Large populations in high quality sites are presumed to contain a high degree of genetic variability, to have a low susceptibility to the effects of inbreeding depression, and to be relatively resilient.

BRANKSPECS

Size: 200 or more individuals in a small (less than 1 hectare) area (based on available EOR data). Condition: the occurrence should have a good likelihood of long-term viability (various age classes and evidence of flowering and fruiting are represented indicating that the reproductive mechanisms are intact) with little human disturbance. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: the surrounding landscape should contain the ecological processes needed to sustain the occurrence but may be fragmented and/or impacted by humans.

CRANKSPECS

Size: 50 or more individuals (based on available EOR data). Condition: The occurrence may be less productive than the above situations, but is still viable (with various age classes and evidence of flowering and fruiting indicating that the reproductive mechanisms are intact). The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of human disturbance). Landscape Context: there may be significant human disturbance, but the ecological processes needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival.

DRANKSPECS

Size: Less than 50 individuals (based on available EOR data). Condition: little or no evidence of successful reproduction is observed (poor seedling recruitment, no flowering or fruiting observed, or poor age class distribution). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance. Landscape context: the surrounding area is fragmented with many ecological processes no longer intact (i.e., hydrologic regime has been substantially altered resulting in drying of the soil in an occurrence). The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

EOSPECS:

Any naturally occurring population that is separated by a sufficient distance or barrier from a neighboring population. As a guideline, EOs are separated by either: 1 mile or more across unsuitable habitat or altered and unsuitable areas; or 2 miles or more across apparently suitable habitat not known to be occupied. Justification: The rationale for this large a separation distance across suitable but apparently unoccupied habitat is that it is likely additional research will find this habitat to be occupied. It can often be assumed that apparently unconnected populations will eventually be found to be more closely connected; these are best regarded as suboccurrences. No information on mobility of pollen and propagules is available on which to base the separation distance for this species.

ARANKSPECS:

Size: No population size information is available for this species at this time. Condition: The occurrence has an excellent likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. This occurrence should be in a high-quality site with less than 1% cover of exotic plant species and/or no significant anthropogenic disturbance. Landscape Context: The occurrence is surrounded by an area that is unfragmented and includes the ecological processes needed to sustain this species. Justification: Large populations in high quality sites are presumed to contain a high degree of genetic variability, to have a low susceptibility to the effects of inbreeding depression, and to be relatively resilient. The type locality is the only occurrence known for this species. There is no quantitative information regarding population size or quality. When this information is acquired or other occurrences are found, the eospecs should be reassessed.

BRANKSPECS:

Size: No population size information is available for this species at this time. Condition: The occurrence should have a good likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. Anthropogenic disturbance within the occurrence is minimal. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: The surrounding landscape should contain the ecological processes needed to sustain the occurrence but may be fragmented and/or impacted by humans.

CRANKSPECS:

Size: No population size information is available for this species at this time. Condition: The occurrence may be less productive than the above situations, but is still viable, with multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of anthropogenic disturbance). Landscape Context: There may be significant human disturbance, but the ecological processes needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival. We estimate that the effects of inbreeding depression would become severe over time in an isolated population of less than 10 individuals, although there is no data available on the population biology of this species or on the sizes of known populations at this time.

DRANKSPECS:

Size: Less than 10 individuals. Condition: Little or no evidence of successful reproduction is observed (poor seedling recruitment, no flowering or fruiting observed, or poor age class distribution). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance. Landscape context: The surrounding area is fragmented with many ecological processes no longer intact. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

EOSPECS:

Any naturally occurring population that is separated by a sufficient distance or barrier from a neighboring population. As a guideline, EOs are separated by either: 1 mile or more across unsuitable habitat or altered and unsuitable areas; or 2 miles or more across apparently suitable habitat not known to be occupied. Justification: The rationale for this large a separation distance across suitable but apparently unoccupied habitat is that it is likely additional research will find this habitat to be occupied. It can often be assumed that apparently unconnected populations will eventually be found to be more closely connected; these are best regarded as suboccurrences. No information on mobility of pollen and propagules is available on which to base the separation distance for this species.

ARANKSPECS:

Size: 2000 or more individuals occupying at least 2 acres (based on available EOR data). Condition: the occurrence has an excellent likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. This occurrence should be in a high-quality site with less than 1% cover of exotic plant species and/or no significant anthropogenic disturbance. This species is dependent on processes that create and maintain openings in its upper montane and subalpine forest habitat. These include a natural fire regime (less important at higher elevations) and heavy localized seasonal snowpack resulting in snow glades (less important at lower elevations). Landscape Context: the occurrence is surrounded by an area that is unfragmented and includes the ecological processes needed to sustain this species. Justification: Large populations in high quality sites are presumed to contain a high degree of genetic variability, to have a low susceptibility to the effects of inbreeding depression, and to be relatively resilient.

BRANKSPECS:

Size: 200 to 2000 individuals (based on available EOR data). Condition: the occurrence should have a good likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. Anthropogenic disturbance within the occurrence is minimal. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: the surrounding landscape should contain the ecological processes needed to sustain the occurrence but may be fragmented and/or impacted by humans.

CRANKSPECS:

Size: 10 to 200 individuals (based on available EOR data). Condition: The occurrence may be less productive than the above situations, but is still viable, with multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of anthropogenic disturbance). Landscape Context: there may be significant human disturbance, but the ecological processes needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival.

DRANKSPECS:

Size: Less than 10 individuals (based on available EOR data). Condition: little or no evidence of successful reproduction is observed (poor seedling recruitment, no flowering or fruiting observed, or poor age class distribution). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance. Landscape context: the surrounding area is fragmented with many ecological processes no longer intact. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

Ipomopsis polyantha 9/22/2000

EOSPECS:

Any naturally occurring population that is separated by a sufficient distance or barrier from a neighboring population. As a guideline, EOs are separated by either: 1 mile or more across unsuitable habitat or altered and unsuitable areas; or 2 miles or more across apparently suitable habitat not known to be occupied. Justification: The rationale for this large a separation distance across suitable but apparently unoccupied habitat is that it is likely additional research will find this habitat to be occupied. It can often be assumed that apparently unconnected populations will eventually be found to be more closely connected; these are best regarded as suboccurrences. No information on mobility of pollen and propagules is available on which to base the separation distance for this species. Very little is currently known about this species, and only two occurrences are currently known. When more information is available, the element occurrence specifications for this species should be re-evaluated.

ARANKSPECS:

Size: 1000 or more individuals (based on available EOR data). Condition: The occurrence has an excellent likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. This occurrence should be in a high-quality site with less than 1% cover of exotic plant species and/or no significant anthropogenic disturbance. An A-ranked occurrence should be in a natural setting without the presence of significant infrastructure or habitat alterations as is the case in the two known occurrences. Landscape Context: The occurrence is surrounded by an area that is unfragmented and includes the ecological processes needed to sustain this species. A natural occurrence will probably include some sort of natural disturbance regime, although the nature of the ecological requirements of this species are unknown at this time. Justification: Only two occurrences of this species are known at this time, and both are in unnatural, degraded sites. If other occurrences are discovered, the element occurrence rank specifications should be re-evaluated. Large populations in high quality sites are presumed to contain a high degree of genetic variability, to have a low susceptibility to the effects of inbreeding depression, and to be relatively resilient.

BRANKSPECS:

Size: 100 or more individuals (based on available EOR data). Condition: The occurrence should have a good likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. Anthropogenic disturbance within the occurrence is minimal. If exotic species are present, they comprise less than 10% of the total ground cover. The plants should be growing on a natural or semi natural substrate, not a road shoulder or other recently created or highly anthropogenically disturbed habitat. Landscape Context: The surrounding landscape should contain the ecological processes needed to sustain the occurrence but may be fragmented and/or impacted by humans.

CRANKSPECS:

Size: 10 to 100 individuals (based on available EOR data). Condition: The occurrence may be less productive than the above situations, but is still viable, with multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of anthropogenic disturbance). Large populations on road shoulders should be considered C-ranked occurrences due to their highly altered and unnatural ecological setting. Landscape Context: There may be significant human disturbance, but the ecological processes needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival.

DRANKSPECS:

Size: Less than 10 individuals (based on available EOR data). Condition: Little or no evidence of successful reproduction is observed (poor seedling recruitment, no flowering or fruiting observed, or poor age class distribution). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance. Landscape context: The surrounding area is fragmented with many ecological processes no longer intact. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

EOSPECS:

An element occurrence of this species is defined as any naturally occurring population that is separated by a sufficient distance or barrier from a neighboring population. Good-quality occurrences of *Lesquerella pruinosa* have been described by Carpenter (1992) as containing numerous plants with many seedlings. The 80-acre Lind site at Piedra Valley, Colorado contains about 10,000 plants. Good quality occurrences can also contain large plants with numerous leaves that produce flowers and fruit and are widely dispersed across their habitat. The level of seed production in a high-quality occurrence is not known. The longevity of L pruinosa may be ten years or more. Population fluctuation is probably large, 10 percent or more over 3 or 4 years. As a guideline, EOs are separated by either: 1 mile or more across unsuitable habitat or altered and unsuitable areas; or 2 miles or more across apparently suitable habitat not known to be occupied. Justification: The rationale for this large a separation distance across suitable but apparently unoccupied habitat is that it is likely additional research will find this habitat to be occupied. It can often be assumed that apparently unconnected populations will eventually be found to be more closely connected; these are best regarded as suboccurrences. No information on mobility of pollen and propagules is available on which to base the separation distance for this species.

ARANKSPECS:

Size: 1000 or more individuals (based on available EOR data). Condition: the occurrence has an excellent likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. This occurrence should be in a high-quality site with less than 1% cover of exotic plant species and/or no significant anthropogenic disturbance. Landscape Context: the occurrence is surrounded by an area that is unfragmented and includes the ecological processes needed to sustain this species. This plant is well adapted to the easily eroded slopes of mancos shale on which it is found, and erosion may competitively exclude other species that may otherwise invade its habitat. Justification: Large populations in high quality sites are presumed to contain a high degree of genetic variability, to have a low susceptibility to the effects of inbreeding depression, and to be relatively resilient.

BRANKSPECS:

Size: 100 or more individuals (based on available EOR data). Condition: the occurrence should have a good likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. Anthropogenic disturbance within the occurrence is minimal. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: the surrounding landscape should contain the ecological processes needed to sustain the occurrence but may be fragmented and/or impacted by humans.

CRANKSPECS:

Size: 10 to 99 individuals (based on available EOR data). Condition: The occurrence may be less productive than the above situations, but is still viable, with multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of anthropogenic disturbance). Landscape Context: there may be significant human disturbance, but the ecological processes needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival.

DRANKSPECS:

Size: Less than 10 individuals (based on available EOR data). Condition: little or no evidence of successful reproduction is observed (poor seedling recruitment, no flowering or fruiting observed, or poor age class distribution). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance.   Landscape context: the surrounding area is fragmented with many ecological processes no longer intact. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

Lomatium latilobum 4/11/2000

EOSPECS:

Any naturally occurring population. EOs are separated by either: 1 mile or more across unsuitable habitat or altered and unsuitable areas; or 2 miles or more across apparently suitable habitat not known to be occupied. Justification: The rationale for this large a separation distance across suitable but apparently unoccupied habitat is that it is likely additional research will find this habitat to be occupied. It can often be assumed that apparently unconnected populations will eventually be found to be more closely connected; these are best regarded as suboccurrences.

ARANKSPECS:

Size: 1000 or more individuals (based on available EOR data). Condition: occurrences with an excellent likelihood of long-term viability (various age classes and evidence of flowering and fruiting are represented indicating that the reproductive mechanisms are intact). This occurrence should be in a high-quality site (i.e. less than 1% cover exotic plant species and/or no significant human disturbances). Landscape Context: the occurrence is surrounded by an area that is unfragmented and includes the ecological processes needed to sustain this species. Justification: Although there is very little information regarding population size or quality for most occurrences of this species, the largest occurrence for which a population size estimate is available reports approximately 1000 plants. When more information is acquired, the eospecs should be reassessed.

BRANKSPECS:

Size: 200 or more individuals (based on available EOR data). Condition: The occurrence should have a good likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. Anthropogenic disturbance within the occurrence is minimal. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: The surrounding landscape should contain the ecological processes needed to sustain the occurrence but may be fragmented and/or impacted by humans.

CRANKSPECS:

Size: 50 to 200 individuals (based on available EOR data). Condition: The occurrence may be less productive than the above situations, but is still viable, with multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of anthropogenic disturbance). Landscape Context: There may be significant human disturbance, but the ecological processes needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival.

DRANKSPECS:

Size: Less than 50 individuals (based on available EOR data). Condition: Little or no evidence of successful reproduction is observed (poor seedling recruitment, no flowering or fruiting observed, or poor age class distribution). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance. Landscape context: The surrounding area is fragmented with many ecological processes no longer intact. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

Lupinus crassus 9/19/2000

EOSPECS:

Any naturally occurring population that is separated by a sufficient distance or barrier from a neighboring population. As a guideline, EOs are separated by either: 1 mile or more across unsuitable habitat or altered and unsuitable areas; or 2 miles or more across apparently suitable habitat not known to be occupied. Justification: The rationale for this large a separation distance across suitable but apparently unoccupied habitat is that it is likely additional research will find this habitat to be occupied. It can often be assumed that apparently unconnected populations will eventually be found to be more closely connected; these are best regarded as suboccurrences. No information on mobility of pollen and propagules is available on which to base the separation distance for this species.

ARANKSPECS:

Size: 2000 or more individuals occupying 100 or more acres (based on available EOR data). Condition: the occurrence has an excellent likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. This occurrence should be in a high-quality site with less than 1% cover of exotic plant species and/or no significant anthropogenic disturbance. Landscape Context: the occurrence is surrounded by an area that is unfragmented and includes the ecological processes needed to sustain this species. Long-term persistence of this species may be contingent upon the presence of a natural fire regime in its pinon- juniper woodland habitat. Populations in draws may depend on periodic flow of water; visitation by appropriate pollinators must take place for plants to set seed. Justification: Large populations in high quality sites are presumed to contain a high degree of genetic variability, to have a low susceptibility to the effects of inbreeding depression, and to be relatively resilient.

BRANKSPECS:

Size: 500 or more individuals occupying 20 or more acres (based on available EOR data). Condition: the occurrence should have a good likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. Anthropogenic disturbance within the occurrence is minimal. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: the surrounding landscape should contain the ecological processes needed to sustain the occurrence but may be fragmented and/or impacted by humans.

CRANKSPECS:

Size: 20 to 500 individuals occupying 5 to 20 acres (based on available EOR data). Condition: The occurrence may be less productive than the above situations, but is still viable, with multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of anthropogenic disturbance). Landscape Context: there may be significant human disturbance, but the ecological processes needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival.

DRANKSPECS:

Size: Less than 20 individuals occupying less than 5 acres (based on available EOR data). Condition: little or no evidence of successful reproduction is observed (poor seedling recruitment, no flowering or fruiting observed, or poor age class distribution). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance. Landscape context: the surrounding area is fragmented with many ecological processes no longer intact. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

EOSPECS:

Any naturally occurring population that is separated by a sufficient distance or barrier from a neighboring population. As a guideline, EOs are separated by either: 1 mile or more across unsuitable habitat or altered and unsuitable areas; or 2 miles or more across apparently suitable habitat not known to be occupied. Justification: The rationale for this large a separation distance across suitable but apparently unoccupied habitat is that it is likely additional research will find this habitat to be occupied. It can often be assumed that apparently unconnected populations will eventually be found to be more closely connected; these are best regarded as suboccurrences. No information on mobility of pollen and propagules is available on which to base the separation distance for this species.

ARANKSPECS:

Size: 1000 or more individuals (based on available EOR data). Condition: the occurrence has an excellent likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. This occurrence should be in a high-quality site with less than 1% cover of exotic plant species and/or no significant anthropogenic disturbance. Landscape Context: the occurrence is surrounded by an area that is unfragmented and includes the ecological processes needed to sustain this species. Depth and longevity of snowpack and exposure are likely to be highly pertinent to the persistence of occurrences of this species. Justification: Large populations in high quality sites are presumed to contain a high degree of genetic variability, to have a low susceptibility to the effects of inbreeding depression, and to be relatively resilient.

BRANKSPECS:

Size: 500 or more individuals (based on available EOR data). Condition: the occurrence should have a good likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. Anthropogenic disturbance within the occurrence is minimal. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: the surrounding landscape should contain the ecological processes needed to sustain the occurrence but may be fragmented and/or impacted by humans.

CRANKSPECS:

Size: 20 to 500 individuals (based on available EOR data). Condition: The occurrence may be less productive than the above situations, but is still viable, with multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of anthropogenic disturbance). Landscape Context: there may be significant human disturbance, but the ecological processes needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival.

DRANKSPECS:

Size: Less than 20 individuals (based on available EOR data). Condition: little or no evidence of successful reproduction is observed (poor seedling recruitment, no flowering or fruiting observed, or poor age class distribution). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance. Landscape context: the surrounding area is fragmented with many ecological processes no longer intact. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

Mentzelia chrysantha 9/27/2000

EOSPECS:

Any naturally occurring population. EOs are separated by either: 1 mile or more across unsuitable habitat or altered and unsuitable areas; or 2 miles or more across apparently suitable habitat not known to be occupied. Justification: The rationale for this large a separation distance across suitable but apparently unoccupied habitat is that it is likely additional research will find this habitat to be occupied. It can often be assumed that apparently unconnected populations will eventually be found to be more closely connected; these are best regarded as suboccurrences.

ARANKSPECS:

Size: 500 or more individuals (based on available EOR data). Condition: the occurrence has an excellent likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. This occurrence should be in a high-quality site with less than 1% cover exotic plant species and/or no significant anthropogenic disturbance. Landscape Context: the occurrence is surrounded by an area that is unfragmented and includes the ecological processes needed to sustain this species. Some degree of natural disturbance may reduce competitive exclusion by other species. A-ranked occurrences of this species are found in natural ecological settings (not on roadcuts), most likely on barren limestone or shale substrates. Justification: Large populations in high quality sites are presumed to contain a high degree of genetic variability, have a low susceptibility to the effects of inbreeding depression, and to be relatively resilient.

BRANKSPECS:

Size: 100 to 500 individuals (based on available EOR data). Condition: the occurrence should have a good likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. Anthropogenic disturbance within the occurrence is minimal. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: the surrounding landscape should contain the ecological processes needed to sustain the occurrence but may be fragmented and/or impacted by humans.

CRANKSPECS:

Size: 10 to 100 individuals (based on available EOR data). Condition: The occurrence may be less productive than the above situations, but is still viable, with multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of anthropogenic disturbance). Landscape Context: there may be significant human disturbance, but the ecological processes needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival.

DRANKSPECS:

Size: Less than 10 individuals (based on available EOR data). Condition: little or no evidence of successful reproduction is observed (poor seedling recruitment, no flowering or fruiting observed, or poor age class distribution). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance. Landscape context: the surrounding area is fragmented with many ecological processes no longer intact. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

EOSPECS:

Any naturally occurring population that is separated by a sufficient distance or barrier from a neighboring population. As a guideline, EOs are separated by either: 1 mile or more across unsuitable habitat or altered and unsuitable areas; or 2 miles or more across apparently suitable habitat not known to be occupied. Justification: The rationale for this large a separation distance across suitable but apparently unoccupied habitat is that it is likely additional research will find this habitat to be occupied. It can often be assumed that apparently unconnected populations will eventually be found to be more closely connected; these are best regarded as suboccurrences. No information on mobility of pollen and propagules is available on which to base the separation distance for this species.

ARANKSPECS:

Size: 500 or more individuals (based on available EOR data). Condition: the occurrence has an excellent likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. This occurrence should be in a high-quality site with less than 1% cover of exotic plant species and/or no significant anthropogenic disturbance. Landscape Context: the occurrence is surrounded by an area that is unfragmented and includes the ecological processes needed to sustain this species. This species, though tolerant of disturbance, has very narrow edaphic requirements. Natural disturbance by soil and scree movement and possibly by periodic fire may be required by this species. Justification: Large populations in high quality sites are presumed to contain a high degree of genetic variability, to have a low susceptibility to the effects of inbreeding depression, and to be relatively resilient.

BRANKSPECS:

Size: 100 or more individuals (based on available EOR data). Condition: the occurrence should have a good likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. Anthropogenic disturbance within the occurrence is minimal. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: the surrounding landscape should contain the ecological processes needed to sustain the occurrence but may be fragmented and/or impacted by humans.

CRANKSPECS:

Size: 10 to 100 individuals (based on available EOR data). Condition: The occurrence may be less productive than the above situations, but is still viable, with multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of anthropogenic disturbance). Landscape Context: there may be significant human disturbance, but the ecological processes needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival.

DRANKSPECS:

Size: Less than 10 individuals (based on available EOR data). Condition: little or no evidence of successful reproduction is observed (poor seedling recruitment, no flowering or fruiting observed, or poor age class distribution). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance. Landscape context: the surrounding area is fragmented with many ecological processes no longer intact. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

EOSPECS:

Any naturally occurring population that is separated by a sufficient distance or barrier from a neighboring population. Populations of this species appear to be highly naturally isolated both geographically and genetically. Thus, a separation distance for this species is arguably applied very conservatively. However, one large population is found on the alluvial outwash left by a failed dam, suggesting that in at least rare catastrophic instances, the species can disperse widely. If natural dispersal vectors besides water exist for this species, they are unknown at this time. The primary mode of reproduction is through the asexual production of gemmae that are derived from the leaf petioles (Weber 1972, Moody et al. 1999). However, there appears to be a significant degree of morphological variability between populations (pers. com. D. Steingraeber 2000). Until more definitive data is available that will enable us to more appropriately define a separation distance for this species, it is recommended that occurrences within one mile of each other be considered sub-occurrences. There is no habitat connectivity between any of the known occurrences, and it is unlikely that occurrences of this species will be separated by apparently suitable habitat.

ARANKSPECS:

Size: 1000 or more plants (based on available EOR data). Condition: The occurrence should have an excellent likelihood of long-term viability (evidence of vigorous growth and propagula production observed indicating that the reproductive mechanisms are intact). Occurrences should be in a high-quality site with no significant human disturbance such as trampling by hikers. The occupied habitat includes the ecological processes needed to sustain this species (i.e. water seepage from a granitic substrate). Landscape Context: The occurrence is surrounded by an area that is unfragmented in which the ground and surface water regime is unaltered. Justification: Very little is known about this species. Because of its very specific habitat requirements and the limited availability of this habitat, large, secure populations of this species are unlikely. The largest population documented contains 1000-1500 plants. Because the pollen is sterile in this species, it is assumed at this time that all reproduction takes place via asexual reproduction; thus flower production may not be an indicator of reproductive success.

BRANKSPECS:

Size: 200 or more individuals in a small (5 square meters or less) area (based on available EOR data). Condition: the occurrence should have a good likelihood of long term viability (evidence of propagula production observed indicating that the reproductive mechanisms are intact). Anthropogenic disturbance should be minimal in the occurrence, but it may be somewhat vulnerable to trampling. Landscape Context: The surrounding landscape contains the ecological processes needed to sustain the occurrence but may be fragmented or otherwise affected by human impacts.

CRANKSPECS:

Size: 20 or more individuals observed in a small (typically 1 square meter or less) area. Condition: The occurrence may be less productive (with poor production of propagula and less vigorous plants) than in A- and B-ranked occurrences, but is still viable. The occupied habitat may be degraded or disturbed by human visitation. The long-term persistence of the occurrence may be highly questionable in C-ranked occurrences due to the unnatural or early seral nature of the occupied area. Landscape Context: the surrounding area may be moderately impacted by human activities but the ecological processes needed to sustain the occurrence, particularly the presence of the appropriate hydrological regime, are still functioning. Justification: EOs not meeting "C"-rank criteria have a very high probability of extirpation due to natural stochastic events or human activity.

DRANKSPECS:

Size: 20 or fewer individuals (based on available EOR data). Condition: Vigor is poor and/or propagula production is not observed, with little or no evidence of successful reproduction. The occupied habitat is degraded and there is a significant level of human disturbance. The necessary hydrological regime for this species may no longer exist due to human impacts or due to natural changes in the hydrology of the seep. Landscape Context: The surrounding landscape is fragmented with many ecological processes no longer intact. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

REFERENCES:

Moody, A., P. Diggle, and D. Steingraeber. 1999. Developmental Analysis of the Evolutionary Origin of Vegetative Propagules in *Mimulus gemmiparus* (Scrophulariaceae). American Journal of Botany 86(11): 1512-1522.

Steingraeber, D. 2000. Professor, Department of Biology, Colorado State University, Fort Collins, Colorado. Personal communication regarding *Mimulus gemmiparus*.

Weber, W. 1972. *Mimulus gemmiparus* sp. nov. from Colorado. Madrono 21: 423-425.

EOSPECS:

Any naturally occurring population that is separated by a sufficient distance or barrier from a neighboring population. As a guideline, EOs are separated by either: 1 mile or more across unsuitable habitat or altered and unsuitable areas; or 2 miles or more across apparently suitable habitat not known to be occupied. Justification: The rationale for this large a separation distance across suitable but apparently unoccupied habitat is that it is likely additional research will find this habitat to be occupied. It can often be assumed that apparently unconnected populations will eventually be found to be more closely connected; these are best regarded as suboccurrences. No information on mobility of pollen and propagules is available on which to base the separation distance for this species.

ARANKSPECS:

Size: 3000 or more individuals (based on available EOR data). Condition: the occurrence has an excellent likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. This occurrence should be in a high-quality site with less than 1% cover of exotic plant species and/or no significant anthropogenic disturbance such as major road development, mining, or residential development. Landscape Context: the occurrence is surrounded by an area that is unfragmented and includes the ecological processes needed to sustain this species. This species has narrow habitat requirements, restricted to areas with specific volcanic parent material, and its distribution is thus naturally patchy. It is probably a poor competitor. Justification: Large populations in high quality sites are presumed to contain a high degree of genetic variability, to have a low susceptibility to the effects of inbreeding depression, and to be relatively resilient.

BRANKSPECS:

Size: 1000 to 3000 individuals (based on available EOR data). Condition: the occurrence should have a good likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. Anthropogenic disturbance within the occurrence is minimal. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: the surrounding landscape should contain the ecological processes needed to sustain the occurrence but may be fragmented and/or impacted by humans.

CRANKSPECS:

Size: 20 to 1000 individuals (based on available EOR data). Condition: The occurrence may be less productive than the above situations, but is still viable, with multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of anthropogenic disturbance). Landscape Context: there may be significant human disturbance, but the ecological processes needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival.

DRANKSPECS:

Size: Less than 20 individuals (based on available EOR data). Condition: little or no evidence of successful reproduction is observed (poor seedling recruitment, no flowering or fruiting observed, or poor age class distribution). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance. Landscape context: the surrounding area is fragmented with many ecological processes no longer intact. Most of the D-ranked occurrences of this species are disturbed by recreational uses and residential development. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

EOSPECS:

Any naturally occurring population that is separated by a sufficient distance or barrier from a neighboring population. As a guideline, EOs are separated by either: 1 mile or more across unsuitable habitat or altered and unsuitable areas; or 2 miles or more across apparently suitable habitat not known to be occupied. Justification: The rationale for this large a separation distance across suitable but apparently unoccupied habitat is that it is likely additional research will find this habitat to be occupied. It can often be assumed that apparently unconnected populations will eventually be found to be more closely connected; these are best regarded as suboccurrences. No information on mobility of pollen and propagules is available on which to base the separation distance for this species.

ARANKSPECS:

Size: 1000 or more individuals (based on available EOR data). Condition: The occurrence has an excellent likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. This occurrence should be in a high-quality site with less than 1% cover of exotic plant species and/or no significant anthropogenic disturbance. Landscape Context: the occurrence is surrounded by an area that is unfragmented and includes the ecological processes needed to sustain this species. These include appropriate temperature regime, number of snowfree days per year, lack of significant erosion impact from trails and roads, and presence of a well-drained substrate. Justification: Large populations in high quality sites are presumed to contain a high degree of genetic variability, have a low susceptibility to the effects of inbreeding depression, and to be relatively resilient.

BRANKSPECS:

Size: 200 to 1000 individuals (based on available EOR data). Condition: The occurrence should have a good likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. Anthropogenic disturbance within the occurrence is minimal. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: the surrounding landscape should contain the ecological processes needed to sustain the occurrence but may be fragmented and/or impacted by humans.

CRANKSPECS:

Size: 20 to 200 individuals (based on available EOR data). Condition: The occurrence may be less productive than the above situations, but is still viable, with multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of anthropogenic disturbance). Landscape Context: there may be significant human disturbance, but the ecological processes needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival.

DRANKSPECS:

Size: Less than 20 individuals (based on available EOR data). Condition: Little or no evidence of successful reproduction is observed (poor seedling recruitment, no flowering or fruiting observed, or poor age class distribution). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance. Landscape context: The surrounding area is fragmented with many ecological processes no longer intact. Occurrence may be impacted severely by erosion or trampling. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

EOSPECS:

Any naturally occurring population that is separated by a sufficient distance or barrier from a neighboring population. As a guideline, EOs are separated by either: 1 mile or more across unsuitable habitat or altered and unsuitable areas; or 2 miles or more across apparently suitable habitat not known to be occupied. Justification: The rationale for this large a separation distance across suitable but apparently unoccupied habitat is that it is likely additional research will find this habitat to be occupied. It can often be assumed that apparently unconnected populations will eventually be found to be more closely connected; these are best regarded as suboccurrences. No information on mobility of pollen and propagules is available on which to base the separation distance for this species.

ARANKSPECS:

Size: 1000 or more individuals (based on available EOR data). Condition: the occurrence has an excellent likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. This occurrence should be in a high-quality site with less than 1% cover of exotic plant species and/or no significant anthropogenic disturbance. Landscape Context: the occurrence is surrounded by an area that is unfragmented and includes the ecological processes needed to sustain this species. This species may require periodic fire to open the canopy of its pinyon- juniper woodland habitat. Justification: Large populations in high quality sites are presumed to contain a high degree of genetic variability, to have a low susceptibility to the effects of inbreeding depression, and to be relatively resilient.

BRANKSPECS:

Size: 100 or more individuals (based on available EOR data). Condition: the occurrence should have a good likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. Anthropogenic disturbance within the occurrence is minimal. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: the surrounding landscape should contain the ecological processes needed to sustain the occurrence but may be fragmented and/or impacted by humans.

CRANKSPECS:

Size: 15 to 100 individuals (based on available EOR data). Condition: The occurrence may be less productive than the above situations, but is still viable, with multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of anthropogenic disturbance). Landscape Context: there may be significant human disturbance, but the ecological processes needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival.

DRANKSPECS:

Size: Less than 15 individuals (based on available EOR data). Condition: little or no evidence of successful reproduction is observed (poor seedling recruitment, no flowering or fruiting observed, or poor age class distribution). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance. Landscape context: the surrounding area is fragmented with many ecological processes no longer intact. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

Penstemon harringtonii 9/20/2000

EOSPECS:

Any naturally occurring population that is separated by a sufficient distance or barrier from a neighboring population. As a guideline, EOs are separated by either: 1 mile or more across unsuitable habitat or altered and unsuitable areas; or 2 miles or more across apparently suitable habitat not known to be occupied. Justification: The rationale for this large a separation distance across suitable but apparently unoccupied habitat is that it is likely additional research will find this habitat to be occupied. It can often be assumed that apparently unconnected populations will eventually be found to be more closely connected; these are best regarded as suboccurrences. No information on mobility of pollen and propagules is available on which to base the separation distance for this species. Because many Penstemon species apparently lie dormant without producing above-ground biomass for one or more years, the failure to observe this species in a single year of observation at a site does not rule out the possibility that it is present.

ARANKSPECS:

Size: 500 or more individuals observed within a 5 year period (based on available EOR data). Condition: the occurrence has an excellent likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. This occurrence should be in a high-quality site with less than 1% cover of exotic plant species and/or no significant anthropogenic disturbance. Landscape Context: the occurrence is surrounded by an area that is unfragmented and includes the ecological processes needed to sustain this species. This species requires a high quality matrix community of sagebrush shrubland or pinyon juniper woodland. Thus, a natural fire regime is necessary to maintain appropriate densities of shrubs and trees for *Penstemon harringtonii*. The presence of appropriate pollinators is also required for the long-term persistence of this species. This species, like other Penstemons, may fluctuate in numbers of individuals at a specific location from year to year. Therefore, a specific location may be higher ranked than the current information reflects. This should be considered in ranking a conservation site or creating a management plan for a specific location. Justification: Large populations in high quality sites are presumed to contain a high degree of genetic variability, to have a low susceptibility to the effects of inbreeding depression, and to be relatively resilient.

BRANKSPECS:

Size: 200 or more individuals observed within a 5 year period (based on available EOR data). Condition: the occurrence should have a good likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. Anthropogenic disturbance within the occurrence is minimal. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: the surrounding landscape should contain the ecological processes needed to sustain the occurrence but may be fragmented and/or impacted by humans.

CRANKSPECS:

Size: 20 to 200 individuals observed within a 5 year period (based on available EOR data). Condition: The occurrence may be less productive than the above situations, but is still viable, with multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of anthropogenic disturbance). Landscape Context: there may be significant human disturbance, but the ecological processes needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival.

DRANKSPECS:

Size: Less than 20 individuals (based on available EOR data). Condition: little or no evidence of successful reproduction is observed (poor seedling recruitment, no flowering or fruiting observed, or poor age class distribution). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance. Landscape context: the surrounding area is fragmented with many ecological processes no longer intact. Fire suppression, road building, off-road vehicle use, and residential development are human activities that have affected the condition and landscape context of many D-ranked occurrences of this species. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

Penstemon penlandii 9/21/2000

EOSPECS:

Any naturally occurring population that is separated by a sufficient distance or barrier from a neighboring population. As a guideline, EOs are separated by either: 1 mile or more across unsuitable habitat or altered and unsuitable areas; or 2 miles or more across apparently suitable habitat not known to be occupied. Justification: The rationale for this large a separation distance across suitable but apparently unoccupied habitat is that it is likely additional research will find this habitat to be occupied. It can often be assumed that apparently unconnected populations will eventually be found to be more closely connected; these are best regarded as suboccurrences. No information on mobility of pollen and propagules is available on which to base the separation distance for this species.

ARANKSPECS:

Size: 2500 or more individuals within a 5 year period (based on available EOR data). Condition: The occurrence has an excellent likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. This occurrence should be in a high-quality site with less than 1% cover of exotic plant species and/or no significant anthropogenic disturbance. Landscape Context: The occurrence is surrounded by an area that is unfragmented and includes the ecological processes needed to sustain this species. Justification: Further research is needed to assess the population dynamics and ecology of this species. Many Penstemons fluctuate in numbers of individuals at a specific location from year to year. Because this species is known from only two occurrences, the EO specs should be reassessed if more occurrences are found. Large populations in high quality sites are presumed to contain a high degree of genetic variability, to have a low susceptibility to the effects of inbreeding depression, and to be relatively resilient.

BRANKSPECS:

Size: 1000 to 2500 individuals observed within a 5 year period (based on available EOR data). Condition: The occurrence should have a good likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. Anthropogenic disturbance within the occurrence is minimal. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: The surrounding landscape should contain the ecological processes needed to sustain the occurrence but may be fragmented and/or impacted by humans.

CRANKSPECS:

Size: 100 to 1000 individuals within a 5 year period (based on available EOR data). Condition: The occurrence may be less productive than the above situations, but is still viable, with multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of anthropogenic disturbance). Landscape Context: There may be significant human disturbance, but the ecological processes needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival.

DRANKSPECS:

Size: Less than 100 individuals observed within a 5 year period (based on available EOR data). Condition: Little or no evidence of successful reproduction is observed (poor seedling recruitment, no flowering or fruiting observed, or poor age class distribution). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance. Landscape context: The surrounding area is fragmented with many ecological processes no longer intact. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

EOSPECS:

Any naturally occurring population that is separated by a sufficient distance or barrier from a neighboring population. As a guideline, EOs are separated by either: 1 mile or more across unsuitable habitat or altered and unsuitable areas; or 2 miles or more across apparently suitable habitat not known to be occupied. Justification: The rationale for this large a separation distance across suitable but apparently unoccupied habitat is that it is likely additional research will find this habitat to be occupied. It can often be assumed that apparently unconnected populations will eventually be found to be more closely connected; these are best regarded as suboccurrences. No information on mobility of pollen and propagules is available on which to base the separation distance for this species.

ARANKSPECS:

Size: 1000 or more individuals (based on available EOR data). Condition: The occurrence has an excellent likelihood of long-term viability as evidenced by evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. This occurrence should be in a high-quality site with less than 1% cover exotic plant species and/or no significant anthropogenic disturbance. Landscape Context: the occurrence is surrounded by an area that is unfragmented and includes the ecological processes needed to sustain this species. These include a lack of chronic disturbance but occasional disturbance due to soil movement or storm water runoff which permits seedling establishment. Justification: Large populations in high quality sites are presumed to contain a high degree of genetic variability, have a low susceptibility to the effects of inbreeding depression, and to be relatively resilient.

BRANKSPECS:

Size: 200 or more individuals (based on available EOR data). Condition: The occurrence should have a good likelihood of long-term viability as evidenced by the presence of a robust seed bank, and by the observation of flowering and fruiting individuals. Anthropogenic disturbance within the occurrence is minimal. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: the surrounding landscape should contain the ecological processes needed to sustain the occurrence but may be fragmented and/or impacted by humans.

CRANKSPECS:

Size: 50 to 200 individuals (based on available EOR data). Condition: The occurrence may be less productive than the above situations, but is still viable, with evidence of flowering, fruiting, and a robust seed bank indicating that the reproductive mechanisms are intact. The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of anthropogenic disturbance). Landscape Context: there may be significant human disturbance, but the ecological processes needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival.

DRANKSPECS:

Size: Less than 50 individuals (based on available EOR data). Condition: Little or no evidence of successful reproduction is observed (poor seedling recruitment or no flowering or fruiting observed). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance. Landscape context: the surrounding area is fragmented with many ecological processes no longer intact. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

EOSPECS:

Any naturally occurring population that is separated by a sufficient distance or barrier from a neighboring population. As a guideline, EOs are separated by either: 1 mile or more across unsuitable habitat or altered and unsuitable areas; or 2 miles or more across apparently suitable habitat not known to be occupied. Justification: The rationale for this large a separation distance across suitable but apparently unoccupied habitat is that it is likely additional research will find this habitat to be occupied. It can often be assumed that apparently unconnected populations will eventually be found to be more closely connected; these are best regarded as suboccurrences. No information on mobility of pollen and propagules is available on which to base the separation distance for this species.

ARANKSPECS:

Size: 1000 or more individuals (based on available EOR data). Condition: the occurrence has an excellent likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. This occurrence should be in a high-quality site with less than 1% cover of exotic plant species and/or no significant anthropogenic disturbance, such as historic mining or ORV recreation. Landscape Context: the occurrence is surrounded by an area that is unfragmented and includes the ecological processes needed to sustain this species. Rocky, presumably well-drained sites are required by this species. Justification: Large populations in high quality sites are presumed to contain a high degree of genetic variability, to have a low susceptibility to the effects of inbreeding depression, and to be relatively resilient.

BRANKSPECS:

Size: 500 or more individuals (based on available EOR data). Condition: the occurrence should have a good likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. Anthropogenic disturbance within the occurrence is minimal. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: the surrounding landscape should contain the ecological processes needed to sustain the occurrence but may be fragmented and/or impacted by humans.

CRANKSPECS:

Size: 20 to 500 individuals (based on available EOR data). Condition: The occurrence may be less productive than the above situations, but is still viable, with multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of anthropogenic disturbance). Landscape Context: there may be significant human disturbance, but the ecological processes needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival.

DRANKSPECS:

Size: Less than 20 individuals (based on available EOR data). Condition: little or no evidence of successful reproduction is observed (poor seedling recruitment, no flowering or fruiting observed, or poor age class distribution). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance. Landscape context: the surrounding area is fragmented with many ecological processes no longer intact. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

Physysaria bellii 9/19/2000

EOSPECS:

Any naturally occurring population that is separated by a sufficient distance or barrier from a neighboring population. As a guideline, EOs are separated by either: 1 mile or more across unsuitable habitat or altered and unsuitable areas; or 2 miles or more across apparently suitable habitat not known to be occupied. Justification: The rationale for this large a separation distance across suitable but apparently unoccupied habitat is that it is likely additional research will find this habitat to be occupied. It can often be assumed that apparently unconnected populations will eventually be found to be more closely connected; these are best regarded as suboccurrences. No information on mobility of pollen and propagules is available on which to base the separation distance for this species.

ARANKSPECS:

Size: A robust population of 50,000 or more individuals on 50 or more acres (based on available EOR data). Condition: the occurrence has an excellent likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. This occurrence should be in a high-quality site with less than 1% cover of exotic plant species and/or no significant anthropogenic disturbance. Landscape Context: the occurrence is surrounded by an area that is unfragmented and includes the ecological processes needed to sustain this species. *Physaria bellii* is tolerant of anthropogenic disturbance to some extent and may colonize areas such as mine talings, but an A- ranked occurrence must be a population on a naturally disturbed substrate. Justification: Large populations in high quality sites are presumed to contain a high degree of genetic variability, to have a low susceptibility to the effects of inbreeding depression, and to be relatively resilient.

BRANKSPECS:

Size: 1,000 or more individuals on 10 or more acres (based on available EOR data). Condition: the occurrence should have a good likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. Anthropogenic disturbance within the occurrence is minimal. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: the surrounding landscape should contain the ecological processes needed to sustain the occurrence but may be fragmented and/or impacted by humans.

CRANKSPECS:

Size: 100 or more individuals occupying 5 or more acres (based on available EOR data). Condition: The occurrence may be less productive than the above situations, but is still viable, with multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of anthropogenic disturbance). Landscape Context: there may be significant human disturbance, but the ecological processes needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival.

DRANKSPECS:

Size: Less than 100 individuals on up to 5 acres (based on available EOR data). Condition: little or no evidence of successful reproduction is observed (poor seedling recruitment, no flowering or fruiting observed, or poor age class distribution). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance. Landscape context: the surrounding area is fragmented with many ecological processes no longer intact. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

Physysaria rollinsii 9/19/2000

EOSPECS:

Any naturally occurring population that is separated by a sufficient distance or barrier from a neighboring population. As a guideline, EOs are separated by either: 1 mile or more across unsuitable habitat or altered and unsuitable areas; or 2 miles or more across apparently suitable habitat not known to be occupied. Justification: The rationale for this large a separation distance across suitable but apparently unoccupied habitat is that it is likely additional research will find this habitat to be occupied. It can often be assumed that apparently unconnected populations will eventually be found to be more closely connected; these are best regarded as suboccurrences. No information on mobility of pollen and propagules is available on which to base the separation distance for this species.

ARANKSPECS:

Size: No quantitative information is available on population size at this time for *Physaria rollinsii*. Condition: the occurrence has an excellent likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. This occurrence should be in a high-quality site with less than 1% cover of exotic plant species and/or no significant anthropogenic disturbance. Landscape Context: the occurrence is surrounded by an area that is unfragmented and includes the ecological processes needed to sustain this species. A natural disturbance regime may be necessary for *Physaria rollinsii* to reduce competition with other species. Justification: No quantitative information is available on population size for this species at this time. Sparse specimen label data is the only information currently known for this species. Large populations in high quality sites are presumed to contain a high degree of genetic variability, to have a low susceptibility to the effects of inbreeding depression, and to be relatively resilient. When more information is acquired, the eospecs should be reassessed.

BRANKSPECS:

Size: No quantitative information is available on population size at this time for *Physaria rollinsii*. Condition: the occurrence should have a good likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. Anthropogenic disturbance within the occurrence is minimal. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: the surrounding landscape should contain the ecological processes needed to sustain the occurrence but may be fragmented and/or impacted by humans.

CRANKSPECS:

Size: No quantitative information is available on population size at this time for *Physaria rollinsii*. Condition: The occurrence may be less productive than the above situations, but is still viable, with multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of anthropogenic disturbance). Landscape Context: there may be significant human disturbance, but the ecological processes needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival. We estimate that the effects of inbreeding depression would become severe over time in an isolated population of less than 10 individuals, although there is no data available on the population biology of this species or on the sizes of known populations at this time.

DRANKSPECS:

Size: Less than 10 individuals. Condition: little or no evidence of successful reproduction is observed (poor seedling recruitment, no flowering or fruiting observed, or poor age class distribution). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance. Landscape context: the surrounding area is fragmented with many ecological processes no longer intact. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

Potentilla rupincola 9/20/2000

EOSPECS:

Any naturally occurring population that is separated by a sufficient distance or barrier from a neighboring population. As a guideline, EOs are separated by either: 1 mile or more across unsuitable habitat or altered and unsuitable areas; or 2 miles or more across apparently suitable habitat not known to be occupied. Justification: The rationale for this large a separation distance across suitable but apparently unoccupied habitat is that it is likely additional research will find this habitat to be occupied. It can often be assumed that apparently unconnected populations will eventually be found to be more closely connected; these are best regarded as suboccurrences. No information on mobility of pollen and propagules is available on which to base the separation distance for this species.

ARANKSPECS:

Size: 500 or more individuals (based on available EOR data). Condition: the occurrence has an excellent likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. This occurrence should be in a high-quality site with less than 1% cover of exotic plant species and/or no significant anthropogenic disturbance. Landscape Context: the occurrence is surrounded by an area that is unfragmented and includes the ecological processes needed to sustain this species. Justification: Large populations in high quality sites are presumed to contain a high degree of genetic variability, to have a low susceptibility to the effects of inbreeding depression, and to be relatively resilient.

BRANKSPECS:

Size: 100 or more individuals (based on available EOR data). Condition: the occurrence should have a good likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. Anthropogenic disturbance within the occurrence is minimal. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: the surrounding landscape should contain the ecological processes needed to sustain the occurrence but may be fragmented and/or impacted by humans.

CRANKSPECS:

Size: 10 to 100 individuals (based on available EOR data). Condition: The occurrence may be less productive than the above situations, but is still viable, with multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of anthropogenic disturbance). Landscape Context: there may be significant human disturbance, but the ecological processes needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival.

DRANKSPECS:

Size: Less than 10 individuals (based on available EOR data). Condition: little or no evidence of successful reproduction is observed (poor seedling recruitment, no flowering or fruiting observed, or poor age class distribution). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance. Landscape context: the surrounding area is fragmented with many ecological processes no longer intact. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

EOSPECS:

Any naturally occurring population that is separated by a sufficient distance or barrier from a neighboring population. For this species, occurrences in drainages or wetlands that are separated by uplands should be regarded as separate occurrences. As a guideline, EOs are separated by either: 1 mile or more across unsuitable habitat or altered and unsuitable areas; or 2 miles or more across apparently suitable habitat not known to be occupied. Justification: The rationale for this large a separation distance across suitable but apparently unoccupied habitat is that it is likely additional research will find this habitat to be occupied. It can often be assumed that apparently unconnected populations will eventually be found to be more closely connected; these are best regarded as suboccurrences. No information on mobility of pollen and propagules is available on which to base the separation distance for this species.

ARANKSPECS:

Size: 1000 or more individuals (based on available EOR data). Condition: The occurrence has an excellent likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of successful flowering and fruiting, indicating that the reproductive mechanisms are intact, and the plants are robust. This occurrence should be in a high-quality site with less than 1% cover of exotic plant species and/or no significant anthropogenic disturbance. The area should be free from activities such as peat and other mining, ditching, or grazing. Landscape Context: The occurrence is surrounded by an area that is unfragmented and includes the ecological processes needed to sustain this species. This species is dependent on a constant water source to support the fen vegetation with which it occurs. Justification: Large populations in high quality sites are presumed to contain a high degree of genetic variability, to have a low susceptibility to the effects of inbreeding depression, and to be relatively resilient.

BRANKSPECS:

Size: 100 or more individuals (based on available EOR data). Condition: The occurrence should have a good likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. Anthropogenic disturbance within the occurrence is minimal or historic. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: The surrounding landscape should contain the ecological processes needed to sustain the occurrence but may be fragmented and/or impacted by humans.

CRANKSPECS:

Size: 10 to 100 individuals (based on available EOR data). Condition: The occurrence may be less productive than the above situations, but is still viable, with multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of anthropogenic disturbance). Disturbance from mining, grazing, or ditching may be more pronounced in C-ranked occurrences but the species still has the potential to persist at this location. Landscape Context: There may be significant human disturbance, but the ecological processes needed to sustain the species are still intact. The wetland hydrology may be severely altered but the area still retains enough of the ecosystem functions to sustain the occurrence. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival.

DRANKSPECS:

Size: Less than 10 individuals (based on available EOR data). Condition: Little or no evidence of successful reproduction is observed (poor seedling recruitment, no flowering or fruiting observed, or poor age class distribution). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance. Landscape context: The surrounding area is fragmented with many ecological processes no longer intact. The wetland hydrology has been altered too severely to permit the persistence of the species, possibly resulting from flooding, excavation, ditching, or other alterations. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

EOSPECS:

Any location with one or more individuals. Occurrences should be considered new if they are separated from existing occurrences markedly by distinct features on the landscape such as ridges, rivers, or roads. An occurrence within a meadow habitat may be considered new if separated by more than one mile of unsuitable habitat. Due to the dynamics of riparian habitat and population fluctuation of *Spiranthes diluvialis*, an occurrence may stretch over many river miles and include breaks in the occurrence of up to five miles if the habitat continues.

ARANKSPECS:

Size: 100 or more individuals (based on available EOR data). Condition: the occurrence has an excellent likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. This occurrence should be in a high-quality site with less than 1% cover of exotic plant species and/or no significant anthropogenic disturbance. Landscape Context: the occurrence is surrounded by an area that is unfragmented and includes the ecological processes needed to sustain this species. This species requires mesic conditions in wet meadows or riparian areas, and an A-ranked occurrence should have a suitable hydrological regime. Justification: Large populations in high quality sites are presumed to contain a high degree of genetic variability, to have a low susceptibility to the effects of inbreeding depression, and to be relatively resilient.

BRANKSPECS:

Size: 50 or more individuals (based on available EOR data). Condition: the occurrence should have a good likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. Anthropogenic disturbance within the occurrence is minimal. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: the surrounding landscape should contain the ecological processes needed to sustain the occurrence but may be fragmented and/or impacted by humans.

CRANKSPECS:

Size: 20 or more individuals (based on available EOR data). Condition: The occurrence may be less productive than the above situations, but is still viable, with multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of anthropogenic disturbance). Such occurrences may be seriously threatened by weed invasion, as the wet meadows this species occupies are vulnerable to invasive species. Landscape Context: there may be significant human disturbance, but the ecological processes needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival.

DRANKSPECS:

Size: Less than 20 individuals (based on available EOR data). Condition: little or no evidence of successful reproduction is observed (poor seedling recruitment, no flowering or fruiting observed, or poor age class distribution). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance. Landscape context: the surrounding area is fragmented with many ecological processes no longer intact. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

EOSPECS:

Any naturally occurring population that is separated by a sufficient distance or barrier from a neighboring population. As a guideline, EOs are separated by either: 1 mile or more across unsuitable habitat or altered and unsuitable areas; or 2 miles or more across apparently suitable habitat not known to be occupied. Justification: The rationale for this large a separation distance across suitable but apparently unoccupied habitat is that it is likely additional research will find this habitat to be occupied. It can often be assumed that apparently unconnected populations will eventually be found to be more closely connected; these are best regarded as suboccurrences. No information on mobility of pollen and propagules is available on which to base the separation distance for this species.

ARANKSPECS:

Size: 500 or more individuals (based on available EOR data). Condition: the occurrence has an excellent likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. This occurrence should be in a high-quality site with less than 1% cover of exotic plant species and/or no significant anthropogenic disturbance. Landscape Context: the occurrence is surrounded by an area that is unfragmented and includes the ecological processes needed to sustain this species. This species requires perennial flowing water from a seep or waterfall, and cliffs of limestone or sandstone. Justification: Large populations in high quality sites are presumed to contain a high degree of genetic variability, to have a low susceptibility to the effects of inbreeding depression, and to be relatively resilient.

BRANKSPECS:

Size: 200 or more individuals (based on available EOR data). Condition: the occurrence should have a good likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. Anthropogenic disturbance within the occurrence is minimal. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: the surrounding landscape should contain the ecological processes needed to sustain the occurrence but may be fragmented and/or impacted by humans.

CRANKSPECS:

Size: 20 to 200 individuals (based on available EOR data). Condition: The occurrence may be less productive than the above situations, but is still viable, with multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of anthropogenic disturbance). Landscape Context: there may be significant human disturbance, but the ecological processes needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival.

DRANKSPECS:

Size: Less than 20 individuals (based on available EOR data). Condition: little or no evidence of successful reproduction is observed (poor seedling recruitment, no flowering or fruiting observed, or poor age class distribution). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance. Landscape context: the surrounding area is fragmented with many ecological processes no longer intact. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

Thelypodium paniculatum 9/20/2000

EOSPECS:

Any naturally occurring population that is separated by a sufficient distance or barrier from a neighboring population. As a guideline, EOs are separated by either: 1 mile or more across unsuitable habitat or altered and unsuitable areas; or 2 miles or more across apparently suitable habitat not known to be occupied. Justification: The rationale for this large a separation distance across suitable but apparently unoccupied habitat is that it is likely additional research will find this habitat to be occupied. It can often be assumed that apparently unconnected populations will eventually be found to be more closely connected; these are best regarded as suboccurrences. No information on mobility of pollen and propagules is available on which to base the separation distance for this species.

ARANKSPECS:

Size: No quantitative information is available on population size at this time for *Thelypodium paniculatum*. Condition: the occurrence has an excellent likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. This occurrence should be in a high-quality site with less than 1% cover of exotic plant species and/or no significant anthropogenic disturbance. Landscape Context: the occurrence is surrounded by an area that is unfragmented and includes the ecological processes needed to sustain this species. Justification: Sparse specimen label data are the only information currently known for this species. No quantitative information is available on population size or quality for this species at this time. Large populations in high quality sites are presumed to contain a high degree of genetic variability, to have a low susceptibility to the effects of inbreeding depression, and to be relatively resilient. When more information is acquired, the eospecs should be reassessed.

BRANKSPECS:

Size: No quantitative information is available on population size at this time for *Thelypodium paniculatum*. Condition: the occurrence should have a good likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. Anthropogenic disturbance within the occurrence is minimal. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: the surrounding landscape should contain the ecological processes needed to sustain the occurrence but may be fragmented and/or impacted by humans.

CRANKSPECS:

Size: No quantitative information is available on population size at this time for *Thelypodium paniculatum*. Condition: The occurrence may be less productive than the above situations, but is still viable, with multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of anthropogenic disturbance). Landscape Context: there may be significant human disturbance, but the ecological processes needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival. We estimate that the effects of inbreeding depression would become severe over time in an isolated population of less than 10 individuals, although there is no data available on the population biology of this species or on the sizes of known populations at this time.

DRANKSPECS:

Size: Less than 10 individuals. Condition: Little or no evidence of successful reproduction is observed (poor seedling recruitment, no flowering or fruiting observed, or poor age class distribution). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance. Landscape context: The surrounding area is fragmented with many ecological processes no longer intact. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

EOSPECS:

Any naturally occurring population that is separated by a sufficient distance or barrier from a neighboring population. As a guideline, EOs are separated by either: 1 mile or more across unsuitable habitat or altered and unsuitable areas; or 2 miles or more across apparently suitable habitat not known to be occupied. Justification: The rationale for this large a separation distance across suitable but apparently unoccupied habitat is that it is likely additional research will find this habitat to be occupied. It can often be assumed that apparently unconnected populations will eventually be found to be more closely connected; these are best regarded as suboccurrences. No information on mobility of pollen and propagules is available on which to base the separation distance for this species.

ARANKSPECS:

Size: No quantitative information is available on population size at this time for *Townsendia gypsophila*. Condition: the occurrence has an excellent likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. This occurrence should be in a high-quality site with less than 1% cover of exotic plant species and/or no significant anthropogenic disturbance. Landscape Context: the occurrence is surrounded by an area that is unfragmented and includes the ecological processes needed to sustain this species. Justification: No quantitative information is available on population size for this species at this time. Large populations in high quality sites are presumed to contain a high degree of genetic variability, to have a low susceptibility to the effects of inbreeding depression, and to be relatively resilient. When more information is acquired, the eospecs should be reassessed.

BRANKSPECS:

Size: No quantitative information is available on population size at this time for *Townsendia gypsophila*. Condition: the occurrence should have a good likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. Anthropogenic disturbance within the occurrence is minimal. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: the surrounding landscape should contain the ecological processes needed to sustain the occurrence but may be fragmented and/or impacted by humans.

CRANKSPECS:

Size: No quantitative information is available on population size at this time for *Townsendia gypsophila*. Condition: The occurrence may be less productive than the above situations, but is still viable, with multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of anthropogenic disturbance). Landscape Context: there may be significant human disturbance, but the ecological processes needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival. We estimate that the effects of inbreeding depression would become severe over time in an isolated population of less than 10 individuals, although there is no data available on the population biology of this species or on the sizes of known populations at this time.

DRANKSPECS:

Size: Less than 10 individuals. Condition: little or no evidence of successful reproduction is observed (poor seedling recruitment, no flowering or fruiting observed, or poor age class distribution). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance. Landscape context: the surrounding area is fragmented with many ecological processes no longer intact. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

Townsendia rothrockii 9/21/2000

EOSPECS:

Any naturally occurring population that is separated by a sufficient distance or barrier from a neighboring population. As a guideline, EOs are separated by either: 1 mile or more across unsuitable habitat or altered and unsuitable areas; or 2 miles or more across apparently suitable habitat not known to be occupied. Justification: The rationale for this large a separation distance across suitable but apparently unoccupied habitat is that it is likely additional research will find this habitat to be occupied. It can often be assumed that apparently unconnected populations will eventually be found to be more closely connected; these are best regarded as suboccurrences. No information on mobility of pollen and propagules is available on which to base the separation distance for this species.

ARANKSPECS:

Size: No population size information is available for this species at this time. Condition: the occurrence has an excellent likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. This occurrence should be in a high-quality site with less than 1% cover of exotic plant species and/or no significant anthropogenic disturbance. Landscape Context: the occurrence is surrounded by an area that is unfragmented and includes the ecological processes needed to sustain this species. Justification: Large populations in high quality sites are presumed to contain a high degree of genetic variability, to have a low susceptibility to the effects of inbreeding depression, and to be relatively resilient. When more information is acquired, the eospecs should be reassessed for this species.

BRANKSPECS:

Size: No population size information is available for this species at this time. Condition: the occurrence should have a good likelihood of long-term viability as evidenced by the presence of multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. Anthropogenic disturbance within the occurrence is minimal. If exotic species are present, they comprise less than 10% of the total ground cover. Landscape Context: the surrounding landscape should contain the ecological processes needed to sustain the occurrence but may be fragmented and/or impacted by humans.

CRANKSPECS:

Size: No population size information is available for this species at this time. Condition: The occurrence may be less productive than the above situations, but is still viable, with multiple age classes and evidence of flowering and fruiting, indicating that the reproductive mechanisms are intact. The occupied habitat is somewhat degraded (exotic plant species make up between 10-50% of the total ground cover and/or there is a moderate level of anthropogenic disturbance). Landscape Context: there may be significant human disturbance, but the ecological processes needed to sustain the species are still intact. Justification: EOs not meeting "C"-rank criteria are likely to have a very high probability of inbreeding depression and extirpation due to natural stochastic processes and/or occur in degraded habitat with low long-term potential for survival. We estimate that the effects of inbreeding depression would become severe over time in an isolated population of less than 10 individuals, although there is no data available on the population biology of this species or on the sizes of known populations at this time.

DRANKSPECS:

Size: Less than 10 individuals. Condition: little or no evidence of successful reproduction is observed (poor seedling recruitment, no flowering or fruiting observed, or poor age class distribution). Exotic plant species make up greater than 50% of the total ground cover, and/or there is a significant level of human disturbance. Landscape context: the surrounding area is fragmented with many ecological processes no longer intact. The occurrence has a low probability of long-term persistence due to inbreeding depression, natural stochastic events, and its intrinsic vulnerability to human impacts.

APPENDIX 23

ANIMAL SPECIES VIABILITY GUIDELINES

Southern Rocky Mountain Conservation Planning
Zoology Element Occurrence Specification Development

November 24, 2000

Rob Schorr, John Sovell, Cynthia Melcher, Brad Lambert, Jeremy Siemers

Elements addressed by the Colorado Natural Heritage Program Zoology Section

Scientific name (common name)	G-Rank	Author
Invertebrates		
Baetis adonis (mayfly)	G3	John Sovell, West Slope Zoologist
Baetis virile (mayfly)	G3	John Sovell, West Slope Zoologist
Capnia arapahoe (stonefly)	G1	John Sovell, West Slope Zoologist
Ephemerella apopsis (mayfly)	G1	John Sovell, West Slope Zoologist
Leucrocuta petersi (caddisfly)	G1	John Sovell, West Slope Zoologist
Rithrogena flavianula (mayfly)	G1	John Sovell, West Slope Zoologist
Amphibians		
Bufo boreas pop. 1 (boreal toad)	G4T1Q	Brad Lambert, Zoologist
Birds		
Centrocercus sp 1 (Gunnison's Sage Grouse)	G1	John Sovell, West Slope Zoologist
Melanerpes lewis (Lewis' Woodpecker)	G5	Cynthia Melcher, Zoologist
Asio flammeus (Short-eared Owl)	G5	Cynthia Melcher, Zoologist
Lagopus leucurus (White-tailed Ptarmigan)	G5	Cynthia Melcher, Zoologist
Amphispiza belli (Sage Sparrow)	G5	Cynthia Melcher, Zoologist
Empidonax traillii extimus (Southwestern willow flycatcher)	G5T2	Cynthia Melcher, Zoologist
Sphyrapicus thyroideus (Willamson's sapsucker)	G5	Cynthia Melcher, Zoologist
Cyseloides niger (Black Swift)	G4	Jeremy Siemers, Zoology Information Manager
Fishes		
Ptychocheilus lucius (Colorado pikeminnow)	G1T?Q	John Sovell, West Slope Zoologist
Gila robusta (roundtail chub)	G2G3	Rob Schorr, Zoologist
Mammals		
Thomomys bottae rubidus (valley pocket gopher)	G5T1	Rob Schorr, Zoologist

The above Element Occurrence Specifications are included on the following pages. The reviewers and potential reviewers are provided with the text. Potential reviewers are those experts who have been supplied with copies to review or will be supplied copies to review.

BAETIS ADONIS

A MAYFLY

EOSPECS
An element occurrence is defined by the presence along or within a stream of one or more emergent or pre-emergent mayflies. EO's are considered distinct if they are separated by 78km, or if occurring in streams of separate drainages. Justification: *Baetis adonis* is a poorly known species (McCafferty et al. 1997), however, nymphs of species from the genus *Baetis* are more likely to drift and therefore disperse downstream (Kohler 1983). In addition, females of the species are more likely than other mayflies to fly in upstream directions before ovipostion (Flecker and Allan 1988). The net result is greater tendency for mixing of populations within a drainage. Genetic studies indicate that allele frequencies exhibit significant geographic differences and severe deficiencies of heterozygots (i.e. inbreeding) at geographic scales of 26-2300km (Sweeney et al. 1987). This suggests little migration between mayfly populations, even ones within 26km of each other. Considering a linear stream length of 26km, three times that length is 78km. Genetic studies on a rare species of ephemeroptera in Maine indicate that major genetic mixing occurs between populations within 4km of each other, but major differentiation didoccurred between populations separated by 100km (Gibbs et al. 1998). This suggests that adult flight is a genetically effective means of dispersal for populations within 100km of each other. This also supports a separation distance of at least 78km.

GSPECS.AUTHOR: Sovell, J.R.
GSPECS.OFFICE: COHP-US
GSPECS.DATE: 2000-05-02

ARANKSPECS
Size: data unavailable. Condition: the occurrence has an excellent chance of long-term viability with evidence of reproduction based on the occurrence of reproductive adults in association with pre-emergent nymphs observed in a clear stream. Landscape Context: observation is from above 7,000ft, and stream exhibits continuous free flowing habitat for at least a distance of 20km in an upstream direction (i.e. no dams or beaver ponds). Riffles within the stream are present within 100m of the observation.

Justification: There is no information on habitat preference or life history of *Baetis adonis*, but *B. adonis* has only been recorded from the San Gabriel Mountains of California and at 7300ft in the foothills of the Sangre de Cristo Mountains of New Mexico (McCafferty et al. 1997). Members of the genus *Baetis* are also lotic species whose nymphs appear to prefer riffles where they are abundant (Harper and Harper 1982). Also, ephemeropteran species composition and densities are greatly reduced in vicinities directly below dams (Lehmkuhl 1972)

BRANKSPECS
Size: data unavailable. Condition: the occurrence has an excellent chance of long-term viability with evidence of reproduction based on the occurrence of reproductive adults in association with pre-emergent nymphs observed in a clear stream. Landscape Context: observation is from above 7,000ft, and stream exhibits continuous free flowing habitat for at least a distance of 10km in an upstream direction (i.e. no dams or beaver ponds). Riffles within the stream are present within 250m of the observation, but occurrence not meeting A rank specs.

CRANKSPECS

Size: data unavailable. Condition: the occurrence has a good chance of long-term viability with evidence of reproduction based on the occurrence of reproductive adults in association with pre-emergent nymphs observed in a clear stream. Landscape Context: observation is from above 5,000ft, and stream exhibits continuous free flowing habitat for at least a distance of 10km in an upstream direction (i.e. no dams or beaver ponds). Riffles within the stream are present within 500m of the observation, but occurrence not meeting B rank specs.

DRANKSPECS
Size: data unavailable. Condition: the occurrence has a fair chance of long-term viability with evidence of reproduction based on the occurrence of reproductive adults in association with pre-emergent nymphs observed in a clear stream. Landscape Context: observation is from below 5,000ft, occurring within 5km of an upstream dam, and without riffles within 500m of the occurrence.

Literature cited:

Flecker, A. S. and J. D. Allen. 1988. Flight direction in some Rocky Mountain mayflies (Ephemeroptera), with observations of parasitism. Aquatic Insects. 10:33-42.

Gibbs, H. L., K. E. Gibbs, M. Siebenmann and L. Collins. 1998. Genetic differentiation among populations of the rare mayfly *Siphlonisca aerodromia* Needham. Journal of the North American Benthological Society. 17: 464-472.

Harper, P. P and R. Harper. 1982. Mayfly communities in a Laurentian watershed (Insecta: Ephemeroptera). Canadian Journal of Zoology. 60: 2828-2841.

Kohler, S. L. 1983. Positioning on substrates, positioning changes, and diel drift periodicities in mayflies. Canadian Journal of Zoology. 61:1362-1368.

Lehmkuhl, D. M. 1972. Change in thermal regime as a cause of reduction of benthic fauna downstream of a reservoir. Journal of the Fisheries Research Board of Canada. 29:1329-1332.

McCafferty, W. P., C. R. Lugo-Oritiz and G. Z. Jacobi. 1997. Mayfly fauna of New Mexico. The Great Basin Naturalist. 57: 283-314.

Sweeney, B. W., D. H. Funk and R. L. Vannote. 1987. Genetic variation in stream mayfly (Insecta: Ephemeroptera) populations of eastern North America. Annals of the Entomological Society of America. 80:600-612.

Reviewers: Boris Kondratieff, Colorado State University and Joan Friedlander and Greg Hayward of U.S. Forest Service

BAETIS VIRILE

A MAYFLY

EOSPECS
An element occurrence is defined by the presence along or within a stream of one or more emergent or pre-emergent mayflies. EO's are considered distinct if they are separated by 78km, or if occurring in streams of separate drainages. Justification: *Baetis virile* is a poorly known species, however, nymphs of species from the genus *Baetis* are more likely to drift and therefore disperse downstream (Kohler 1983). In addition, females of the species are more likely than other mayflies to fly in upstream directions before they ovipostion (Flecker and Allan 1988). The net result is greater tendency for mixing of populations within a drainage. Genetic studies indicate that allele frequencies exhibit significant geographic differences and severe deficiencies of heterozygots (i.e. inbreeding) at geographic scales of 26-2300km (Sweeney et al. 1987). This suggests little migration between mayfly populations, even ones within 26km of each other. Considering a linear stream length of 26km, three times that length is 78km. Genetic studies on a rare species of ephemeroptera in Maine indicate that major genetic mixing occurs between populations within 4km of each other, but major differentiation did occurred between populations separated by 100km (Gibbs et al. 1998). This suggests that adult flight is a genetically effective means of dispersal for populations within 100km of each other. This also supports a separation distance of at least 78km.

GSPECS.AUTHOR: Sovell, J.R.
GSPECS.OFFICE: COHP-US
GSPECS.DATE: 2000-05-02

ARANKSPECS
Size: data unavailable. Condition: the occurrence has an excellent chance of long-term viability with evidence of reproduction based on the occurrence of reproductive adults in association with pre-emergent nymphs observed in a clear stream. Landscape Context: observation is from a continuous free flowing habitat for at least a distance of 20km in an upstream direction (i.e. no dams or beaver ponds). Riffles within the stream are present within 100m of the observation.

Justification: There is no information on habitat preference or life history of *Baetis virile*, but members of the genus *Baetis* are lotic species whose nymphs appear to prefer riffles where they are abundant (Harper and Harper 1982). Also, ephemeropteran species composition and densities are greatly reduced in vicinities directly below dams (Lehmkuhl 1972)

BRANKSPECS
Size: data unavailable. Condition: the occurrence has an excellent chance of long-term viability with evidence of reproduction based on the occurrence of reproductive adults in association with pre-emergent nymphs observed in a clear stream. Landscape Context: observation is from a continuous free flowing habitat for at least a distance of 10km in an upstream direction (i.e. no dams or beaver ponds). Riffles within the stream are present within 250m of the observation, but occurrence not meeting A rank specs.

CRANKSPECS
Size: data unavailable. Condition: the occurrence has an good chance of long-term viability with evidence of reproduction based on the occurrence of reproductive adults in association with pre-emergent nymphs observed in a clear stream. Landscape Context: observation is from a continuous free flowing habitat for at least a distance of 5km in an upstream direction (i.e. no

dams or beaver ponds). Riffles within the stream are present within 500m of the observation, but occurrence not meeting B rank specs.

DRANKSPECS
Size: data unavailable. Condition: the occurrence has an fair chance of long-term viability with evidence of reproduction based on the occurrence of reproductive adults in association with pre-emergent nymphs observed in a clear stream. Landscape Context: observation occurs within 5km of an upstream dam, and there are no riffles within 500m of the occurrence.

Literature cited:

Flecker, A. S. and J. D. Allen. 1988. Flight direction in some Rocky Mountain mayflies (Ephemeroptera), with observations of parasitism. Aquatic Insects. 10:33-42.

Gibbs, H. L., K. E. Gibbs, M. Siebenmann and L. Collins. 1998. Genetic differentiation among populations of the rare mayfly *Siphlonisca aerodromia* Needham. Journal of the North American Benthological Society. 17: 464-472.

Harper, P. P and R. Harper. 1982. Mayfly communities in a Laurentian watershed (Insecta: Ephemeroptera). Canadian Journal of Zoology. 60: 2828-2841.

Kohler, S. L. 1983. Positioning on substrates, positioning changes, and diel drift periodicities in mayflies. Canadian Journal of Zoology. 61:1362-1368.

Lehmkuhl, D. M. 1972. Change in thermal regime as a cause of reduction of benthic fauna downstream of a reservoir. Journal of the Fisheries Research Board of Canada. 29:1329-1332.

Sweeney, B. W., D. H. Funk and R. L. Vannote. 1987. Genetic variation in stream mayfly (Insecta: Ephemeroptera) populations of eastern North America. Annals of the Entomological Society of America. 80:600-612.

Reviewers: Boris Kondratieff, Colorado State University and Joan Friedlander and Greg Hayward of U.S. Forest Service

CAPNIA ARAPAHOE

A STONEFLY

EOSPECS
An element occurrence is defined by the presence along or within a stream of one or more emergent or pre-emergent stoneflies. EO's are considered distinct if they occur in separate tributaries of the same drainage or in streams of separate drainages, but not for populations occurring within the same stream, regardless of separation distance between populations. Justification: The limited data for Plecoptera make it difficult to assess dispersal characteristics of either adults or nymphs, however, reports supply evidence that drift propensity is low in pre-emergent instars (Stewart and Szczytko 1983, Stewart and Stark 1993) with downstream displacements of ~4m in some Plecopteran species (Waters 1965). There is potential for passive or catastrophic drift. Especially for leaf debris inhabitants that are shredders like most of the Capniidae, and probably *Capnia arapahoe* (there are no reports on life history for this species). Shredders do not emigrate from their organic substrate and are more susceptible to passive drift (movement during high flow), as is their preferred substrate (Anderson and Lehmkuhl 1968).

GSPECS.AUTHOR: Sovell, J.R.
GSPECS.OFFICE: COHP-US
GSPECS.DATE: 2000-05-02

ARANKSPECS
Size: data unavailable. Condition: the occurrence has an excellent chance of long-term viability with evidence of reproduction based on the occurrence of reproductive emergent adults in association with larval pre-emergent nymphs observed in a relatively undisturbed stream. The occurrence is in an undisturbed stream (i. e. complete absence of grazing, urban development, beaver or man-made impoundment's, channelization, or pollution from mining or manufacturing). Stream characterized by clear cool waters, with a pebble, cobble, and bedrock substrate (Stewart and Stark 1993, Nelson and Kondratieff 1989). Landscape Context: absence of clear-cutting within 0.5km of the stream bank and with a healthy and heterogeneous riparian community including cottonwood, willow, and/or boxelder.

BRANKSPECS
Size: data unavailable. Condition: the occurrence has an excellent chance of long-term viability with evidence of reproduction through occurrence of reproductive emergent adults in association with larval pre-emergent nymphs observed in a relatively undisturbed stream. The occurrence is in a relatively undisturbed stream (i. e. location exhibiting any two of the following disturbances: grazing, urban development, beaver or man-made impoundment's, channelization, or pollution from mining or manufacturing). Stream characterized by clear cool waters with a pebble, cobble, and bedrock substrate (Stewart and Stark 1993, Nelson and Kondratieff 1989). Landscape Context: absence of clear-cutting within 0.5km of the stream bank and with a healthy and heterogeneous riparian community including cottonwood, willow, and boxelder.

CRANKSPECS
Size: data unavailable. Condition: the occurrence has a fair to poor chance of long-term viability and lacks evidence of reproduction with only emergent adults or pre-emergent nymphs, but not both observed along a pristine stream as described above for BRANKSPECS. Landscape Context: absence of clear-cutting within 0.5km of the stream bank and with a healthy and heterogeneous riparian community including cottonwood, willow, and boxelder.

DRANKSPECS
Size: data unavailable. Condition: the occurrence has a poor chance of long-term viability and lacks evidence of reproduction with only emergent adults or pre-emergent nymphs, but not both observed in a disturbed stream. Landscape Context: the stream and surrounding community is in a highly disturbed state (i. e. three or more of the following disturbances present: grazing, urban development, roads, beaver or man-made impoundment's, channelization, pollution from mining or manufacturing, clear-cutting to streambank, or recreational use including fishing, hiking, or kayaking).

Literature cited:

Anderson, N. H. and D. M Lehmkuhl. 1968. Catastrophic drift of insects in a woodland stream. Ecology 49: 198-206.

Nelson, C. R. and B. C. Kondratieff. 1988. A new species of *Capnia* (Plecoptera: Capniidae) from the Rocky Mountains of Colorado. Entomological News 99: 77-80.

Stewart, K. W. and S. W. Szczytko. 1983. Drift of Ephemeroptera and Plecoptera in two Colorado rivers. Freshwater Invertebrate Biology 2: 117-131.

Stewart, K. W., and B. P. Stark. 1993. Nymphs of North America stonefly genera (Plecoptera). University of North Texas Press, Denton, Texas.

Waters, T. F. 1965. Interpretation of invertebrate drift in streams. Ecology 46: 327-333.

Reviewers: Boris Kondratieff, Colorado State University and Joan Friedlander and Greg Hayward of U.S. Forest Service

EPHEMERELLA APOPSIS

A MAYFLY

EOSPECS
An element occurrence is defined by the presence along or within a stream of one or more emergent or pre-emergent mayflies. EO's are considered distinct if they are separated by 78km, or if occurring in streams of separate drainage's. Justification: There is limited information on Ephemeropteran drift dispersal, however, Vinikour (1981) noted movements by mayflies of >500m through a final-cut strip mine pit, including movements by members of the genus *Ephemerella*. Vinikour speculated that movements could be much greater. Genetic studies including studies on members of the genus *Ephemerella* indicate that allele frequencies exhibit significant geographic differences and severe deficiencies of heterozygots (i.e. inbreeding) at geographic scales of 26-2300km (Sweeney et al. 1987). This suggests little migration between mayfly populations, even ones within 26km of each other. Considering a linear stream length of 26km, three times that length is 78km.

GSPECS.AUTHOR: Sovell, J.R.
GSPECS.OFFICE: COHP-US
GSPECS.DATE: 2000-05-02

ARANKSPECS
Size: data unavailable. Condition: the occurrence has an excellent chance of long-term viability with evidence of reproduction based on the occurrence of reproductive adults in association with pre-emergent nymphs observed in a clear stream with a gravel and cobble substrate. Landscape Context: observation occurs above 10,000ft at a stream with continuous free flowing habitat (i.e. no dams) for at least 20km in the upstream direction.

Justification: Members of the genus *Ephemerella* are lotic species (Harper and Harper 1982) and *E. apopsis* has only been recorded from a stream above 10,000ft ((McCafferty 1992). Ephemeropteran species composition and densities are greatly reduced in vicinities directly below dams (Lehmkuhl 1972), and substrate (i.e. gravel, cobble) seems to be an important resource for *Ephemerella* sp. (Flanagan et al. 1990).

BRANKSPECS
Size: data unavailable. Condition: the occurrence has an excellent chance of long-term viability with evidence of reproduction based on the occurrence of reproductive adults in association with pre-emergent nymphs observed in a clear stream with a gravel and cobble substrate. Landscape Context: observation occurs above 8,000ft at a stream with continuous free flowing habitat (i.e. no dams) for at least 10km in an upstream direction, but occurrence not meeting A rank specs.

CRANKSPECS
Size: data unavailable. Condition: the occurrence has a fair to poor chance of long-term viability and lacks evidence of reproduction with either adults or pre-emergent nymphs observed, but not both, in a clear stream with a gravel and cobble substrate. Landscape Context: observation occurs above 5,000ft at a stream with continuous free flowing habitat (i.e. no dams) for at least 5km in an upstream direction, but occurrence not meeting B rank specs.

DRANKSPECS
Condition: the occurrence has a fair to poor chance of long-term viability and lacks evidence of reproduction with either adults or pre-emergent nymphs observed, but not both, in a clear stream

with a gravel and cobble substrate. Landscape Context: observation occurs below 5,000ft and within 5km of an upstream dam.

Literature cited:

Flanagan, J. F., D. G. Cobb and M. K. Friesen. 1991. The relationship between some physical factors and mayflies emerging from South Duck River and Cowan Creek, Manitoba. *In*, Mayflies and stoneflies: Life history and biology, I. C. Campbell (ed.).

Harper, P. P and R. Harper. 1982. Mayfly communities in a Laurentian watershed (Insecta: Ephemeroptera). Canadian Journal of Zoology. 60: 2828-2841.

Lehmkuhl, D. M. 1972. Change in thermal regime as a cause of reduction of benthic fauna downstream of a reservoir. Journal of the Fisheries Research Board of Canada. 29:1329-1332.

McCafferty, W. P. 1992. *Ephemerella apopsis*, a new species from rocky mountain high (Ephemeroptera: Ephemerellidae). Entomological News. 103:135-138.

Sweeney, B. W., D. H. Funk and R. L. Vannote. 1987. Genetic variation in stream mayfly (Insecta: Ephemeroptera) populations of eastern North America. Annals of the Entomological Society of America. 80:600-612.

Vinikour, W. S. 1981. Aquatic insect drift through a final-cut mine pit, with emphasis on drift distances. Hydrobiologia. 77:225-232.

Reviewers: Boris Kondratieff, Colorado State University and Joan Friedlander and Greg Hayward of U.S. Forest Service

LEUCROCUTA PETERSI

A MAYFLY

EOSPECS
An element occurrence is defined by the presence along or within a stream of one or more emergent or pre-emergent mayflies. EO's are considered distinct if they are separated by 78km, or if occurring in streams of separate drainages. Justification: There is limited information on Ephemeropteran drift dispersal, however, Vinikour (1981) noted movements by mayflies of >500m through a final-cut strip mine pit, and he speculated that movements could be much greater. Genetic studies indicate that allele frequencies exhibit significant geographic differences and severe deficiencies of heterozygots (i.e. inbreeding) at geographic scales of 26-2300km (Sweeney et al. 1987). This suggests little migration between mayfly populations, even ones within 26km of each other. Considering a linear stream length of 26km, three times that length is 78km.

GSPECS.AUTHOR: Sovell, J.R.
GSPECS.OFFICE: COHP-US
GSPECS.DATE: 2000-05-02

ARANKSPECS
Size: data unavailable. Condition: the occurrence has an excellent chance of long-term viability with evidence of reproduction based on the occurrence of reproductive adults in association with pre-emergent nymphs observed in a clear small to mid-sized boreal stream. Riffles within the stream are present within 100m of the observation. Landscape Context: there is continuous free flowing habitat (e.g. no dams or beaver ponds) at site of observation.

Justification: There is no information on habitat preference or life history of *Leucrocuta petersi*, but members of the genus *Leucrocuta* are lotic species whose nymphs appear restricted to riffles where they are abundant (Harper and Harper 1982). Whiting and Sheard (1990) noted that habitats of heptageniids could be classified into two groups: large rivers in grassland and parkland, and small to mid-sized streams in boreal forest. *Leucrocuta hebe* was placed within the boreal forest group.

BRANKSPECS
Size: data unavailable. Condition: the occurrence has an excellent chance of long-term viability with evidence of reproduction based on the occurrence of reproductive adults in association with pre-emergent nymphs. Condition: observed in a clear small to mid-sized boreal stream with riffles within 250m of the observation. Landscape Context: there is continuous free flowing habitat (i.e. no dams or beaver ponds) at site of observation, but occurrence not meeting A rank specs.

CRANKSPECS
Size: data unavailable. Condition: the occurrence has an excellent chance of long-term viability with evidence of reproduction based on the occurrence of reproductive adults in association with pre-emergent nymphs. Condition: observed in a clear small to mid-sized boreal stream with riffles within 500m of the observation. Landscape Context: there is continuous free flowing habitat (i.e. no dams or beaver ponds) at site of observation, but occurrence not meeting B rank specs.

DRANKSPECS

Size: data unavailable. Condition: the occurrence has an excellent chance of long-term viability with evidence of reproduction based on the occurrence of reproductive adults in association with pre-emergent nymphs. Condition: observed in a clear small to mid-sized boreal and without riffles within 500m of the occurrence. Landscape Context: there is continuous free flowing habitat (i.e. no dams or beaver ponds) at site of observation, but occurrence not meeting C rank specs.

Literature cited:

Harper, P. P and R. Harper. 1982. Mayfly communities in a Laurentian watershed (Insecta: Ephemeroptera). Canadian Journal of Zoology. 60: 2828-2841.

Sweeney, B. W., D. H. Funk and R. L. Vannote. 1987. Genetic variation in stream mayfly (Insecta: Ephemeroptera) populations of eastern North America. Annals of the Entomological Society of America. 80:600-612.

Vinikour, W. S. 1981. Aquatic insect drift through a final-cut mine pit, with emphasis on drift distances. Hydrobiologia. 77:225-232.

Whiting, E. R., and J. W. Sheard. 1990. Patterns in the distribution of heptageniid (Ephemeroptera) species in Saskatchewan, Canada.

Reviewers: Boris Kondratieff, Colorado State University and Joan Friedlander and Greg Hayward of U.S. Forest Service

RHITHROGENA FLAVIANULA

A MAYFLY

EOSPECS
An element occurrence is defined by the presence along or within a stream of one or more emergent or pre-emergent mayflies. EO's are considered distinct if they are separated by 78km, or if occurring in streams of separate drainages. Justification: There is no information on the ecology of *R. flavianula*. There is limited information on Ephemeropteran drift dispersal, however, Vinikour (1981) noted movements by mayflies of >500m through a final-cut strip mine pit, and he speculated that movements could be much greater. Genetic studies including indicate that allele frequencies exhibit significant geographic differences and severe deficiencies of heterozygots (i.e. inbreeding) at geographic scales of 26-2300km (Sweeney et al. 1987). This suggests little migration between mayfly populations, even ones within 26km of each other. Considering a linear stream length of 26km, three times that length is 78km. Genetic studies on a rare species of ephemeroptera in Maine indicate that major genetic mixing occurs between populations within 4km of each other, but that major differentiation occurred between populations separated by 100km (Gibbs et al. 1998). This suggests that adult flight is a genetically effective means of dispersal for populations within 100km of each other. This also supports a separation distance of at least 78km.

GSPECS.AUTHOR: Sovell, J.R.
GSPECS.OFFICE: COHP-US
GSPECS.DATE: 2000-05-02

ARANKSPECS
Size: data unavailable. Condition: the occurrence has an excellent chance of long-term viability with evidence of reproduction based on the occurrence of reproductive adults in association with pre-emergent nymphs observed in a clear stream. Landscape Context: the stream supplies continuous free flowing habitat (i.e. no dams or beaver ponds) and is above 3000ft.

Justification: There is no information on the ecology, habitat preference or life history of *Rhithrogena. flavianula*, but members of the genus *Rhithrogena* are lotic species whose nymphs occupy prealpine streams above 3000ft (Breitenmoser and Sartori 1995). Also, ephemeropteran species composition and densities are greatly reduced in vicinities directly below dams (Lehmkuhl 1972).

BRANKSPECS
Size: data unavailable. Condition: the occurrence has an excellent chance of long-term viability with evidence of reproduction based on the occurrence of reproductive adults in association with pre-emergent nymphs observed in a clear stream. Landscape Context: observation from above 3,000ft, and with continuous free flowing habitat (i. e. no dams) for at least a distance of 10km in an upstream direction, but occurrence not meeting A rank specs.

CRANKSPECS
Size: data unavailable. Condition: the occurrence has a fair chance of long-term viability and is without evidence of reproduction based on observation of only emergent adults or pre-emergent nymphs, but not both in a clear stream. Landscape Context: observation from above 3,000ft, and with continuous free flowing habitat (i.e. no dams) for at least a distance of 5km in an upstream direction, but occurrence not meeting B rank specs.

DRANKSPECS
Condition: the occurrence has a fair chance of long-term viability and is without evidence of reproduction based on observation of only emergent adults or pre-emergent nymphs, but not both in a clear stream. Landscape Context: observation is from below 3,000ft, and occurring within 5km of an upstream dam.

Literature cited:

Breitenmoser-Wursten, C and M. Sartori. 1995. Distribution, diversity, life cycle and growth of a mayfly community in a prealpine stream system (Insecta, Ephemeroptera). Hydrobiologia 308: 85-101.

Gibbs, H. L., K. E. Gibbs, M. Siebenmann and L. Collins. 1998. Genetic differentiation among populations of the rare mayfly *Siphlonisca aerodromia* Needham. Journal of the North American Benthological Society 17: 464-472.

Lehmkuhl, D. M. 1972. Change in thermal regime as a cause of reduction of benthic fauna downstream of a reservoir. Journal of the Fisheries Research Board of Canada. 29:1329-1332.

Sweeney, B. W., D. H. Funk and R. L. Vannote. 1987. Genetic variation in stream mayfly (Insecta: Ephemeroptera) populations of eastern North America. Annals of the Entomological Society of America. 80:600-612.

Vinikour, W. S. 1981. Aquatic insect drift through a final-cut mine pit, with emphasis on drift distances. Hydrobiologia. 77:225-232.

Reviewers: Boris Kondratieff, Colorado State University and Joan Friedlander and Greg Hayward of U.S. Forest Service

BUFO BOREAS POPULATION 1 (Southern Rocky Mountain Population)

BOREAL TOAD

EOSPECS:

An element occurrence is defined by documentation of one or more individuals (adults, juveniles, tadpoles or egg masses). EO's should be separated by 8 km within a common 1st, 2nd, or 3rd order drainage, or by 5 km between drainage's. Within minimum separation distances, barriers that prevent toad movement should be considered for separating EO's. Examples of barriers include residential or commercial development, high traffic volume highways and mountain ranges with passes above 12,500 ft (3810 m).

Justification: The 8 km separation distance within a common drainage was based on the Boreal Toad Recovery Team's criteria of 8 km for separating breeding populations within common drainage's (Loeffler 1998). Although this number is somewhat arbitrary, it is supported by recent movement data. Boreal toad radio telemetry studies in Clear Creek County, Colorado, found that the maximum distance traveled by a toad was 6.48 km over 106 days (Jones 2000). The 8 km separation distance chosen is larger than a separation distance calculated from home range estimates. By taking a standard radius from the largest home range (85.17 ha) from Jones (2000) data, and allowing for a vacant home range of that size as unoccupied habitat, the separation distance would be approximately 2 km. The evidence supports seasonal variability in boreal toad movements. Individual toads may move 4 km or more between breeding and nonbreeding habitats (S. Corn, pers. com. in Hammerson 1999). Jones (2000) found strong evidence for breeding site fidelity from his research in Clear Creek County, Colorado. Three years of mark and recapture data from Chaffee County, Colorado also show a high degree of breeding site fidelity by adult toads (Lambert, unpublished data). Breeding site fidelity indicates that genetic dispersal is low, although individuals that do not establish a home ranges presumably disperse in attempt to colonize unoccupied habitat (Campbell 1970). The shorter distance of 5 km was chosen to separate EO's between drainage's, because the mountain stream drainage's most often associated with boreal toads are separated by high mountain passes that would inhibit toad mobility (pers. obs.). Greater dispersal distances are expected within a drainage as opposed to movements between drainage's. There is a record of a toad moving over a 12,000 ft. pass and reports of toads as high as 11,939 ft. (Livo and Yeakley 1997), but until contradictory evidence is produced, a mountain pass above 12,500 ft. should be considered as a barrier for toad movement. There is little information on the movement of juvenile toads and the role they play in the dispersal of genetic material, so the EO specs were written based on adult movement studies. Suitable vs. unsuitable habitat has been avoided in defining separation distances, because of high variability in habitat use (Hammerson 1999). Toad movements are highly variable between individuals and sexes and in different habitats (Jones 2000).

GSPECS.AUTHOR: Lambert, B.
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GSPECS.DATE: 2000-11-15

ARANKSPECS:

Size: An A-rank occurrence is an EO that has >100 adults or >20 egg masses documented in at least 2 of the last 5 years. Condition: Confirmed recruitment in at least 2 of the last 5 years and the presence of multiple age classes is evidence of a healthy population with a good likelihood of long-term viability. Recruitment is defined as the presence of 1 year old toads in any given year

(Loeffler 1998). The population should be free from any disease that is linked to a documented population decline over multiple years. Human impacts, especially activities in and around breeding sites should be minimal. Landscape context: The surrounding habitat should be free from threats that could affect water quality or alter the shallow ponds necessary for breeding.

Justification: Since breeding site monitoring data in Colorado is available for the years 1995-2000, numbers were chosen to incorporate the high counts from the largest breeding populations in Colorado. High counts from 2 of the last 5 years were chosen because the number of breeding adults present at breeding sites naturally fluctuate from year to year and because it is unusual for females to breed in consecutive years (Jones 2000). Currently in Colorado, a disease (chytrid fungus) is causing declines in boreal toad populations. The presence of a disease in a population needs to be monitored for multiple years to assess impacts.

BRANKSPECS:

Size: 50-100 adults or 10-20 egg masses documented in at least 2 of the last 5 years. Condition: Confirmed recruitment in at least 2 of the last 5 years and the presence of multiple age classes indicates the good likelihood of long-term viability. There should be no presence of a disease that is linked to a documented population decline over multiple years. Landscape context: Human impacts that affect water quality or alter the shallow breeding ponds should be minimal.

C-RANKSPECS

Size: 20-49 adults or 2-9 egg masses documented in at least 2 of the last 5 years. Condition: There should be evidence of successful reproduction to indicate long-term viability. The habitat can be somewhat degraded as long as the breeding site(s) remain in good shape. Landscape context: There should be no threats outside the EO that affect the water quality or breeding habitat.

Justification: The C-rank size is based on the Boreal Toad Recovery Team's minimum criteria for a viable population (Loeffler 1998) and adjusted for ease in interval ranking. Boreal toad populations can persist in habitats degraded by human activities. For example, in Colorado there are viable boreal toad populations next to golf courses and in areas disturbed by mining.

D-RANKSPECS

Size: Any lone observation of a boreal toad or any EO that does not meet the criteria for a higher rank is considered a D-rank occurrence. Condition: Little or no evidence of successful reproduction is observed. Landscape context: The surrounding habitat is heavily degraded by human activities or development that would inhibit dispersal.

LITERATURE CITED

Campbell, J. B. 1970. New elevational records for the boreal toad (*Bufo boreas boreas*). *Arctic and Alpine Research* 2:157-159.

Hammerson, G. A. 1999. *Amphibians and Reptiles in Colorado*. University Press of Colorado, Niwot, CO.

Jones, M. S. 2000. Boreal toad research progress report 1999. Colorado Division of Wildlife. 157 pp.

Livo, L. J. and D. Yeakley. 1997. Comparison of current with historical elevational range in the boreal toad, *Bufo boreas*. *Herpetological Review* 28:143-144.

Loeffler, C. 1998. Conservation plan and agreement for the management and recovery of the Southern Rocky Mountain population of the boreal toad (*Bufo boreas boreas*). Colorado Division of Wildlife. 65 pp.

Loeffler, C. 1999. Report on the status and conservation of the boreal toad in the Southern Rocky Mountains. Colorado Division of Wildlife Technical. 48 pp.

Reviewers: Lauren Livo, University of Colorado - reviewed specs
Geoffrey Hammerson, TNC - review in progress

Additional potential reviewers:
Chuck Loeffler, Colorado Division of Wildlife
Erin Muths, USGS-BRD
Steve Corn, USGS-BRD
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CENTROCERCUS MINIMUS

GUNNISON SAGE GROUSE

EOSPECS
There are two EO classes: BREEDING and NONBREEDING. EO class BREEDING is defined by the presence of one or more male grouse at a lek site as evidenced by the direct observation of displaying males or the observation of a female with brood in sagebrush habitat. Breeding EO's are considered distinct when a distance of 13km of suitable or unsuitable habitat separates either lek sites or observed broods. Justification: Mean estimate of breeding home range for Gunnison Sage Grouse is 1379ha (Commons 1997). Assuming a non-linear home range and using the diameter as the axis, three times the axis is 13km for a 1379ha circular home range. Grouse are extremely vagile species with documented dispersion from leks of up to 36km for Sage Grouse (Washington Department of Fish and Wildlife 1995) and 15km for Gunnison Sage Grouse (Commons 1997). Consequently, habitat suitability is not considered in this evaluation due to high dispersal abilities of the species.

EO class NONBREEDING is defined as the presence of one or more individuals seen or heard between September and early February. Nonbreeding EO's are considered distinct if 12km separate observations. Justification: Reported mean nonbreeding or winter home ranges of Gunnison Sage Grouse are 1248ha (Commons 1997). Habitat suitability is not considered in this analysis as winter migrations of Sage Grouse can exceed 150km and 28km for Gunnison Sage Grouse.

GSPECS.AUTHOR: SOVELL, J. R.
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GSPECS.DATE: 2000-05-03

ARANKSPECS
EO class BREEDING. Size: lek site averaging >30 males/year (based on 5 or more years of data). Condition: lek surrounded by >100acres of contiguous suitable habitat dominated by sagebrush, with a water source within 3km of the lek. Landscape Context: if grazing occurs it is eliminated from March to June 15 (Gunnison Sage Grouse Conservation Plan 1998, Northern Sage Grouse Conservation Plan 1999).
EO class NONBREEDING. Size: population of >100 grouse observed within the last 2 years. Condition: population occupies an area with >100acres of contiguous suitable habitat dominated by sagebrush. Landscape Context: habitat is without threat of subdivision or other development (Gunnison Sage Grouse Conservation Plan 1998, Northern Sage Grouse Conservation Plan 1999).

BRANKSPECS
EO class BREEDING. Size: lek site averaging >10 males/year (based on 5 or more years of data). Condition: lek is surrounded by >100acres of contiguous suitable habitat dominated by sagebrush, with a water source within 5km of the lek. Landscape Context: and if grazing occurs it is eliminated from March to June 15, but occurrence does not meet A rank criteria.
EO class NONBREEDING: Population of >50 grouse observed within 2 of the last 5 years. Condition: population is in an area with >100acres of contiguous suitable habitat dominated by sagebrush. Landscape Context: habitat is without threat of subdivision or other development, but occurrence does not meet A rank criteria.

CRANKSPECS

EO class BREEDING. Size: lek site averaging >5 males/year (based on 1 or more years of data). Condition: lek is surrounded by >50acres of contiguous suitable habitat dominated by sagebrush, with a water source within 9km of the lek, but occurrence does not meet A or B rank criteria.
EO class NONBREEDING. Size: population of >10 grouse observed within the last 5 years. Condition: population occupies an area with >50acres of contiguous suitable habitat dominated by sagebrush. Landscape Context: habitat is without threat of subdivision or other development, but occurrence does not meet A or B rank criteria.

DRANKSPECS
EO class BREEDING. Size: one or more individuals have been observed on lek within the last 5 years, but occurrence does not meet A, B, or C rank criteria.
EO class NONBREEDING. Size: population with <10 grouse. Condition: population observed in an area of fragmented sage. Landscape Context: occupied habitat is a desirable location for subdivision or other development or development already initiated.

Literature cited:

Commons, M. L. 1997. Movement and habitat use by Gunnison Sage Grouse (*Centrocercus minimus*) in southwestern Colorado. Masters of Science Thesis, Natural Resources Institute, University of Manitoba, Winnepeg, Manitoba.

Gunnison Conservation Plan Dove Creek, Colorado. 1998.

Northern Sage Grouse Conservation Plan Northern Colorado, Moffat County. 1999. Northwest Colorado Sage Grouse Working Group.

Washington Department of Fish and Wildlife. 1995. Washington State Management Plan for Sage Grouse. Wildlife Management Program, 600 Capitol Way N, Olympia, Washington.

Reviewers: Jessica Young, Western State College and Joan Friedlander and Greg Hayward of U.S. Forest Service

MELANERPES LEWIS

LEWIS'S WOODPECKER

EOSPECS
There are two major EO classes: BREEDING and NONBREEDING (but note that populations breeding in northern portions of the species' range migrate 100 - 1000 km [Tobalske 1997], while those in southern regions either do not migrate or they migrate 1 - 20 km down in elevation] [Tobalske 1997 from Snow 1941, Bock 1970]).

A BREEDING EO is defined by the presence of one or more breeding pairs, as determined through direct (active nest-cavity, eggs, broods, or the presence of fledglings prior to dispersal) or indirect (adult carrying food into a nest site, adult removing fecal sacs, and/or adults feeding on successive days in the same location) evidence in suitable breeding habitat. Breeding EOs are considered distinct when separated by $\geq$4.3 km (see justification below for potential application of different distances) of unsuitable, or apparently suitable but unoccupied, habitat.

Justification for BREEDING EO separations: Separation distances for occurrences of volant species are somewhat arbitrary, based primarily on largest home-range size and correspondingly manageable units of habitat or land area. Home ranges of breeding Lewis's Woodpeckers have not been measured, per se. Thomas et al. (1979) reported territory sizes of 1.0 - 6.1 ha, which, in light of the common belief that this species defends only the immediate area around nests and food-caches (Tobalske 1997), may actually represent > the territory itself (i.e., partial home range). Saab and Dudley (1998) detected 0.05 - 1.2 Lewis's Woodpecker nests/km along transects spaced 200 m apart (i.e., ~0.05 - 1.2 nests/20 ha) in burned conifer forests; the range of densities may represent, in part, variation in habitat quality and availability of food resources; in the absence of more specific information, separations were based on the minimum nest densities (157 ha/nesting pair; based on Saab and Dudley 1998). Assuming that woodpeckers nesting in forests use roughly circular polygons of habitat, the diameter of a large home range would be ~1.42 km, and 3 times that distance (the axes of two occupied home ranges separated by the axis of one unoccupied home range; Natural Heritage Program 1999--Draft EO Data Standard) would be ~4.3 km; birds nesting linear strips of riparian woodland <1.42 km wide may require separation distances of >4.3 km.

Suitable BREEDING habitat consists of open, park-like forests of mature/old-growth pine (esp. Pinus ponderosa, occ. P. jeffreyi but species' overall breeding distribution generally coincides with P. Ponderosa) up to 2800 m in elevation; they also nest in open riparian bottomlands dominated by large cottonwoods (Populus spp.), in burned forests (esp. P. Ponderosa)--particularly older (7-30 years, or until all snags have fallen and understory growth becomes dominant) burns or in younger (<7 years) partially salvage-logged burns, and in selectively logged pine forests; occ. nests in oak (Quercus spp.) woodlands, orchards of nut- or fruit-producing trees, pinyon-juniper (Pinus-Juniperus spp.) woodlands, pine mixed with fir (esp. Abies concolor), willow (Salix spp.), birch (Betula spp.), or woodlots/shelterbelts associated with ranches and farms (compiled in Tobalske 1997); however, will avoid areas immediately surrounding farm structures and grazed areas (Hadow 1973). The species is considered a post-burn specialist, depending on burn age and altitude, original cover type, and/or post-burn forestry practices (compiled in Tobalske 1997; Saab and Dudley 1998); this species appears to find suitable habitat in large expanses of burned forest (esp. P. Ponderosa), particularly where gaps (used for flycatching) are created by natural treefall or partial logging and where appropriate distributions/densities/sizes of snags are retained (see below); some partial salvage-logging after fire does not appear to degrade habitat quality for these woodpeckers (Saab and Dudley 1998).

The species typically nests in cavities of dead or partially dead trees, esp. tall/large-dbh trees; often nests in cavities excavated by other species of woodpeckers, but will excavate their own cavities if the snag is sufficiently softened (decayed) (compiled in Tobalske 1997). Dbh of nesting trees ranges from 33 - 112.6 cm (Tobalske 1997 from Linder 1994, Vierling 1997, Saab and Dudley 1998); in a 100,000-ha, partially salvage-logged, ponderosa-dominated, stand-replacement burn, nest densities were highest where mean numbers of snags retained were 63.5/ha (> 23 cm dbh) and 17.8/ha (> 53 cm dbh). The degree of nest-site fidelity remains unevaluated with banded birds, however nest cavities may be occupied for many consecutive years (Bock 1970). In the breeding season, Lewis's Woodpecker's forages primarily by flycatching for Hymenoptera in open areas and secondarily by gleaning insects from the shrub layer and ground; a moderate cover of shrub understory (i.e., not too tall or dense) is believed to promote adequate populations of prey, but an open canopy appears to be critical (compiled in Tobalske 1997).

An untested habitat-suitability index (HSI) model for this species prescribes a forest canopy cover of 30%, shrub cover of ≥50%, and ≥2.5 well-decayed snags of ≥30.5 cm in dbh per ha (Sousa 1983); however, the results of subsequent studies suggest that the dbh of snags used for nesting are usually greater than 30.5 (see above). Subsequent disagreements over percent shrub cover required may stem, in part, from poor differentiation between shrub cover in foraging areas (i.e., across home range) versus that of the immediate nest site (see discussion of site characteristics on page 16 in Tobalske 1997); another HSI model (for Williamson's Sapsucker; Sousa 1983) was found to be unreliable in predicting all but gross habitat preferences (Conway and Martin 1993).

A NONBREEDING EO is defined by the presence of >2 birds in staging areas where post-nesting adults and juveniles assemble into flocks prior to migration (generally staging areas consist of open canopy stands of large cottonwoods with ample prey; often near orchards or previous nesting sites) and/or the presence of ≥1 birds in suitable nonbreeding habitat for ≥2 winter months (Nov.-Feb.). Nonbreeding EOs are considered distinct when separated by ≥6.5 km (see justification above for applications of different distances) of unsuitable, or apparently suitable but unoccupied, habitat.

Justification for occurrence separations: There are no data on sizes/distances of winter home ranges/movement patterns; however, it is known that nonbreeding home ranges can overlap broadly (Tobalske 1997). The species defends food caches and exhibits fidelity to cache sites (compiled in Tobalske 1997); thus, spacing/ movements are likely determined by local food sources and availabilities of food-cache sites (Bock 1970, Hadow 1973). Until data on spacing/movements becomes available, a separation distance of 1.5 times that for breeding home ranges was selected to allow for the need to travel larger distances for food in nonbreeding season than in breeding season.

Suitable NONBREEDING habitat consists of oak woodlands, riparian bottomlands dominated by cottonwoods, nut- or fruit-producing orchards, and woodlands adjacent to corn fields (but not adjacent to structures or grazed areas) where food resources (acorns, nuts, dried fruits, corn, native seeds) are abundant; sites for storing food (e.g., bark of large trees) are also essential components of winter habitat (compiled in Tobalske 1997).

GSPECS.AUTHOR: Melcher, C.P.; GSPECS.OFFICE: US-COHP; GSPECS.DATE: 2000-11-17

ARANKSPECS

BREEDING EOs--A mean density of ≥4 pairs/100 ha across >2500 ha. Condition: The occurrence has an excellent likelihood of long-term viability, as evidenced by occupancy of breeding pairs during ≥2 breeding seasons within a 5-year period and ≥75% nest success. The habitat is high-quality, consisting of snags ≥45 cm in dbh at densities of >1700/100 ha (the larger proportion of which are soft snags or soft-snag recruits), 10-60% live shrub cover, and ≤30% live canopy cover. Landscape context: The occurrence is surrounded by an area characterized by relatively native disturbance processes/severities (e.g., fires, insect infestations, and/or flood events that create snags) and little or no intensive agriculture, use of pesticides, urbanization, felling of cottonwood snags, or clearcutting.

Justification: Local distributions experience a certain degree of natural periodicity, thus occupancy in sequential breeding seasons may not occur even in the best situations (B. Tobalske, pers. comm.). Specifics regarding minimum patch size remain unquantified; however, availability of nest sites may be limiting (Tobalske 1997); thus, a minimum of 2500 ha was selected to capture critical habitat features that may be patchily distributed across a given landscape or occur in large disturbances. Breeding densities of 16.6 pairs/100 ha recommended in Thomas et al. (1979) may be over-optimistic; maximum nest densities may be ~1/17 (based on Saab and Dudley 1998); if densities occur at ≥4 pairs/100 ha, then 2500 ha of high-quality habitat should support ≥100 pairs. Recommended snag densities are significantly higher than those recommended by Thomas et al. (1979) (who also underestimated the snag-density needs of Williamson's Sapsucker [Conway and Martin 1993], although what is more important than snag density, per se, is the proportion of soft snags or soft-snag recruits [B. Tobalske, pers. comm.]). Most studies subsequent to Sousa's (1983) HSI model for Lewis's Woodpecker reported means of 45 - 113 cm dbh among snags used for nesting (compiled in Tobalske 1997; Saab and Dudley 1998); Saab and Dudley (1998) found highest nesting densities where densities of moderately decayed snags >53 cm dbh were 13.8 - 17.8/ha; thus, the HSI minimum snag size of ≥30.5 cm at densities of 249/100 ha may be inadequate for supporting large, viable populations. A shrub cover of 13 - 60% is the range of shrub cover found in burned sites (13 - 16% in Block and Brennan 1987, Linder 1994; Saab and Dudley [1998] did not report shrub cover) and recommended by the untested HSI model for Lewis's Woodpecker (≥50%; Sousa 1983). A live canopy cover of 0 - 30% is the range of cover implied 0% in Saab and Dudley (1998) to the 30% recommended by the HSI model. Nesting success was high in burns (>75%) (Saab and Dudley 1998).

NONBREEDING Eos--Size: A mean density of ≥8 birds/100 ha across >1000 ha. Condition: The occurrence has an excellent likelihood of long-term viability, as evidenced by occupancy over ≥2 winters. The habitat is high-quality and includes ≥40 suitable food-caching trees/100 ha. Landscape context: The occurrence is surrounded by an area characterized by relatively native disturbance processes/severities (e.g., fires, insect infestations, and/or flood events that create snags) and little or no intensive agriculture, use of pesticides, urbanization, felling of cottonwood snags, or clearcutting.

Justification for NONBREEDING EO ranks: Area requirements/home ranges of wintering birds remain undetermined (although some birds are year-round residents and may use areas similar to those used during breeding season); local food resources (mast and insects) and availabilities of food-caching sites (the bark or crevices of large trees) likely determine area requirements and minimum spacing between food caches (Bock 1970, Hadow 1973). Feeding areas and food caches may overlap (Tobalske 1997 from Bock, pers. comm.; Hadow 1973); 8 birds--3 of which defended food stores in the same tree--used a 76-m long stand of riparian woodland (width unspecified--probably relatively narrow, as it was in the foothills) in a context of oak, which likely provided enough food resources to allow the birds to occur at high densities around food-cache sites (however, total home range was not specified) (Hadow 1973); at a plains site, food stores defended by separate individuals were at least 84 - 200 m apart. In the absence of better information, a minimum area of 500 ha was selected to capture a landscape-scale components (e.g., a 10-km strip of riparian woodland 0.5 km wide that would provide food-cache sites, plus 500 ha of mast-production areas), and which allows for patchy/ephemeral resources. Minimum densities were based on individuals needing ≥10 ha for finding food beyond food cache areas.

BRANKSPECS
BREEDING EOs--Size: A mean density of ≥4 pairs/100 ha across >1500 ha. Condition: The occurrence has a good likelihood of long-term viability, as evidenced by occupancy of breeding pairs during ≥2 breeding seasons within a 5-year period and >70% nest success. The habitat is high-quality, consisting of snags ≥45 cm in dbh at densities of >1000/100 ha (the larger proportion of which are soft snags or soft-snag recruits), 10-60% live shrub cover, and ≤35% live tree-canopy cover. Landscape context: The occurrence is surrounded by an area characterized by relatively native disturbance processes (e.g., fires, insect infestations, and/or floods that create snags) and only minimal (<10%) habitat damage or fragmentation caused by human activities.

Justification: Saab and Dudley (1998) determined that numbers of nests remained statistically similar if mean densities of moderately decayed snags >53 cm in dbh were 1380 - 1780/100 ha.

NONBREEDING EOs--Size: A mean density of ≥8 birds/100 ha across >500 ha. Condition: The occurrence has a good likelihood of long-term viability, as evidenced by occupancy during ≥2 winters. The habitat is high-quality and includes ≥30 suitable food-caching trees/100 ha. Landscape context: The occurrence is surrounded by an area characterized by relatively native disturbance processes/severities (e.g., fires, insect infestations, and/or flood events that create snags) and only minimal (<10%) habitat damage or fragmentation caused by human activities.

CRANKSPECS
BREEDING Eos--Size: A mean density of ≥2 pairs/100 ha across >500 ha. Condition: The occurrence has a ≥50% likelihood of long-term viability, as evidenced by occupancy of breeding pairs during ≥2 breeding seasons within a 5-year period and ≥50% nest success. The habitat is of moderate quality where the number of suitable nesting trees/snags is 250-1000/100 ha, live canopy cover is 35-55%, and shrub cover is <10%. Landscape context: The occurrence is surrounded by an area where native disturbance processes may have been moderately altered by fire suppression or practices that prevent normal flood regimes from creating snags in riparian woodlands areas, large-scale (>10-50% of the surrounding area) agriculture and/or development, invasions of non-native trees (e.g., Tamarisk and Eleagnus spp.), and/or logging practices.

Justification: Snyder and Miller (1991) attributed declines of riparian woodlands along Arkansas and South Platte rivers in Colorado (i.e., Lewis's Woodpecker habitat [Vierling 1997]) to attrition and/or degradation of riparian woodlands (esp. mature stands of cottonwoods). Likely causes included: habitat loss from encroaching agriculture and development; changes in age-class/structure (fewer large trees) caused by grazing, dewatering, altered geomorphology of river channels; and/or invasions of exotic trees. Because these birds rely heavily on flycatching in the breeding season, local pesticide use in agricultural or diseased-forest contexts could lead to lower nesting success and/or abandonment of nest sites (see discussion on page 21 in Tobalske 1997).

NONBREEDING EOs--Size: A mean density of ≥4 birds/100 ha across 100-500 ha. Condition: The occurrence has a ≥50% likelihood of long-term viability, as evidenced by occupancy during ≥2 winters. Habitat quality is moderate and includes ≥20 suitable food-caching trees/100 ha. Landscape context: The occurrence is surrounded by an area where native disturbance processes may have been moderately altered by fire suppression or practices that prevent normal flood regimes from creating snags in riparian woodlands areas, large-scale (>10-50% of the surrounding area) agriculture and/or development, invasions of non-native trees (e.g., Tamarisk and Eleagnus spp.), and/or logging practices.

DRANKSPECS
BREEDING EOs--Size: A mean density of <2 pair/100 ha across <500 ha. Condition: The occurrence has a <50% likelihood of long-term viability, as evidenced by occupancy during <1 year within 5-10 breeding seasons and/or <50% nest success. The density of suitable nesting snags is <250/100 ha, and/or the canopy cover is $\geq$55%. Landscape context: The occurrence is surrounded by areas highly degraded and/or fragmented (>50%) through human activities; pesticide applications may occur repeatedly.

Justification: Bock (1970) and Linder (1994) describe suitable breeding habitat as having an open canopy (13-16%); Snyder and Miller (1991) define open, intermediate, and closed canopies as 10-35%, 36-55%, and >55%, respectively.

NONBREEDING EOs--Size: A mean density of <4 birds/100 ha across <100 ha. Condition: The occurrence has a <50% likelihood of long-term viability, as evidenced by occupancy during <2 winters. The density of suitable food-caching trees/100 ha is <20. Landscape context: The occurrence is surrounded by areas highly degraded and/or fragmented (>50%) through human activities; pesticide applications may occur repeatedly.

Literature Cited:

Bock, C.E. 1970. The ecology and behavior of the Lewis' Woodpecker (Ansyndesmus lewis). University of California Publications in Zoology 92:1-100.

Bock, C.E., and J.F. Lynch. 1970. Breeding bird populations of burned and unburned conifer forest in the Sierra Nevada. Condor 72:182-189.

Bull, E.L., S.R. Peterson, and J.W. Thomas. 1986. Resource partitioning among woodpeckers in northwestern Oregon. Research Note PNW-4444. US Dept. Agriculture Forest Service, Portland,OR.

Conway, C.J., and T.E. Martin. 1993. Habitat suitability for Williamson's Sapsuckers in mixed-conifer forests. Journal of Wildlife Management 57:322-328.
Diem, K.L., and S.I. Zeveloff. 1980. Ponderosa pine bird communities. Pp. 170-197 in R.M. DeGraaf and N.G. Tilghman (Editors). Management of Western Forests and Grasslands for Nongame Birds: Workshop Proceedings. GTR-INT-86. US Dept. Agriculture Forest Service, Ogden, UT.

Howell, S.N.G., and S. Webb. 1995. A Guide to the Birds of Mexico and northern Central America. Oxford University Press, New York.

Saab, V., and J.G. Dudley. 1998. Responses of cavity-nesting birds to stand-replacement fire and salvage logging in ponderosa pine/Douglas-fir forests of southwestern Idaho. RP-RMRS-11, Rocky Mountain Research Station, U.S. Dept. Agriculture Forest Service, Ogden, UT.

Natural Heritage Program. 1999. Draft Element Occurrence Data Standard. Available on-line at: http://whiteoak.tnc.org/eodraft/index.htm.

Short, L.L. 1982. Woodpeckers of the World. Delaware Museum of Natural History Monograph Series no. 4.

Snow, R.B. 1941. A natural history of the Lewis' Woodpecker Asyndesmus lewis (Gray). M.S. Thesis, University of Utah, Salt Lake City, UT.

Sousa, P.J. 1983. Habitat suitability index models: Lewis' Woodpecker. FWS/OBS-82/10.32. U.S. Dept. Interior Fish and Wildlife Service.

Stallcup, P.L. 1968. Spatio-temporal relationships of nuthatches and woodpeckers in ponderosa pine forests of Colorado. Ecology 49:831-843.

Thomas, J.W., R.G. Anderson, C, Maser, and E.L. Bull. 1979. Snags. Pp. 60-77 in J.W. Thomas (Technical Editor). Wildlife Habitat in Managed Forests: The Blue Mountains of Oregon and Washington. Agricultural Handbook 553. US Dept. Agriculture Forest Service.

Tobalske, B. 1997. Lewis' woodpecker (Melanerpes lewis). Pages 1-28 pages in: A. Poole, and F. Gill, eds. Birds of North America, No. 284. The Academy of Natural Sciences, Philadelphia, Pennsylvania, and The American Ornithologists' Union, Washington, D.C.

Reviewed by Brett Tobalske on 10/13/2000
Other possible reviewer: Carl Bock, Dept EPO Biology, UC Boulder

ASIO FLAMMEUS

SHORT-EARED OWL

EOSPECS
There are two major EO classes: BREEDING and NONBREEDING. NOTE: This set of EO specifications pertains ONLY to the nominate subspecies, A.f. f.lammeus, in the North American portion of its range (it also occurs in Eurasia). Authorities recognize 8 - 9 subspecies, 5 -6 of which occur as island endemics in the Pacific, Caribbean, North Atlantic, and Micronesia; one occurs in South America (compiled in Holt and Leasure 1993). Excepting A.f. flammeus in the North American portion of its range, little is known about the species; thus, the EO specifications pertain only to A.f. flammeus in North America. As more information becomes available, additional EO specifications may be designed for other populations and/or subspecies.

A BREEDING EO is defined by the presence of one or more breeding pairs, as determined through direct (active nest, eggs, broods) or indirect (adult carrying nest material or food) evidence in suitable breeding habitat. Breeding EOs are considered distinct when separated by 33 km of unsuitable, or apparently suitable but unoccupied, habitat.

Justification for occurrence separations: Separation distances for occurrences of volant species are somewhat arbitrary, based primarily on largest home-range size and correspondingly manageable units of habitat or land area. For Short-eared Owls, breeding home ranges of up to 10,000 ha (100 sq. km) have been reported; however, breeding territories are often concentrated within relatively small areas (e.g., 32 - 33 nests within 164 - 200 ha, respectively (Tate 1992, Holt and Leasure 1993), and size appears to increase with decreasing prey densities (Holt and Leasure 1993 from Lockie 1955 and Clark 1975); thus, in some cases (esp. when prey are abundant), the birds exhibit clustered nesting distributions, and in those cases home ranges may overlap considerably. Assuming that birds inhabiting grasslands, prairies, marshes, and shrubsteppe habitats use roughly circular polygons of habitat, the diameters of the largest-reported home ranges would be ~11 km, and 3 times that distance (the axes of two occupied territories separated by the axis of one unoccupied territory; Natural Heritage Program 1999--Draft EO Data Standard) would be ~33 km.

Suitable BREEDING habitat consists of: large expanses of relatively unfragmented, open country that support large populations of at least cyclic (if not stable) populations of small mammals (esp. microtines), from the high Arctic to middle latitudes of the U.S. (now restricted to highest latitudes in the eastern third of the U.S., where declines have been significant; Holt and Leasure 1993); main habitats are grasslands (prairie, coastal grassland or marsh, tundra, agricultural settings) and shrublands (heath, shrubsteppe, coastal shrublands). Areas managed for nesting waterfowl often provide important habitat for Short-eared Owls (Holt and Leasure 1993 from Larsen 1987; D.W. Holt, pers. obs.). Nest sites generally located in denser vegetation, predominately grasses or shrubs where 40 - 90% of the vegetation is <50 cm high, although there must be some taller vegetation (10 - 60% >50 cm) to conceal the nesting bird; birds typically place the nest on a dry site--usually a small knoll or hummock, although sometimes wetter spots are used (compiled in Holt and Leasure 1993). The birds are typically quite nomadic, often abundant one year then absent the next, depending on prey populations; however, there are instances where nests have been built in the same location in subsequent years (compiled on Holt and Leasure 1993).

A NONBREEDING EO is defined by the presence of one or more birds in suitable nonbreeding habitat for a period of ≥1 month during the nonbreeding season. Nonbreeding EOs are considered distinct when separated by 33 km of unsuitable, or apparently suitable but unoccupied, habitat.

Justification for occurrence separations: In some cases, winter ranges or territories become breeding territories--probably most often in cases where populations of small mammals are at least temporarily abundant; thus, separations for nonbreeding occurrences are similar to those for breeding occurrences.

Suitable NONBREEDING habitats are similar to breeding habitats, although additional types of open areas (stubble or weedy fields, gravel pits, shrub thickets, shelterbelts) may be used if prey populations are large and/or roosting cover is present. The birds generally roost on the ground, often on hummocks or other small projections; when snow cover is deep, however, they will roost in trees (compiled in Holt and Leasure 1993), especially in lower cover (Walk 1998).

GSPECS.AUTHOR: Melcher, C.P. GSPECS.OFFICE: US-COHP GSPECS.DATE:2000-11-17

ARANKSPECS
Both BREEDING and NONBREEDING EOs--Size: ≥100 pairs (in breeding season) or 100 birds (in nonbreeding season) across ≥10,000 ha. Condition: The occurrence has an excellent likelihood of long-term viability, as evidenced by the presence of birds over ≥3 of 5 years. Small mammals (esp. microtines) are regularly (peaking every 3-4 years) abundant over most of the habitat; 40-90% of the habitat is grass and/or shrub cover <50 cm tall, and 10-40% is grass or shrub cover >50 cm tall; and numerous small knolls and/or grassy hummocks are scattered throughout habitat. Landscape context: The occurrence is surrounded by a mosaic of relatively unfragmented, native grassland in various stages of succession. Relatively native disturbance processes (e.g., fire, extent of grazing) still occur (or have been restored); there are few or no domestic/feral cats or dogs or native nest predators that have become locally abundant due to anthropogenic activities (e.g., skunks, racoons); there is no local use of agricultural pesticides (Azodrin [Monocrotophos] is particularly lethal to raptors) (Mendelssohn and Paz 1977).

Justification: Because this species wanders over large areas in search of food and relies heavily on small prey that typically cycle in population density over3-4 years, Short-eared Owls in a given area may be abundant one year and absent or nearly absent the next (Pitelka et al. 1955). Thus, it is important to protect large, landscape-level tracts of open land for this species, and habitat suitability/occupation should be based on multiple-year inventories of small prey populations. Primary causes of declines most likely have been habitat fragmentation and predation pressure brought on through anthropogenic influences (compiled in Holt and Leasure 1993). Because these birds consume predominantly herbivorous prey, they generally do not exhibit symptoms of pesticide accumulation often found in other raptor species; however, pesticides used to kill small mammals (e.g., Azodrin) have resulted in at least one mass mortality of Short-eared Owls (Mendelssohn and Paz 1977). Comparative data on breeding versus nonbreeding home ranges are not available; thus, minimum BREEDING and NONBREEDING habitat areas are similar, set to capture landscape features that the birds use for both breeding and nonbreeding.

BRANKSPECS
BREEDING and NONBREEDING EOs--Size: ≥50 pairs (in the breeding season) or 50 birds (in the nonbreeding season) across ≥5000 ha. Condition: The occurrence has a good likelihood of long-term viability, as evidenced by the presence of birds ≥3 in 5 years. Small mammals (esp. microtines) generally are abundant over most of the habitat; 40-90% of habitat is grass and/or shrub cover <50 cm tall, and 10-40% is grass or shrub cover >50 cm tall; and numerous small

knolls and/or grassy hummocks are scattered throughout. Landscape context: The occurrence is surrounded by a mosaic of relatively unfragmented, native grassland in various stages of succession. Relatively native disturbance processes still occur (or have been restored); there are few or no domestic/feral cats or dogs and/or native nest predators have become unusually abundant due to anthropogenic activities (e.g., skunks, racoons); there is little or no local use of pesticides.

CRANKSPECS
BREEDING and NONBREEDING EOs--Size: ≥10 pairs (in breeding season) or ≥10 birds (in nonbreeding season) across <500 - 5000 ha. Condition: The occurrence has ≥50% likelihood of long-term viability, as evidenced by the presence of birds over ≥2 of 5 years. Small mammals (esp. microtines) are at least locally abundant in 50% of the habitat; 20-40% of habitat is grass and/or shrub cover <50 cm tall, and 5-10% is grass or shrub cover >50 cm tall; and small knolls and/or grassy hummocks are either clumped or widely scattered over the habitat. Landscape context: The occurrence is surrounded by an area of somewhat (≤50%) fragmented, native grassland and/or 50-75% of the habitat has been allowed to attain advanced stages of succession. Nonnative disturbance processes and/or predation are light to moderate.

DRANKSPECS
BREEDING EOs--Size: <10 birds across <500 ha. Condition: The occurrence has <50% likelihood of long-term viability, as evidenced by the presence of birds over <2 of 5-10 years. Small mammals (esp. microtines) have declined, or never were abundant over most of the habitat; <20% of habitat is grass and/or shrub cover <50 cm tall, and <5% is grass or shrub cover >50 cm tall; small knolls and/or grassy hummocks are uncommon. Landscape context: The occurrence is surrounded by an area of highly fragmented habitat (>50%), the habitat has been altered significantly through invasion of exotic grasses and plants and/or disruption of native processes over most of the habitat, and/or native/nonnative predators are unusually abundant.

Justification: Territory sizes in North America range from 20-126 ha (compiled in Holt and Leasure 1993); however, home ranges must include enough area for adequate foraging activity.

References and Literature Cited:

Clark, R.J. 1975. A field study of the Short-eared Owl, Asio flammeus (Pontoppidan) in North America. Wildlife Monographs 47:1-67.

Holt, D.W., and S.M. Leasure. 1993. Short-eared Owl (Asio flammeus). No. 62 in A. Poole and F. Gill (Editors). The Birds of North America. The Academy of Natural Science, Philadelphia, PA; and The American Ornithologists' Union, Washington, DC.

Larsen, J.C. 1987. Short-eared Owl breeding survey. Publication No. W-65-R-4, Nongame Wildlife, California Department of Fish and Game.

Lockie, J.D. 1955. The breeding habits and food of Short-eared Owls after a vole plague. Bird Study 2:53-67.

Mendelssohn, H., and U. Paz. 1977. Mass mortality of birds of prey caused by Azodrin, an organophosphorus insecticide. Biological Conservation 11:163-170.

Pitelka, F.A., P.Q. Tomich, and G.W. Treichel. 1955. Ecological relationships of jeagers and owls as lemming predators near Barrow, Alaska. Ecological Monographs 25:85-117.

Walk, J.W. 1998. Winter roost sites of Northern Harriers and Short-eared Owls on Illinois grasslands. Journal of Raptor Research 32:116-119.

Potential reviewers: Denver Holt at the Peregrine Fund in Boise, Idaho has agreed to review

LAGOPUS LEUCURUS

WHITE-TAILED PTARMIGAN

EOSPECS
There are two major EO classes: BREEDING and NONBREEDING. NOTE: Most work on life history of this species has been conducted in the lower 48 states, whereas the greatest portion of this species' range is in Canada and Alaska; thus, it is not clear how much the discussions below pertain to birds across their entire range.

BREEDING EOs include 3 sub-EOs, which may or may not overlap: breeding territories, brood-rearing areas (either on or off territory), and areas where unsuccessful adults or post-nesting and fledged birds concentrate. A breeding territory sub-EO is defined by the presence of $\geq$1 breeding pairs, as determined through direct evidence (territorial male accompanied by a female, active nest, eggs, or broods) in suitable breeding habitat during the breeding season. A brood-rearing sub-EO is defined by the presence of $\geq$1 female with an unfledged brood. A post-nesting concentration sub-EO is defined by the presence of $\geq$2 adults and/or fledged young in the post-nesting period (generally from July until fall). BREEDING EOs are considered distinct when separated by $\geq$1 km of unsuitable habitat, or $\geq$4 km of apparently suitable but unoccupied habitat. A NONBREEDING EO is defined by the presence of $\geq$2 birds over $\geq$2 winter months. NONBREEDING EOs are considered distinct when separated by $\geq$1 km of unsuitable habitat, or $\geq$7 km (in large willow basins) and 14 km (in linear willow riparian situations) of apparently suitable, but unoccupied, habitat.

Justification for BREEDING EO separations: Separation distances for occurrences of volant species are somewhat arbitrary, based primarily on largest home ranges and correspondingly manageable units of habitat or land area. For ptarmigan, home-range size in the breeding season has not been reported, although certain movement patterns have been studied to address dispersal and metapopulation issues (e.g., Giesen and Braun 1973, Martin et al. 2000). The largest breeding territory (preincubation) reported was 0.67 sq. km (although territories are typically smaller; Braun et al. 1993). Brood-rearing areas often occur within, or overlap, breeding territories; however, when females do move their broods off territory, banding data indicate that they are not likely to travel >3 km across contiguous alpine habitat (K.M. Giesen, pers. comm.). Post-nesting concentration areas are generally located somewhat upslope of breeding territories, sometimes adjacent, or in close proximity, to breeding territories; at other times birds will move longer distances and/or travel over unsuitable habitat. Assuming that ptarmigan inhabiting the alpine use roughly circular polygons of habitat, the diameters of the largest breeding territories (67.1 ha) are ~ 925 m, and 3 times that distance (the axes of two occupied territories separated by the axis of one unoccupied territory; Natural Heritage Program 1999--Draft EO Data Standard) would be nearly 3 km; however, to allow for home ranges that also include adjacent brood-rearing and concentration areas, the separation distance for defining separate occurrences of breeding EOs was increased to 4 km of apparently suitable but unoccupied habitat.

Justification for NONBREEDING occurrence separations: Sizes of wintering home ranges reported have been as high as 390 ha (minimum convex polygon; Giesen and Braun 1992) in the largest wintering area described (10 sq. km at Guanella Pass in Colorado). Assuming that ptarmigan overwintering in large willow basins use roughly circular polygons of winter habitat, the diameter of a 390-ha home range is ~ 2.2 km, and 3 times that distance (see explanation above) would be 6.6 km, thus 7 km was selected as the minimum separation distance between areas of apparently suitable but unoccupied habitat. In cases where ptarmigan overwinter in more linear riparian willow areas, that minimum separation distance may be much greater, thus the distance was doubled. This species typically flocks in winter, with most flocks consisting of 10 - 20 birds, rarely 200 - 300 (Braun and Schmidt 1971, Braun et al. 1976, Herzog 1980); reports of single birds in winter are uncommon (Herzog 1980).

Suitable BREEDING habitat consists of alpine areas at or above treeline, and occasionally just below treeline where the forest canopy is patchy and fairly open; elevational range depends on latitude, but ranges from a low of 1200 m in Alaska to a high of 4250 m in Colorado (compiled in Braun et al. 1993). Breeding territories are habitat mosaics or scattered rocks or rocky patches, coniferous krummholz, patches of low-growing deciduous shrubs (esp. Salix, occ. Alnus, Betula, Cassiope, and Phyllodoce spp.), alpine turf (including Poaceae, Carex spp.), and/or margins of snowfields/minor drainages (Choate 1963, Scott 1982, Herzog 1977, Frederick and Gutierrez 1992, Braun et al. 1993). Brood-rearing areas consist of moist, well-vegetated patches of alpine turf and/or the margins of snowfields/minor drainages; an abundance of flowering forbs and invertebrates are essential food sources; these areas may or may not occur on breeding territories. Concentration areas are typically upslope of breeding territories and consist of sedge (Carex spp.) meadows, clover (Trifolium spp.) fellfields, rock meadows vegetated with sedges and Geum spp., and/or margins of snowfields/minor drainages; flowering forbs (including those gone to seed) are important foods (compiled in Braun et al. 1993). In early breeding season, this ptarmigan forages primarily on willow buds, twigs, leaves, and, to varying extents, will continue feeding on willow throughout the remainder of the breeding season; in some regions, Alnus, Betula, Cassiope, or Phyllodoce spp. provide suitable forage (Choate 1963, Scott 1982, Herzog 1977, Braun et al. 1993); because these birds almost always feed from the ground, dwarf and prostrate forms of forage shrubs are essential; later in the breeding season, young broods forage heavily on invertebrates, and adults and older chicks forage heavily on flowers, fruits, seeds, and leaves of forbs, as well as invertebrates (compiled n Braun et al. 1993).

Suitable NONBREEDING habitat may be more limiting for ptarmigan than breeding habitat. Generally, nonbreeding habitat consists of shrub-dominated communities at or above treeline, subalpine drainage basins in close proximity to alpine areas, cirques, avalanche chutes, and areas around drainage headwaters; elevations range from a low of 50 m near Valdez, Alaska, to a high of 3650 m in Colorado (compiled in Braun et al. 1993). Dominant vegetation in winter habitat of most regions is willow (tall enough to remain emergent above the snow through winter); the birds will also inhabit communities dominated or co-dominated by Alnus or Betula spp. (Braun et al. 1976). Males and females tend to segregate and use somewhat different winter habitats; males typically winter on, or adjacent to, their breeding territories (depending on winter conditions), which should be encompassed by breeding EOs. Both males and females roost in deep, soft snow--particularly during inclement weather—and they feed almost exclusively on the buds and twig tips of willows that remain emergent above the snow (i.e., wind-swept areas at/above treeline or subalpine drainage basins vegetated with tall willows that remain above the snow); thus, snow depth/quality and wind action affect the winter movements of ptarmigan--they may fly back and forth between alpine and subalpine habitats to seek suitable feeding and roosting areas. Generally, nonbreeding areas are used from late fall, as winter storms become severe, until early to mid spring when they move back to breeding territories (Braun et al. 1976).

A recent and ongoing study by (Larison 2000) has revealed high levels of cadmium poisoning in ptarmigan that overwinter in mining regions, especially central and southern Colorado. The birds come in contact with cadmium as they forage in willows in drainage areas where soil levels of cadmium are high. The cadmium poisoning causes kidney damage, brittle bones, declines in egg production, and death. Thus, ideal nonbreeding EOs would exclude any areas affected by cadmium.

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ARANKSPECS
BREEDING EOs--Size: A mean density of >6 birds/sq. km across >2 sq. km (based on available EOR or Colorado Division of Wildlife data). Condition: The occurrence has an excellent likelihood of long-term viability, as evidenced by successful reproduction, persistent territories defended by older males (>yearling) accompanied by older females, and recruitment over ≥2 breeding seasons. This occurrence should consist of contiguous, high-quality habitat undamaged by intensive grazing or browsing by livestock (esp. sheep) or wild ungulates (esp. elk). Landscape context: This occurrence is largely surrounded by alpine/subalpine habitat unfragmented (<1%) by anthropogenic factors (roads, mining operations) and only minimally fragmented (<10 km) by unsuitable habitat that would impede dispersals of males.

NONBREEDING Eos--Size: >50 birds across >5 sq. km (based on available EOR or Colorado Division of Wildlife data). Condition: The occurrence has an excellent likelihood of long-term viability, as evidenced by the persistence of flocks during >2 winter months over ≥2 winters. This occurrence should be in a high-quality site with little or no evidence of human activities (e.g., snowmobiling, skiing, mining/holding ponds), little or no browsing of shrubs by livestock or wild ungulates, and willows should be unexposed to cadmium. Landscape context: This occurrence is largely surrounded by alpine/subalpine and upper montane riparian habitats unfragmented (<1%) by anthropogenic factors (roads, reservoirs, snowmobile or ski areas, mining operations) and only minimally fragmented (<10 km) by heavily forested areas and other unsuitable habitats that would impede movements within winters or between years.

BREEDING and NONBREEDING EOs are located ≤10 km apart.

Justification for EO ranks: The largest contiguous area of suitable breeding habitat (containing all 3 sub-EOs) reported in Colorado is >13 sq. km (Braun and Rogers 1971, Martin et al. 2000); however, most suitable areas consist of <5 sq. km. Breeding season densities range from 2.0 - 13.5 birds/sq. km (compiled in Braun et al. 1993, Martin et al. 2000), although typical densities are 3 - 5 birds/sq. km. Surviving males typically return to their established territories each breeding season, and successful females often pair with the same males in sequential breeding seasons. The largest contiguous area of suitable winter habitat (10 sq. km) reported in the literature is estimated to support up to 200 - 300 wintering birds (Braun and Schmidt 1971, Braun et al. 1976, Giesen and Braun 1992). Numerical values for minimum areas and densities across EO ranks were selected to represent the range of occupied areas and densities reported in the literature. Because populations of northern grouse tend to be cyclic (Bergerud and Gratson 1988), and because breeding densities of ptarmigan can be temporarily reduced through over harvesting (Braun et al. 1993) and livestock grazing (sheep) and overbrowsing of willows by wild ungulates (Melcher 1992), density estimates should be based on at least 2 years of survey data.

Ptarmigan habitat is typically highly fragmented, thus proximity of breeding to nonbreeding EOs was considered in EO ranks because the birds (esp. males and juveniles) may be limited (either behaviorally and/or physiologically) by distances of >30 - 60 km. Evidence for this includes: 1) dispersal distances and migration movements rarely exceed 30 km; 2) prior to introductions of ptarmigan in 1975, no ptarmigan inhabited Pike's Peak, ~60 km from the nearest alpine areas occupied by ptarmigan; 3) females, which disperse longer distances than males, typically remain within 10 - 20 km of their natal sites; and 4) juvenile birds may winter in closer proximity to natal sites than adults (Hoffman and Braun 1975, Hoffman and Giesen 1983, Giesen and Braun 1993, Martin et al. 2000); thus, the birds appear to reach a limit on movement/dispersal between 30-60 km. NOTE: Current data on ptarmigan movements are limited by the relative inaccessibility of most alpine areas and may not capture the full range of their movement/dispersal capabilities; however, the bell-curve distribution of existing movement/dispersal data (K.M. Giesen, pers. comm.) suggests that we have an adequate representation of the species' typical movements--at least within the studied portions of its range.

BRANKSPECS
BREEDING Eos--Size: A mean density of ≥4 birds/sq. km across >1.5 sq. km (based on available EOR or Colorado Division of Wildlife data). Condition: The occurrence has a good likelihood of long-term viability, as evidenced by successful reproduction, persistent territories defended by older males (>yearling) accompanied by older females, and recruitment over ≥2 breeding seasons. It should consist of contiguous, high-quality habitat only minimally grazed or browsed by livestock or wild ungulates. Landscape context: This occurrence is largely surrounded by alpine/subalpine habitat only minimally fragmented (<10%) by anthropogenic factors (roads, mining operations) and only partially fragmented (10-15 km) by unsuitable habitat.

NONBREEDING EOs--Size: >25 birds for >2 winter months across >2.5 sq. km (based on available EOR or Colorado Division of Wildlife data). Condition: The occurrence has an good likelihood of long-term viability, as evidenced by the persistence of flocks over ≥2 winters. This occurrence should be in a high-quality site with only minimal human activities (e.g., snowmobiling, skiing, mining/holding ponds), little browsing of shrubs by livestock or wild ungluates, and willows should be unexposed to cadmium. Landscape context: This occurrence is largely surrounded by alpine/subalpine and upper montane riparian habitats unfragmented (<10%) by anthropogenic factors (roads, reservoirs, snowmobile or ski areas, mining operations) and only minimally fragmented (10-15 km) by unsuitable habitats.

BREEDING and NONBREEDING EOs are located ≤15 km apart.

CRANKSPECS
BREEDING EOs--Size: A mean density of ≥2.5 birds/sq. km across ≥1 sq. km (based on available EOR or Colorado Division of Wildlife data). Condition: This occurrence is less viable than A- or B-ranked occurrences, although persistence is likely due to recruitment from high-quality areas. The habitat may be somewhat degraded by activities of humans and/or grazing/browsing by livestock/wild ungulates. The habitat may be unoccupied some years due to stochastic events and/or limited recruitment. Landscape context: The occurrence may be somewhat isolated from other occurrences by large expanses (15-25 km) of unsuitable habitat, and/or it may be highly fragmented (10-50%) by human activities; however, most ecological processes remain intact.

NONBREEDING EOs--Size: >10 birds across ≥1 sq. km (based on available EOR or Colorado Division of Wildlife data). Condition: This occurrence is less viable than A- or B-ranked occurrences, although persistence is likely if adequate supplies of winter forage persist. The habitat may be somewhat degraded by activities of humans and/or grazing/browsing by livestock or wild ungulates; the habitat may be unoccupied some years, or occupied less than 2 winter months if winter forage does not remain emergent above the snow and/or if significant crusting-over of snow occurs in roosting areas. Landscape context: The occurrence may be somewhat isolated from other occurrences by large expanses (15-25 km) of unsuitable habitat, and/or it may be highly fragmented (10-50%) by human activities; however, most ecological processes remain intact.

BREEDING and NONBREEDING EOs are located ≤25 km apart.

DRANKSPECS
BREEDING EOs--Size: A mean density of <2.5 birds/sq. km across <1 sq. km (based on available EOR or Colorado Division of Wildlife data). Condition: Little or no evidence of successful reproduction observed (unpaired males, broodless females), lack of persistent territories (indicating poor survival or males) and/or territories defended only by yearling males, poor recruitment. Habitat may be highly degraded by human activities or chronic concentrations of livestock/wild ungulates. Landscape context: The area is surrounded by large expanses (<25 km) of unsuitable habitat and/or landscapes altered (.50%) by human activities, and ecological processes (e.g., regeneration of alpine turf) are impaired.

NONBREEDING Eos--Size: 1-10 birds across <1 sq. km (based on available EOR or Colorado Division of Wildlife data). Condition: This occurrence is unlikely to persist; or the habitat may be occupied only some winters and/or for <1 winter month. Winter forage supplies may be significantly reduced by grazing/browsing livestock/wild ungulates, and/or local winter conditions typically bury the forage and/or harden the snow. Landscape context: The occurrence may be significantly isolated from other occurrences by large expanses (>25 km) of unsuitable habitat, and/or ecological processes are significantly impaired by human activities.

BREEDING and NONBREEDING EOs are located >25 km apart.

Justification: Breeding densities of <2 birds/ sq. km have not been reported. Wintering flocks of <2 birds are rare, most likely because more birds flock to the most suitable habitat (K.M. Giesen, pers. comm.).

References and Literature Cited:

Bergerud, A.T., and M.W. Gratson (Editors). 1988. Adaptive Strategies and Population Ecology of Northern Grouse. University of Minnesota Press, Minneapolis, MN.

Braun, C.E., and G.E. Rogers. 1971. The White-tailed Ptarmigan in Colorado. Technical Publication No. 27. Colorado Division of Game, Fish and Parks, Denver, CO.

Braun, C.E., and R.K. Schmidt, Jr. 1971. Effects of snow and wind on wintering populations of White-tailed Ptarmigan in Colorado. Pp. 238-250 in A.O. Haugen (Editor). Proceedings of the Snow and Ice Symposium, Iowa State University, Ames.

Braun, C.E., R.W. Hoffman, and G.E. Rogers. 1976. Wintering areas and winter ecology of White-tailed Ptarmigan in Colorado. Special Report No. 38. Colorado Division of Wildlife, Denver, CO.

Braun, C.E., K. Martin, and L.A. Robb. 1993. White-tailed Ptarmigan (Lagopus leucurus). No. 66 in A. Poole and F. Gill (Editors). The Birds of North America. The Academy of Natural Sciences, Philadelphia, PA; The American Ornithologists' Union, Washington, DC.

Choate, T.S. 1963. Habitat and population dynamics of White-tailed Ptarmigan in Montana. Journal of Wildlife Management 27:684-699.

Frederick, G.P., and R.J. Gutierrez. 1992. Habitat use and population characteristics of White-tailed Ptarmigan in the Sierra Nevada, California. Condor 94:889-902.

Giesen, K.M., and C.E. Braun. 1992. Winter home range and habitat characteristics of White-tailed Ptarmigan in Colorado. Wilson Bulletin 104:263-272.

Giesen, K.M., and C.E. Braun. 1993. Dispersal of White-tailed Ptarmigan in Colorado. Journal of Wildlife Management 57:72-77.

Hoffman, R.W., and K.M. Giesen. 1983. Demography of an introduced population of White-tailed Ptarmigan. Canadian Journal of Zoology 61:1758-1764.

Herzog, P.W. 1977. Summer habitat use by White-tailed Ptarmigan in southwestern Alberta. Canadian Field-Naturalist 91:367-371.

Herzog, P.W. 1980. Winter habitat use by White-tailed Ptarmigan in southwestern Alberta. Canadian Field-Naturalist 94:159-162.

Martin, K., P.B. Stacey, and C.E. Braun. 2000. Recruitment, dispersal, and demographic rescue in spatially-structured White-tailed Ptarmigan populations. Condor 102:503-516.

Melcher, C.P. 1992. Avifauna responses to intensive browsing by elk in Rocky Mountain National Park. M.S. thesis, Colorado State University, Fort Collins, CO.

Natural Heritage Program. 1999. Draft Element Occurrence Data Standard. Available on-line at: http://whiteoak.tnc.org/eodraft/index.htm.

Scott, M.D. 1982. Distribution and habitat use of White-tailed Ptarmigan in Montana. Proceedings of the Montana Academy of Science 41:57-66.

Being reviewed by Kathi Martin and Ken Giesen

AMPHISPIZA BELLI

SAGE SPARROW

EOSPECS
There are two major EO classes: BREEDING and NONBREEDING. However, 3 of the 5 subspp. (A.b. belli, A.b. clementeae, and A.b. cinerea) are NONMIGRATORY (Martin and Carlson 1998), although A.b. belli will move down slope in winter in the northern portion of its range. Also, A.b. clementeae (San Clemente Island subsp.) is federally threatened and endangered in California; thus additional notes and specifications have been provided for this subspecies.

A BREEDING EO is defined by the presence of one or more breeding pairs, as determined through direct (active nest, eggs, broods) or indirect (adult carrying nesting material, food, or fecal sacs) evidence in suitable breeding habitat. Breeding EOs are considered distinct when separated by $\geq$1 km of unsuitable, or apparently suitable but unoccupied, habitat.

Justification for EO separations: Separation distances for occurrences of volant species are somewhat arbitrary, based primarily on largest home-range size and correspondingly manageable units of habitat or land area. For Sage Sparrows, breeding home ranges, per se, have not been well-studied, although Martin and Carlson (1998) report fall-to-spring movements of no more than 900 m among young A.b. belli (nonmigratory). Territory sizes (compiled in Carlson and Martin 1998) range from 0.65 - 7.06 ha; both males and females appear to use their territories almost exclusively for all activities in the breeding season (Green 1981 from Martin and Carlson 1998; T.D. Rich, pers. comm.); thus, territory size is a reasonable alternative for estimating breeding home range. Assuming that birds inhabiting shrublands use roughly circular polygons of habitat, the diameters of the largest territories (7.06 ha) would be ~300 m, and 3 times that distance (the axes of two occupied home ranges separated by the axis of one unoccupied territory; Natural Heritage Program 1999--Draft EO Data Standard) would be 900 m, similar to interseasonal movements among nonmigratory Sage Sparrows reported by Martin and Carlson (1998). Therefore, the default minimum of 1 km between EOs (ibid) was selected.

Suitable BREEDING habitat varies among subspecies, but generally extensive, unfragmented tracts of open to semi-open shrublands (<2000 m elevation) are selected (Knick and Rotenberry 1995, Martin and Carlson 1998, Vander Haegen et al. 2000, T.D. Rich, pers. comm.). Type varies from maritime desert scrub (for A.b. clementeae) and coastal sage scrub to dry chaparral, interior desert scrub, and interior sage shrublands (compiled in Martin and Carlson 1998). Nesting Sage Sparrows associate most often with big sagebrush (Artemisia tridentata), but also with saltbush (Atriplex spp.), bitterbrush (Purshia tridentata), shadscale (Atriplex contertifolia), rabbitbrush (Chrysothamnus spp.), greasewood (Sarcobatus vermiculatus), chamisa (Adenostoma fasciculatum), and creosote (Larrea tridentata) (Rich 1978, Wiens and Rotenberry 1981, Smith et al. 1984, Martin and Carlson 1998); A.b. clementeae nests in boxthorn (Lycium californicum; Willey 1996). The birds nest in shrubs that are >50% live (Peterson and Best 1985, Willey 1996). Average height of most nesting shrubs ranges from 66 - 69 cm (Petersen and Best 1985; Reynolds 1981; Rich 1980; Martin and Carlson 1998); A.b. clementeae nests in shrubs averaging 43 cm in height (range 30 - 52 cm). Interior birds prefer to nest in A.t. wyomingensis, and do not appear to nest in low-stature sages (e.g., A. arbuscula, A. nova) or A. tripartita (T.D. Rich, pers. comm.).

In all cases, habitat structure and shrub distribution/density may be more important than shrub species, per se. Knick and Rotenberry (1995) detected a positive correlation between probability of occupancy and percent sage cover/patch size; however, tall, dense stands (e.g., due to fire suppression) may be unsuitable (Burridge 1995). Bare ground between shrubs or clumps of shrubs provides essential foraging areas (Wiens and Rotenberry 1979, Martin and Carlson 1998), although percent bare ground required is not known (T.D. Rich, pers. comm.). High-severity fires promoted by decades of fire suppression and invasion of exotic annual grasses (esp. cheatgrass [Bromus tectorum]) are causing significant declines in shrubsteppe habitats; moreover, annual grasses often replace sagelands entirely after severe burns; Wiens (1985) and Rogers et al. (1988) reported abandonment by sage sparrows when habitats were invaded by exotic grasses, especially cheatgrass.

Zeiner et al. (1990 from U.S.D.A. Forest Service 1994) suggest that Sage Sparrows may need water or succulent plants for survival; however, their data resulted from a captive-bird study; more information is needed to determine water needs among wild populations. Rotenberry and Wiens (1989) indicated that productivity declined when populations of Townsend's ground squirrels (Spermophilus townsendi) were high; in Colorado, high populations of ground squirrels also depress productivity of Sage Grouse (Centrocercus urophasianus [K.M. Giesen, pers. comm.]. Whether or not water sources and/or ground squirrels limit occupancy/persistence of Sage Sparrows, apparently suitable habitat is frequently unoccupied, indicating the possibility of important habitat characteristics not yet recognized (Rich 1978).

NONBREEDING EOs and separations are not defined due to lack of information on winter home ranges. Nonmigratory subspp., however, are fairly social in the nonbreeding season, and may occur in pairs to small flocks (~10 birds) (Martin and Carlson 1998; J.C. Lovio, pers. comm.); A.b. belli have remained within 900 m of natal sites between fledging and the subsequent spring (Martin and Carlson 1998).

Suitable NONBREEDING habitat in northern portions of A.b. nevadensis= range is dominated by big sagebrush; in southern portions this subspecies also inhabits desert scrub composed of creosote, sparse cacti (esp. Opuntia spp.), and/or tall yucca (Yucca spp.) and greasewood; elsewhere A. belli inhabits maritime, coastal-desert, sage scrub, desert washes, and arid grasslands (compiled in Martin and Carlson 1998). Along the lower Colorado River, migrants concentrate (up to 46.5 individuals/40 ha) in honey mesquite (Prosopis glandulosa) woodlands with high densities of inkweed (Suaeda torreqana), but not in similar woodlands without inkweed (2.8 individuals/40 ha) (Meents et al. 1982).

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ARANKSPECS
BREEDING EOs--Size: A mean density of >50 pairs/100 ha across >2500 ha (for interior/migratory subspp.) or >30 pairs/100 ha across $\geq$280 ha (for interior/ migratory subspp.). Condition: The occurrence has an excellent likelihood of long-term viability, as evidenced by the presence of breeding pairs over $\geq$2 years. The habitat is high-quality and includes 10-60% shrub cover distributed in relatively large patches across habitat; a mean shrub height of 43-100 cm; little evidence of ground squirrels (interior subspp.) or feral goats or pigs (San Clemente Island subspp.); and <1% cover of cheatgrass or other exotic grasses. Landscape context: The occurrence is surrounded by an area where relatively native disturbance processes (e.g., low-intensity browsing/grazing, low-severity fire) still occur.

Justification for interior/migratory subspp.: These birds respond strongly to landscape-scale variables; generally, they occur only in extensive, unfragmented shrubsteppe (Knick and Rotenberry 1995; Vander Haegen 2000; T.D. Rich, pers. comm.). While specifics regarding patch size remain somewhat unquantified, Vander Haegen et al. (2000) concluded that occurrence of A.b. nevadensis in eastern Washington was significantly related to percent cover of shrubsteppe within 5-km radius, indicating a negative response to fragmentation (Vander Haegen at al. 2000); Vander Haegen suggests a minimum 2500 ha for A-ranked occurrences (Vander Haegen, pers. comm.). Reported breeding densities range from 14 - 154 territorial males/100 ha (compiled in Carlson and Martin 1998); however, larger territories (i.e., lower densities) correlate with more fledglings per pair (Petersen and Best 1987); Vander Haegen (Vander Haegen, pers. comm.) suggested a minimum density of 50 territorial males/100 ha for all rank-types for interior/migratory subspecies. Persistence of individual males or territories over >2 years is a strong indicator of successful nesting (Martin and Carlson 1998). Heights of nest shrubs ranged from 50-100 cm (compiled in Martin and Carlson 1998).

Justification for sedentary subspp.: It remains unclear how critical patch size is for nonmigratory subspecies, although Lovio (J.C. Lovio, pers. comm.) Has not observed subspecies of the nonmigratory birds occupying patches <150 ha; thus, the minimum study area (350 m x 8 km or 280 ha) described by Willey (1996) on San Clementeae Island was selected to capture at least that area for this threatened subspp.; mean densities of A.b. clementeae were ~32 pairs/100 ha (Willey 1990). Introductions of goats and pigs originally caused the declines of A.b. clementeae (Everatt et al. 1994 from Martin and Carlson 1998).

BRANKSPECS
BREEDING EOs--Size: A mean density of ≥50 pairs/100 ha across >1000 but ≤2500 ha (for interior/migratory subspp.) and ≥ 30 pairs/100 ha across >200 but <280 ha (for interior/migratory subspp.). Condition: The occurrence has a good likelihood of long-term viability, as evidenced by the presence of breeding pairs over ≥2 years. The high-quality habitat includes 10-60% shrub cover distributed in relatively large patches across habitat; a mean shrub height of 43-100 cm; little evidence of ground squirrels; and <10% cover of cheatgrass or other exotic grasses. Landscape context: The occurrence is surrounded by an area where relatively native disturbance processes (e.g., low-intensity browsing/grazing, low-severity fire) still occur or have been restored.

CRANKSPECS
BREEDING Eos--Size: A mean density of <50 pairs/100 ha across ≥ 150 but <1000 ha (for interior/migratory subspp.) or >14 but <30 pairs/100 ha across <200 ha (for interior/migratory subspp.). Condition: The occurrence has a >50% likelihood of long-term viability, as evidenced by the presence of breeding pairs in 2/3 years. The habitat may have had shrub cover reduced to <10%; densities of ground squirrels may be high in 2/3 years; and/or ground cover may be up to 50% cheatgrass or other exotic grasses. Landscape context: The occurrence is surrounded by an area where disturbance processes include a light to moderate amount of non-native activities (e.g., clearing vegetation for, or by, livestock; shrub-killing via fire or chemical treatments), and/or where the habitat has become somewhat fragmented (up to 50%).

DRANKSPECS
BREEDING EOs--Size: A mean density of <14 pairs/100 ha across <150 ha (any subspecies). Condition: The occurrence has a <50% likelihood of long-term viability, as evidenced by the presence of breeding pairs in 1/3 years or less. The habitat is degraded and may have <10% shrub cover, the cover of cheatgrass or other exotics may be ≥50%, and/or densities of ground squirrels may be chronically high. Landscape context: The occurrence is surrounded by an area

where disturbance processes are impaired, there is a significant amount of non-native activity (e.g., clearing vegetation for, or by, livestock; shrub-killing via fire or chemical treatments), and/or the habitat is highly fragmented (>50%).

Justification: Reports of Sage Sparrows indicate that patches of <1000 ha are not likely to allow Sage Sparrows (interior/migratory subspecies) to persist (Vander Haegen, pers. comm.); Lovio (J.C. Lovio, pers. comm.) has not observed coastal/nonmigratory subspecies in patches <150 ha; there are no reports of any Sage Sparrows inhabiting patches <20 ha. Densities of <14 pairs/100 ha not reported (compiled in Carlson and Martin 1998; T. Rich, pers. comm.) (although it is not clear whether these thresholds pertain to A.b. clementeae).

References and Literature Cited:

Burridge, B. 1995. Sonoma County Breeding Bird Atlas: Detailed Maps and Accounts for Our Nesting Birds. Madrone Audubon Society, Santa Rosa, CA.

Everatt, W.T., J.R. Gustafson, C.E. Koehler, and J. Larson. 1994. San Clemete Sage Sparrow. Pp. 220-221 in Life on the Edge. Biosystems Books, Santa Cruz, CA.

Green, B.H. 1981. Habitat selection and utilization by Sage Sparrows (Amphispiza belli) in a cold northern desert mixed shrub community. M.S. thesis, Brigham Young University, Provo, UT.

Knick, S.T., and J.T. Rotenberry. 1995. Landscape characteristics of fragmented shrubsteppe habitats and breeding passerine birds. Conservation Biology 9:1059-1071.

Lovio, J.C. 1995. Diegan coastal sage scrub I. Breeding bird census. Journal of Field Ornithology 66:103.

Martin, J.W., and B.A. Carlson. 1998. Sage Sparrow (Amphispiza belli). No. 326 in A. Poole and F. Gill (Editors).The Birds of North America. The Birds of North America, Inc., Philadelphia, PA.

Meents, J.K., B.W. Anderson, and R.D. Ohmart. 1982. Vegetation relationships and food of Sage Sparrows wintering in honey mesquite habitat. Wilson Bulletin 94:129-138.

Natural Heritage Program. 1999. Draft Element Occurrence Data Standard. Available on-line at: http://whiteoak.tnc.org/eodraft/index.htm.

Petersen, K.L., and L.B. Best. 1985. Nest-site selection by Sage Sparrows. Condor 87:217-221.

Petersen, K.L., and L.B. Best. 1987. Territory dynamics in a Sage Sparrow population: are shifts in site use adaptive? Behavioral Ecology and Sociobiology 21:351-358.

Reynolds, T.D. 1981. Nesting of the Sage Thrasher, Sage Sparrow, and Brewer's Sparrow in southeastern Idaho. Condor 83:61-64.

Rich, T.D.G. 1978. Cowbird parasitism of Sage and Brewer's sparrows. Condor 80:348.

Rich, T.D.G. 1980. Territorial behavior of the Sage Sparrow: spatial and random aspects. Wilson Bulletin 92:425-438.

Rogers, L.E., R.E. Fitzner, L.L. Calwell, and B.E. Vaughn. 1988. Terrestrial animal habitats and population responses. Pp. 181-256 in W.H. Rickard, L.E. Rogers, B.E. Vaughn, and S.F. Liebetrau, editors. Shrubsteppe: Balance and Change in a Semiarid Terrestrial Ecosystem, Elsevier, Amsterdam.

Rotenberry, J.T., and J.A. Wiens. 1980. Habitat structure, patchiness, and avian communities in North American steppe vegetation: a multivariate analysis. Ecology 61:1228-1250.

Rotenberry, J.T., and J.A. Wiens. 1989. Reproductive biology of shrubsteppe passerine birds: geographical and temporal variation in clutch size, brood size, and fledging success. Condor 91:1-14.

Rotenberry, J.T., and J.A. Wiens. 1999. Multiscale habitat associations of the Sage Sparrow: implications for conservation biology. Studies in Avian Biology 19:95-103.

Smith, G.W., N.C. Nydegger, and D.L. Yensen. 1984. Passerine bird densities in shrubsteppe vegetation. Journal of Field Ornithology 55:261-264.

U.S.D.A. Forest Service. 1994. Neotropical Migratory Bird Reference Book. Fisheries, Wildlife, and Rare Plants section, Pacific Southwest Region, U.S. Dept. Agriculture Forest Service, Sacramento, CA.

Vander Haegen, M.W., F.C. Dobler, and D.J. Pierce. 2000. Shrubsteppe bird response to habitat and landscape variable in eastern Washington, U.S.A. Conservation Biology 14:1145-1160.

Wiens, J.A., and J.T. Rotenberry. 1979. Diet niche relationships among North American grassland and shrubsteppe birds. Oecologia 42:253-292.

Wiens, J.A., and J.T. Rotenberry. 1981. Habitat associations and community structure of birds in shrubsteppe environments. Ecological Monographs 51:21-41.

Wiens, J.A., and J.T. Rotenberry. 1985. Response of breeding passerine birds to rangeland alteration in a North American shrub-steppe. Journal of Applied Ecology 22:655-668.

Wiens, J.A., J.T. Rotenberry, and B. Van Horne. 1985. Territory size variation in shrubsteppe birds. Auk 102:500-505.

Wiens, J.A., J.T. Rotenberry, and B. Van Horne. 1986. A lesson in the limitations of field experiments: shrubsteppe birds and habitat alteration. Ecology 67:365-376.

Wiens, J.A., B. Van Horne, and J.T. Rotenberry. 1987. Temporal and spatial variations in the behavior of shrubsteppe birds. Oecologia 73:60-70.

Willey, D.W. 1990. Nesting success of San Clemente Sage Sparrow. Southwestern Naturalist 35:28-31.

Willey, D.W. 1996. Characteristics of nesting areas used by San Clemente Island Sage Sparrows. Condor 99:217-219.

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EMPIDONAX TRAILLII EXTIMUS

SOUTHWESTERN WILLOW FLYCATCHER

EOSPECS
There are two major EO classes: BREEDING and NONBREEDING.

A BREEDING EO is defined by the presence of one or more breeding pairs, as determined through direct (active nest, eggs, broods) or indirect (, adult carrying nesting material, food, or fecal sacs) evidence in suitable breeding habitat. Because this species is so critically endangered, and because observers are highly unlikely to find a nest (they nest in extremely dense and sometimes thorny vegetation and often over water), it is important not to exclude POTENTIAL breeders; thus, a breeding EO may also be defined by breeding behavior of an adult bird and/or the presence of adult birds during the short nonbreeding period from ~June 20-July 20. Breeding EOs are considered distinct when separated by 1 km of unsuitable, or apparently suitable but unoccupied, habitat.

Justification for occurrence separations: Separation distances for occurrences of volant species are somewhat arbitrary, based primarily on largest home-range size and correspondingly manageable units of habitat or land area. For Southwestern Willow Flycatchers, breeding home ranges, per se, have not been reported; Sogge (2000) reports breeding-territory sizes of 0.14 - 2.3 ha, but it remains unclear whether territories and home ranges are analogous for this subspecies; Prescott and Middleton (1988) indicate that the birds defend territories larger than necessary to diminish sudden declines in food resources and to minimize competition--an indication that the birds may not range much beyond their breeding territories to secure resources; if territories and home ranges are similar, or analogous, for Southwestern Willow Flycatchers, then territory size is a reasonable basis for estimating home range. Assuming that birds inhabiting shrublands use roughly circular polygons of habitat, the diameters of home ranges vary from 42 - 171, and 3 times those distances (the axes of two occupied territories separated by the axis of one unoccupied territory; Natural Heritage Program 1999--Draft EO Data Standard) would be ~127 - 514 m. Therefore, the default minimum separation distance of 1 km between EOs (ibid) was selected.

Suitable BREEDING habitat consists of : "dense riparian vegetation near surface water or saturated soil. Other habitat characteristics such as plant species composition, size or shape of habitat patch, canopy structure, vegetation height, etc. vary widely among sites..." (Sogge and Marshall 2000). Habitats are described in terms of low- to mid-elevation sites and high-elevation sites (over 2600 m), and in terms of whether they are dominated by native, non-native, or mixed native/non-native vegetation (Sogge and Marshall 2000). The birds inhabit low-elevation canyon bottoms and broad valleys, around lakes or ponds, and occasionally in moist foothill locations (up to ~2600 m; Sogge and Marshall 2000) of the arid southwest, from southern portions of California, Nevada, and Utah south through Arizona, New Mexico (west of the Rio Grande), and extreme northern Mexico (Sogge 2000); a recent genetic analysis indicates that the subspecies also occurs in Colorado in Alamosa (at Alamosa NWR/McIntire Springs) and Conejos counties (along the Conejos River) (Paxton 2000). The most common dominant vegetation types are willow (Salix spp.; both tree and shrub forms), tamarisk (Tamarix ramosissima), box elder (Acer negundo: in New Mexico), and Russian Olive (Elaeagnus angustifolia). In rare cases, sites may be dominated by Arizona sycamore (Plantanus wrightii), ash (Fraxinus spp.), alder (Alnus spp.), buttonbush (Cephalanthus occidentalis), and seep willow (Baccharis glutinosa). Average canopy height varies from 4-30 m, depending on elevation and dominant species present (location-specific details described in Sogge 2000), foliage and/or twig density is usually high in the lower strata of vegetation, and in most cases foliage density is high in at least a portion of the overall canopy; linear patches of habitat <10 m wide are not known to be occupied. Most birds establish territories that include, or are within ~35 m of, water or saturated soils, although field workers should keep in mind that this will vary between seasons and years (Sogge 2000).

A NONBREEDING EO is defined by the presence of one or more birds in suitable migration habitat (particularly riparian areas, but also wooded or shrubby habitats, and even suburban backyards) during migration (typically late April through mid June, and late July through September), or in suitable wintering habitat (which occurs only outside the U.S.; see Koronkiewicz et al. 1998 for details) for >1 month during the winter. Nonbreeding EOs are considered distinct when separated by 1 km of unsuitable, or apparently suitable but unoccupied, habitat.

Justification for occurrence separations: Based on a study conducted in Panama, Willow Flycatchers defend winter foraging areas, which are somewhat smaller in size (one estimate = 0.11 ha) than breeding territories (Gorski 1969); whether this is typical for all subspecies, or whether their winter territories are similar, or analogous, to their home range remains unknown. In the absence of further information, it is assumed that winter home ranges are ≥0.11 ha. If wintering birds inhabit roughly circular polygons of habitat, the diameters of their home ranges would be ≥0.04 km, and 3 times that distance would be ~.12 km. Therefore, the default minimum separation distance of 1 km between EOs was selected.

Nonbreeding habitats are poorly understood and need more study, particularly in terms of which subspecies use which habitats (Finch et al. 2000). However, details of some areas may be found in Paradzick et al. 1998). A range of NONBREEDING habitats are described for the species overall; in general, suitable nonbreeding habitat consists of: brushlands, shrubby openings, and thickets in humid regions to arid scrublands <2500 m; also uses second-growth on river islands and embankments, along forest edges, and in overgrown pastures; may or may not winter near water (compiled in Sedgwick 2000). Again, standing water or saturated soils may be an important habitat component (Finch et al. 2000). Sogge (pers. comm.) reports observing the birds in Costa Rican lowland tropical forests where some cattle grazing may be providing/ maintaining some of the important habitat components at those Most birds found wintering at sites from Panama to El Salvador do not use true riparian habitats, but occur around lagunas, seeps, estaros, etc. where the natural wetland dynamics are related to rainy/dry seasons.

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ARANKSPECS
BREEDING EOs--Size: A mean density of ≥50 pairs or ≥100 adults across ≥60 ha or a cluster of several smaller patches occupied at similar densities. Condition: The occurrence has an excellent likelihood of long-term viability, as evidenced by the presence of adults in breeding season over ≥2 breeding seasons. The high-quality habitat is characterized by: one or more vegetation layers with a high volume of live foliage; little or no evidence of cowbird parasitism, or parasitism does not result in >20% parasitism rate, and/or cowbird numbers are minimized through an active cowbird-removal program; no treatments that would diminish foliage volume; and the presence of nearby water and/or saturated soils. Landscape context: Relatively native disturbance processes (e.g., little or no browsing/grazing, little to no channelization/dewatering, natural riparian processes intact) still occur or have been restored.

Justification: Several small patches can be as productive as one large patch, and a somewhat loose cluster of smaller patches that comprise ≥60 ha over a larger area could protect the smaller groups from catastrophic events (M Sogge, pers. comm.). Cowbird parasitism and habitat loss (due to cattle grazing, urbanization, channelization and dewatering) are suspected of being the primary causes of precipitous declines among western subspecies (compiled in Sedgwick 2000). The total number of E.t. extimus is estimated at <1000 individuals (U.S.D.I. Fish and Wildlife Service 1997). In 1999, the largest-known population was 243 pairs along the Gila River in southwestern New Mexico (J.A. Sedgwick 2000 from pers. comm. with S. Stoleson and D. Finch); the A-rank specifications were designed to capture at least this population. At least one report indicates that the birds will not nest in the absence of surface water (Johnson et al. 1999), but in some areas the birds will readily nest where soils are moist or even dry during some years and/or parts of the summer (Paradzick et al. 2000, Sogge 2000). Cowbird trapping has been shown to permit increased nest success in southern California (Whitfield et al. 1999), although additional recruitment has not resulted (habitat degradation or regional cowbird populations may limit local increases in population).

NONBREEDING EOs--Size: ≥20 birds across ≥60 ha or a cluster of several smaller patches occupied at similar densities. Condition: The occurrence has an excellent likelihood of long-term viability, as evidenced by the presence of adults for ≥1 month during the nonbreeding season over ≥2 winters or migrations. The high-quality habitat includes one or more vegetation layers characterized by high volume of live foliage, and the presence of saturated soils or emergent wetlands. Light cattle grazing may help maintain habitat. Landscape context: Relatively native disturbance processes (natural wetland dynamics intact) still occur or have been restored.

Justification: Several small patches can be as productive as one large patch, and a somewhat loose cluster of smaller patches that comprise ≥60 ha over a larger area could protect the smaller groups from catastrophic events (M Sogge, pers. comm.). There is little information available from nonbreeding sites. EO rank specifications were set somewhat arbitrarily to capture any moderate-sized populations of wintering birds in reasonably good habitat. Although winter territories/home ranges may be smaller than those on the breeding grounds, this information is based on only one study in one portion of the winter range (subspecies not known) (Gorski 1969). Therefore, minimum NONBREEDING habitat areas were set at values similar to those set for BREEDING EO rank specifications were set to err on the side of caution.

BRANKSPECS
BREEDING EOs--Size: ≥20 pairs or ≥40 adults across ≥10 ha. Condition: The occurrence has a good likelihood of long-term viability, as evidenced by the presence of adults in breeding season over ≥2 breeding seasons. The high-quality habitat includes one or more vegetation layers characterized by high volume of live foliage; little or no evidence of cowbird parasitism, or parasitism does not result in >20% parasitism rate, and/or cowbird numbers are minimized through an active cowbird-removal program; no treatments that would diminish foliage volume; and presence of nearby water and/or saturated soils. Landscape context: Relatively native disturbance processes (see discussion above in A-rank specifications on disturbances) still occur or have been restored.

Justification: Aside from the largest-known population described above, all other known populations are composed of <40 pairs (U.S.D.I Fish and Wildlife Service 1997); the B-rank specifications were designed to capture a significant portion of these mid-sized populations.

NONBREEDING EOs--Size: ≥10 birds across ≥10 ha. Condition: The occurrence has a good likelihood of long-term viability, as evidenced by the presence of adults for ≥1 month during the nonbreeding season over ≥2 winters. The high-quality habitat is characterized by presence of nearby water and/or saturated soils; one or more vegetation layers and a high volume of live foliage. Landscape context: Relatively native disturbance processes (e.g., natural wetland dynamics intact) still occur or have been restored, and some light cattle grazing may help maintain some habitat components.

CRANKSPECS
BREEDING Eos--Size: 2-20 pairs or 4-40 adults across <10. Condition: The occurrence has a >50% likelihood of long-term viability, as evidenced by the presence of adults in breeding season over 2 years. The habitat may be somewhat inferior due to little or only rare and/or intermittent presence of water or saturated soils; the presence of cowbirds and >20% rate of parasitism, and/or no cowbird-management program. Landscape context: Native disturbance processes somewhat altered, or may include a light to moderate amount of non-native activities (e.g., clearing woody vegetation for, or by, livestock, or through chemical treatments or high-severity fire).

NONBREEDING EOs--Size: <10 birds across <10 ha. Condition: The occurrence has a >50% likelihood of long-term viability, as evidenced by the presence of adults over 2 winters. The habitat may be somewhat inferior due to little or no presence of water or saturated soils and low foliage volume (but >50%). Landscape context: Nonnative disturbance processes are moderate.

DRANKSPECS
BREEDING EOs--Size: <5 pairs or <10 adults across <5. Condition: The occurrence has a <50% likelihood of long-term viability, as evidenced by the presence of adults in breeding season in 1 of 2 breeding seasons. The foliage volume of the habitat has been diminished significantly (>50%); there is little or only intermittent presence of water or saturated soils; cowbirds are present and rates of parasitism are high, and/or there is no cowbird-management program. Landscape context: Native disturbance processes are impaired, and nonnative processes are severe.

Justification: Roughly 75% of all extant populations consist of <5 individuals (U.S.D.I. Fish and Wildlife Service 1997).

NONBREEDING EOs--Size: <5 birds across <5 ha. Condition: The occurrence has a <50% likelihood of long-term viability, as evidenced by the presence of adults in 1 of 2 winters for ≥1 month during the nonbreeding season. Foliage volume has been diminished by >50%, and soils are dry or usually dry. Landscape context: Nonnative disturbance processes are taking the place of native processes.

References and Literature Cited:

Brown, B.T., and M.W. Trosset. 1989. Nesting-habitat relationships of riparian birds along the Colorado River in Grand Canyon, Arizona. Southwestern Naturalist 34:260-270.

Carothers, S.W., and B.T. Brown. 1991. The Colorado River through Grand Canyon: Natural History and Human Change. University of Arizona Press, Tucson, AZ.

Drost, C.A., E.H. Paxton, M.K. Sogge, and M.J. Whitfield. 2000. Food habits of the endangered Southwestern Willow Flycatcher. Report to U.S. Dept. Interior Bureau of Reclamation, Phoenix. Colorado Plateau Field Station, U.S. Dept. Interior Geological Survey. Flagstaff, AZ.

Finch, D.M., J.F. Kelly, and J-L. E. Cartron. 2000. Migration and winter ecology. Pp. 57-70 in D.M. Finch and S.H. Stoleson (Editors). Status, Ecology, and Conservation of the Southwestern

Willow Flycatcher. RMRS-GTR-60. Rocky Mountain Research Station, U.D. Dept. Agriculture Forest Service, Ogden, UT. Available online at: http://www.fs.fed.us/rm/pubs/rmrs_gtr60.html.

Flett, M.A., and S.D. Sanders. 1987. Ecology of a Sierra Nevada population of Willow Flycatchers. Western Birds 18:37-42.

Gorski, L.J. 1969. Traill's Flycatcher of the "fitz-bew" songform wintering in Panama. Auk 86:745-747.

Johnson, K., P. Melhop, C. Black, and K. Score. 1999. Reproductive failure of endangered Southwestern Willow Flycatchers on the Rio Grande, New Mexico. Southwestern Naturalist 44:226-231.

Paradzick, C.E., R.F. Davidson, J.W. Rourke, M.W. Sumner, A.M. Wartell, and T.D. McCarthey. 2000. Southwestern Willow Flycatcher 1999 Survey and Nest Monitoring Report. Arizona Game and Fish Department Technical Report 151, Nongame and Endangered Wildlife Program. Phoenix, AZ.

Paxton, E.H. 2000. Molecular genetic structuring and demographic history of the willow flycatcher (Empidonax traillii). M.S. thesis, Northern Arizona University, Flagstaff, AZ.

Prescott, D.R.C., and A.L.A. Middleton. 1988. Feeding-time minimization and the territorial behavior of the Willow Flycatcher (Empidonax traillii). Auk 105:17-28.

Sedgwick, J.A. 2000. Willow Flycatcher (Empidonax traillii). No. 533 in A. Poole and F. Gill (Editors). The Birds of North America. The Birds of North America, Inc., Philadelphia, PA.

Sedgwick, J.A., and F.L. Knopf. 1988. A high incidence of Brown-headed Cowbird parasitism of Willow Flycatchers. Condor 90:253-256.

Sedgwick, J.A., and W.M. Iko. 1999. Costs of Brown-headed Cowbird parasitism to Willow Flycatchers. Studies in Avian Biology 18:167-181.

Sogge, M.K., T.J. Tibbits, and J.R. Petterson. 1997. Status and breeding ecology of the Southwestern Willow Flycatcher in the Grand Canyon. Western Birds 28:142-157.

Sogge, M.K. 2000. Breeding season ecology. Pp. 57-70 in D.M. Finch and S.H. Stoleson (Editors). Status, Ecology, and Conservation of the Southwestern Willow Flycatcher. RMRS-GTR-60. Rocky Mountain Research Station, U.D. Dept. Agriculture Forest Service, Ogden, UT. Available online at: http://www.fs.fed.us/rm/pubs/rmrs_gtr60.html.

Sogge, M.K., and R.M. Marshall 2000. A survey of current breeding habitats. Pp. 43-56 in D.M. Finch and S.H. Stoleson (Editors). Status, Ecology, and Conservation of the Southwestern Willow Flycatcher. RMRS-GTR-60. Rocky Mountain Research Station, U.D. Dept. Agriculture Forest Service, Ogden, UT. Available online at: http://www.fs.fed.us/rm/pubs/rmrs_gtr60.html.

U.S.D.I. Fish and Wildlife Service. 1997. Final determination of critical habitat for the Southwestern Willow Flycatcher. Federal Register 62:39129-39146 (July 22, 1997).

Whitfield, M.J., K.M. Enos, and S.P. Rowe. 1999. Is Brown-headed Cowbird trapping effective for managing populations of the endangered Southwestern Willow Flycatcher? Studies in Avian Biology 18:260-266.

Reviewed by Mary Whitfield andMark Sogge

SPHYRAPICUS THYROIDEUS

WILLIAMSON'S SAPSUCKER

EOSPECS
There are two major EO classes: BREEDING and NONBREEDING (but note that some populations are nonmigratory or move only to lower altitudes) (Dobbs et al. 1997). A BREEDING EO is defined by the presence of one or more breeding pairs, as determined through direct (active nest-cavity, eggs, or broods) or indirect (adult carrying food or fecal sacs) evidence in suitable breeding habitat. Breeding EOs are considered distinct when separated by $\geq$1 km of unsuitable, or apparently suitable but unoccupied, habitat. NONBREEDING EOs and separations are not defined due to lack of information on winter home ranges. NOTE: Very little is known about this species, and they remain virtually unstudied in important parts of their range (e.g., Sierra Nevada; C.E. Bock, pers. comm.). In part, this may be due to the fact that the species is rarely vocal compared to other woodpeckers/sapsuckers, thus it is often overlooked. Fresh sap wells may help indicate their presence; in winter, field workers may find them on calm, windless days where there is little or no background noise by listening for the tapping sounds they make as they drill sap wells (C.E. Bock, pers. comm.).

Justification for EO separations: Separation distances for occurrences of volant species are somewhat arbitrary, based primarily on largest home-range size and correspondingly manageable units of habitat or land area. Home ranges/nesting territories of Williamson's Sapsuckers varies from 4 - 9 ha (compiled in Dobbs et al. 1997); distances between nest sites range from 175 - 375 m (mean of 278 m; Conway and Martin 1993); and densities range from 1 - 4.1 pairs/40 ha (compiled in Dobbs et al. 1993). Assuming that sapsuckers inhabiting forests use roughly circular polygons of habitat, the diameters of the largest home range or density estimates (~10 ha) are ~355 m (which is similar to the maximum distances between nest sites [Conway and Martin 1993]), and 3 times that distance (the axes of two occupied home ranges separated by the axis of one unoccupied home range; Natural Heritage Program 1999--Draft EO Data Standard) would be ~1065 m. Therefore, the default minimum of 1 km between EOs (ibid) was selected.

Suitable BREEDING habitat consists of relatively open, montane, mixed conifer or conifer forests at 850 - 3200 m elevation. Preferred conifer types include Douglas-fir (Pseudotsuga menziesii), ponderosa, Jeffrey, and lodgepole pines (Pinus ponderosa, P. jeffreyi, P. contorta), western larch (Larix occidentalis), and white and red firs (Abies concolor, A. magnifica); preferred deciduous type is aspen (Populus tremuloides) (Smith 1982, Raphael and White 1984, Campbell et al. 1990 from Dobbs et al. 1997, Conway and Martin 1993); in Colorado, observed more often in Douglas-fir than expected on the basis of availability (Winternitz 1976), but in Wyoming and Arizona they nested more often in live or dead aspen (Crockett and Hadow 1975, Conway and Martin 1993); in Oregon, occurrence correlated with western larch (Cannings et al. 1987 from Dobbs et al. 1997, Campbell et al. 1990 from Dobbs et al. 1997); in the eastern Sierra Nevada, they associated with unburned pine-fir and lodgepole forest (Raphael and White 1984). A habitat suitability index model (Sousa 1983) for this sapsucker was tested in central Arizona (Conway and Martin 1993) and predicted adequately the general terrain of occupied areas (i.e., lower halves of drainages over upper slopes and ridgetops), but overall the model was not adequate for predicting used vs. unused sites within occupied terrain. Percent canopy cover may be less important than previously believed (Conway and Martin 1993); however, it is clear that the birds will not find the necessary habitat components in stands with extremely low or high canopy coverage; thus, canopy coverages recommended by Sousa (1983) are probably appropriate (30-60%); the canopy should include ~7-15% aspen (live and dead) distributed patchily throughout the habitat (Conway and Martin 1993).

Nest sites may be a limiting factor for the cavity-nesting Williamson's Sapsucker. They typically excavate cavities in live or dead aspen or partially dead or dead conifers; high densities of tall/large-dbh snags may be preferred (>7 snags/ha, $\geq$23.7 m high, $\geq$29 cm dbh) (Bull et al. 1986, Conway and Martin 1993, Loose and Anderson 1995), and may allow greater nesting success (Conway and Martin 1993); Raphael and White found a mean dbh of 81.6 cm among nest trees in the eastern Sierra Nevada (primarily conifer); conifer nest-sites may be more common when aspen are limiting (Crockett and Hadow 1975, Conway and Martin 1993). On the basis of availability, nest snags in Oregon had larger dbh, greater height, fewer branches, and more broken tops than other snags (Bull et al. 1986). Dobbs et al. (unpubl. data, 1997) indicate that this sapsucker requires softer nesting substrates than most other woodpeckers; however, Raphael and White (1984) classified them as users of hard snags; it remains unclear what generates this and discrepancies in dbh of nest trees, but may be related to local or regional differences in snag availability, forest type, and/or terrain; Raphael and White (1984) studied cavity nesters along extensive, flat ridgetops--terrain that these sapsuckers apparently avoid in Arizona (Conway and Martin 1993) (see discussions above).

Early in the breeding season, this sapsucker forages primarily on conifer sap and associated fibers; in Colorado and Oregon, it feeds primarily on ponderosa pine (Stallcup 1968, Smith 1982) or Douglas-fir (Bull et al. 1986; C.P. Melcher, pers. obs.); in California, it prefers pines and true firs (Grinnell and Storer 1924 from Dobbs et al. 1997, Raphael and White 1984). After sapsuckers hatch, adults and nestlings fed primarily on carpenter ants (Crematorgaster spp.) and wood ants (Formica spp.) (Sousa 1983, compiled in Dobbs et al. 1997), sometimes at the bases of foraging trees (Short 1982 from Dobbs et al. 1997). Trees used for feeding often are smaller in dbh than expected on the basis of availability, possibly because smaller trees have thinner, more-easily drilled bark (Crockett 1975 from Dobbs et al. 1997); mean dbh of trees used for foraging in Oregon was 41 cm (Bull et al. 1986). In California and Colorado, trees with previously wounded boles may be preferred for foraging (Oliver 1970; C.P. Melcher, pers. obs.).

Suitable NONBREEDING habitat most often consists of low- to mid-elevation oak-juniper (Quercus-Juniperus spp.) savannah or woodland to high-elevation pine-oak (Pinus-Quercus spp.) woodland; on rare occasions, uses deciduous riparian woodlands--primarily oak, pine-oak, or juniper-oak--associated with desert grassland areas (Bock and Larson 1986, Hutto 1992 from Dobbs et al. 1997). Winter diet often includes fruits as well as conifer sap (Bock and Larson 1986), thus nonbreeding habitat should include both conifers (both ponderosa pine and juniper) and fruit-bearing trees or shrubs (esp. Arizona Madrono [Arbutus arizonica]; Bock and Larson 1986).

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ARANKSPECS
BREEDING EOs--Size: A mean density of $\geq$7 pairs/100 ha across >2000 ha. Condition: The occurrence has an excellent likelihood of long-term viability, as evidenced by the presence of breeding pairs over $\geq$2 years. The high-quality habitat includes 30-60% live mixed-type canopy cover, including 5-20% aspen (patchily distributed); $\geq$8 snags/ha ($\geq$3 of which are aspen) measuring $\geq$30 cm dbh; and >4 suitable foraging trees/ha. Landscape context: The occurrence is surrounded by an area where native disturbance processes still occur (e.g., low- moderate-severity fires and insect infestations that create snags).

Justification: While specifics regarding minimum patch size remain unquantified, the species appears to be area sensitive, and avoids smaller fragments (Aney 1984 from Yanishevsky and Petring-Rupp 1998); thus, a somewhat arbitrary area of 2000 ha was selected to capture landscape-level habitat features and accommodate >100 breeding pairs (based on mean home-range sizes and higher densities reported; see related discussions above). Minimum densities were based on the higher densities reported in Winternitz (1976). Although aspens are frequently selected for nesting, forests dominated by aspen are selected against (Scott et al. 1980); also, small aspen patches used for nesting often occur adjacent to open stands of ponderosa pine (Crockett and Hadow 1975). Bull 1980 (from Dobbs et al. 1997) specifies a minimum of 8 - 10 suitable nesting snags per ha. Breeding pairs of sapsuckers have been found to use 4 - 5 separate foraging trees (Crockett 1975); thus, >4 suitable foraging trees/ ha should support ≥7 pairs/100 ha. Site fidelity varies from low to high (some birds return every year, others do not return; Dawson 1923 from Dobbs et al 1997; Crockett 1975 from Dobbs et al 1997; Dobkin 1992; T.E. Martin, pers. obs.), thus occurrences should be based on at least 2 years of surveys.

BRANKSPECS
BREEDING EOs--Size: A mean density of ≥4 pairs/100 ha across ≥1000 ha. Condition: The occurrence has a good likelihood of long-term viability, as evidenced by the presence of breeding pairs over ≥2 years. The high-quality habitat includes 30-60% live canopy cover, including 5-20% aspen; >5 snags/ha (including ≥2 aspen snags) measuring ≥30 cm dbh; and ≥3 suitable foraging trees/ha. Landscape context: The occurrence is surrounded by an area where relatively native disturbance processes still occur (e.g., low- to moderate-severity fires and insect infestations that create snags).

Justification: Conway and Martin (1993) suggest retaining at least 5 suitable snags/ha.

CRANKSPECS
BREEDING EOs--Size: A mean density of ≥2.5 pairs/100 ha across ≥300 ha. Condition: The occurrence has a >50% likelihood of long-term viability, as evidenced by the presence of breeding pairs for 2 of 2 years. The habitat may be somewhat degraded by logging, but includes ≥4 suitable nesting trees/snags per ha and ≥2-3 suitable foraging trees/ha; canopy cover of <30% or >60% and/or which includes <5% or >25% aspen; and/or is an area where aerial spraying for ants (or use of chemicals to which ants are sensitive) has occurred within 2 years. Landscape context: Native disturbance processes have been moderately altered by fire suppression, large/severe fires, and/or logging practices. Not more than 50% of the surrounding area has been fragmented by human activities.

Justification: Average densities of <2.5 pairs/100 ha have not been reported. Franzreb and Ohmart (1978) found no significant changes in breeding densities for 2 years where snags and aspens were spared during a logging operation in Arizona; however, it remains unclear whether productivity or long-term viability are affected by such logging practices.

DRANKSPECS
BREEDING EOs--Size: A mean density of <2.5 pairs/100 ha across <300 ha. Condition: The occurrence has a <50% likelihood of long-term viability, as evidenced by the presence of breeding pairs for 1 of 2 years. The habitat may be highly degraded by logging and fragmentation due to development and other human activities, but it includes at 3 suitable nesting snags/ha) and 1 foraging tree/ha; canopy cover of <30% or >70% with little aspen (<0-5%) or a dominance of aspen (>50%); repeated aerial spraying for ants (or use of chemicals to which ants are sensitive) within the last year. Landscape context: Native disturbance processes have been severely altered by fire suppression, large/severe fires, and/or logging practices. More than 50%

of the surrounding area has been fragmented by large/severe fires, widespread clearcutting or other logging practices.

Justification: Thomas et al. (1979) determined that 371 snags/100 ha measuring >30 cm dbh were required for supporting "maximum populations" (Thomas et al. 1979); however, subsequent work (Conway and Martin 1993) indicates that snag densities that low correspond with unused sites.

References and Literature Cited:

Aney, W.C. 1984. The effects of patch size on bird communities of remnant old-growth pine stands in western Montana. M.S. thesis, University of Montana, Missoula.

Bock, C.E., and D.L. Larson. 1986. Winter habitats of sapsuckers in southeastern Arizona. Condor 88:246-247.

Bock, C.E., and J.F. Lynch. 1970. Breeding bird populations of burned and unburned conifer forest in the Sierra Nevada. Condor 72:182-189.

Bull, E.L., S.R. Peterson, and J.W. Thomas. 1986. Resource partitioning among woodpeckers in northwestern Oregon. Research Note PNW-4444. US Dept. Agriculture Forest Service, Portland, OR.

Campbell, R.W., N.K. Dawe, I. McTaggert-Cowan, J.M. Cooper, G.W. Kaiser, and M.C.E. McNall. 1990. The Birds of British Columbia. Vol. 2., Nonpasserines. Royal British Columbia Museum, Victoria, BC.

Cannings, R.A., R.J. Cannings, and S.G. Cannings. 1987. Birds of the Okanagan Valley, British Columbia. Royal British Columbia Museum, Victoria, BC.

Conway, C.J., and T.E. Martin. 1993. Habitat suitability for Williamson's Sapsuckers in mixed-conifer forests. Journal of Wildlife Management 57:322-328.

Crockett, A.B. 1975. Ecology and behavior of the Williamson's Sapsucker in Colorado. Ph.D. dissertation, University of Colorado, Boulder, CO.

Crockett, A.B., and H.H. Hadow. 1975. Nest site selection by Williamson's and Red-naped sapsuckers. Condor 77:365-368.

Dawson, W.L. 1923. The Birds of California. Vol. 2. South Moulton Co., San Diego, CA.

Dobbs, R.D., T.E. Martin, and C.J. Conway. 1997. Williamson's Sapsucker. No. 285 in A. Poole and F. Gill (Editors). The Birds of North America. The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington, DC.

Dobkin, D.S. 1992. Neotropical migrant landbirds in the Northern Rockies and Great Plains. Northern Region Publication no. R1-94-34, US Dept. Agriculture Forest Service, Missoula, MT.

Franzreb, K.E., and R.D. Ohmart. 1978. The effects of timber harvesting on breeding birds in a mixed-coniferous forest. Condor 80:431-441.

Grinnell, J., and T.I. Storer. 1924. Animal Life in the Yosemite. University of California Press, Berkeley, CA.

Li, P., and T.E. Martin. 1991. Nest site selection and nesting success of cavity-nesting birds in high elevation forest drainages. Auk 108:405-418.

Loose, S.S., and S.H. Anderson. 1995. Woodpecker habitat use in the forests of southeastern Wyoming. Journal of Field Ornithology 66:503-514.

Natural Heritage Program. 1999. Draft Element Occurrence Data Standard. Available on-line at: http://whiteoak.tnc.org/eodraft/index.htm.

Oliver, W.W. 1970. The feeding pattern of sapsuckers on ponderosa pine in northeastern California. Condor 72:241.

Scott, V.E., J.A. Whelan, and P.L. Svoboda. 1980. Cavity-nesting birds and forest management. Pp. 311-324 in R.M. DeGraaf and N.G. Tilghman (Editors). Management of Western Forests and Grasslands for Nongame Birds: Workshop Proceedings. GTR-INT-86. US Dept. Agriculture Forest Service, Ogden, UT.

Short, L.L. 1982. Woodpeckers of the World. Delaware Museum of Natural History Monograph Series no. 4.

Smith, K.G. 1982. On habitat selection of Williamson's and "Red-naped" Yellow-bellied Sapsuckers. Southwestern naturalist 27:464-466.

Sousa, P.J. 1983. Habitat suitability index models: Williamson's Sapsucker. FWS/OBS-82/10.47. U.S. Dept. Interior Fish and Wildlife Service.

Stallcup, P.L. 1968. Spatio-temporal relationships of nuthatches and woodpeckers in ponderosa pine forests of Colorado. Ecology 49:831-843.

Thomas, J.W., R.G. Anderson, C, Maser, and E.L. Bull. 1979. Snags. Pp. 60-77 in J.W. Thomas (Technical Editor). Wildlife Habitat in Managed Forests: The Blue Mountains of Oregon and Washington. Agricultural Handbook 553. US Dept. Agriculture Forest Service.

Winternitz, B.L. 1976. Temporal change and habitat preference of some montane breeding birds. Condor 78:383-393.

Yanishevsky, R., and S. Petring-Rupp. 1998. Management of Breeding Habitat for Selected Bird Species in Colorado. Colorado Division of Wildlife, Denver.

Reviewed by: Carl Bock, Dept EPO Biology, UC Boulder and
Courtney Conway

CYPSELOIDES NIGER

BLACK SWIFT

MINIMIUM EO CRITERIA: An Element Occurrence is defined by the presence of a breeding colony consisting of one or more pairs. Breeding is documented by a nest (or rock ledge) containing an egg or nestling, or the observation of one or more adults near a waterfall or sea-side cliff during the breeding season (May through September) (Foerster 1987). Since Black Swifts are such long-range foragers, observations of adults away from a potential breeding site (waterfall, sea cliff, sea cave, moist inland cliff or cave) are not considered an Element Occurrence.

EO SEPARATION: EOs are separated by a distance of at least 1 kilometer.

JUSTIFICATION: Because the location of Black Swift nests can often be quite cryptic (Knorr 1961), simply counting the number of nests may provide a low estimate of the actual size of a colony. For some colonies, nest counts cannot be made from a close distance or must be made from the edge of a cliff above the colony. A count of the number of individuals seen simultaneously during the final two hours of daylight is an efficient way of observing the maximum number of adults. Adults will return from foraging to roost during this time (Foerster and Collins 1990). Colonies often consist of a concentrated group of nests near a waterfall or some other water source. The 1 km separation distance was chosen as a distance that would provide a practical unit for conservation.

GSPECS.AUTHOR: Siemers, J..; GSPECS.OFFICE: US-COHP; GSPECS.DATE: 2000-11-17.

A RANKED OCCURRENCE:
Size: A colony with 10 or more pairs nesting. Condition: Evidence of viability represented by successful fledging of young. Landscape context: No threats to the availability of water flow.

Justification: The maximum number of adults observed at a colony during a study of six active colonies in Southern California was 14 (Foerster and Collins 1990), which would represent 7 pairs. Thirteen active nests have been observed at the largest colony in Colorado (Hirshman 1998). There have been no colonies reported that do not have a consistent flow of water during the breeding season. Of Knorr's (1961, 1993) ecological requirements for breeding colonies, the availability of water is the only one has the significant potential of being altered at any given colony.

B RANKED OCCURRENCE:
Size: A colony with 5-9 pairs nesting or a colony with 10 or more pairs (Landscape context:) with threats to the availability of water flow. Condition: Evidence of viability represented by successful fledging of young.

C RANKED OCCURRENCE:
Size: A colony with 2-4 pairs nesting. Condition: Evidence of viability represented by successful fledging of young. Landscape Context: The colony has greater than 4 pairs nesting, but the threats to the availability of water flow are great.

D RANKED OCCURRENCE:

Size: A colony with 1 pair nesting. Condition: The colony has greater than one pair nesting, but evidence of lack of viability represented by unsuccessful fledging of young for colonies with greater than one pair nesting or (Landscape Context:) threats to the availability of water flow are great.

Citations:

Foerster, K. S. 1987. The distribution and breeding biology of the Black Swift (*Cypseloides niger*) in southern California. M.Sc. thesis, California State University, Long Beach.

Foerster, K. S. and C. T. Collins. 1990. Breeding distribution of the Black Swift in southern California. Western Birds 21(1):1-9.

Hirshman, S. 1998. Black Swifts (*Cypseloides niger*) in Box Canyon, Ouray, Colorado. Journal of the Colorado Field Ornithologists 32(2):53-60.

Knorr, O. A. 1961. The geographical and ecological distribution of the Black Swift in Colorado. Wilson Bulletin 73(2):155-170.

Knorr, O. A. 1993. Black Swift (*Cypseloides niger*) nesting site characteristics: some new insights. Avocetta N° 17:139-140.

Potential reviewers: Kim Potter, independent biologist; Chris Schultz, U.S. Forest Service; Rich Levad, Colorado Bird Observatory, and Charles Collins, California State University Long Beach

PTYCHOCHEILUS LUCIUS

COLORADO PIKEMINNOW

EOSPECS
There are three EO classes: ADULT SPAWNING, ADULT NONSPAWNING, and SUBADULT. EO class ADULT SPAWNING is defined by the presence of one or more ripe adult males or females (450-900mm Total Length) on a spawning bed separated by 30km. Observations within 30km of one another, but separated by a barrier (dam) also constitute separate occurrences. Justification: Pikeminnow are a highly vagile species, but the literature suggests that <20% of adult pikeminnow exhibit movements >10km form sites of original capture suggesting they select and maintain fidelity to home feeding range (Osmudson et al. 1998) within which spawning evidently occurs (Ryden and Ahlm 1996). Spawning migrations, however, can exceed 150km (Tyus 1991). Assuming a linear home range (along a river) three times the 10km home range is 30km. No distinction is made between suitable and unsuitable habitat as the entire river is to a variable extent suitable habitat.

EO class ADULT NONSPAWNING is defined by the presence of one or more adult fish (450-900mm TL) observed from July-March or an unripe adult fish observed off spawning habitat April-June. Adult Nonspawning EO's are considered distinct if separated by a distance of 30km. or if separated by a barrier (dam) Justification: Reports of feeding and spawning range fidelity (Osmundson et al. 1998, Ryden and Ahlm 1996).

EO class NONADULT is defined as the presence of one or more larvae (<25mm TL), postlarvae (25-70mm TL) or subadults (250-500mm TL) separated by a barrier (i.e. dam, small irrigation dam, or waterfall). Justification: The downstream transport hypothesis refers to the downstream movement of larvae after hatch of up to 250km followed by upstream migrations of subadults over many years leading to occupation of adults near original hatch sites and traditional spawning habitats (Tyus 1991, Tyus and Haines 1991). The long distance migrations of nonadult *P. Lusius* make definition of separation distances arbitrary, but for our purposes observations separated by >200km are considered separate occurrences.

GSPECS.AUTHOR: Sovell, J.R.
GSPECS.OFFICE: COHP-US
GSPECS.DATE: 2000-05-02

ARANKSPECS
EO class ADULT SPAWNING: Size: population of 25 or more adults on a spawning bar characterized by a confined area of the river.
EO class ADULT NONSPAWNING: Size: population with >0.5 fish/km along a river with maintained instream flows of half bank-full up to bank-full discharge.
EO class SUBADULT: Size: population with $\geq$0.4 subadult fish/km. Condition (all three classes): or a population with an excellent chance of long-term viability because it is along a stretch of river with absence of or low numbers of nonnative fish, that is managed for high spring flows followed by decreasing discharges in early summer to midsummer (i.e. undamed natural flow characteristics), and with at least one backwater within 3km of the occurrence. Landscape Context: and because its streamside and upland is undisturbed and without industry (cement plants, power plants, etc) or development and therefore low potential for pollution with metals.

BRANKSPECS

EO class ADULT SPAWNING: Size: population >15 adults on a spawning bar, but not meeting B rank criteria.
EO class ADULT NONSPAWNING: Size: population with >0.3 fish/km, but not meeting criteria for A rank.
EO class SUBADULT: Size: population with >0.25 subadult fish/km, but that does not meet A rank criteria. Condition (all three classes): or an occurrence where long-term viability is questionable because at least one of the following disturbances are present: moderate or high numbers of nonnative fish, river with erratic spring and early summer to midsummer flows due to irrigation, water diversions or dams. Landscape Context: moderate potential for pollution with metals because of industrial activity in immediate vicinity or upstream of occurrence or because of encroaching or present development.

CRANKSPECS
EO class ADULT SPAWNING: Population >5 adults on a spawning bar, but that do not meet B rank criteria.
EO class ADULT NONSPAWNING: Population with >0.1 fish/km, but that does not meeting B rank criteria.
EO class SUBADULT: Population with >0.10 subadult fish/km, but that does not meet B rank criteria. Condition (all three classes): or an occurrence where long-term viability is poor because any combination of two the following three disturbances are present: there are moderate or high numbers of nonnative fish and the river has erratic spring and early summer to midsummer flows due to irrigation, water diversions or dams. Landscape Context: there is moderate or high potential for pollution with metals because of industrial activity in immediate vicinity or upstream of occurrence or because of present development.

DRANKSPECS
EO class ADULT SPAWNING: Population of one or more adults on a spawning bar in an unconfined river channel, but not meeting C rank criteria.
EO class ADULT NONSPAWNING: Population with <0.15 adult fish/km. Condition: long-term viability is in dought because of erratic instream flows.
EO class SUBADULT: Population with >0.0 subadult fish/km, but that does not meet B rank criteria. Condition: or an occurrence where it is known that all three of the following disturbances are present: moderate or high numbers of nonnative fish, river with erratic spring and early summer to midsummer flows, and Landscape Context: moderate or high potential for pollution with metals because of industrial activity in immediate vicinity or upstream of occurrence or because of present development.

Literature cited:

Hamman, R. L. 1981. Spawning and culture of Colorado squawfish in raceways. Progressive Fish-Culturalist 43:173-177.

Harvey, M. D., Mussetter, R. A. and E. J. Wick. 1993. A physical process-biology response modal for spawning habitat formation for endangered Colorado squawfish. Rivers 4:114-131.

Osmundson, D. B. and K. P. Burnham. 1998. Status and Trends of the endangered Colorado squawfish in the upper Colorado River. Transactions of the American Fisheries Society 127:957-970.

Osmundson, D. B., Ryel, R. E., Tucker, M. E., Burdick, B. D., Elmbald, W. R. and T. E. Chart. 1998. Dispersal patterns of subadult and adult Colorado squawfish in the upper Colorado River. Transactions of the American Fisheries Society 127:943-956.

Ryder, D. W. and L. A. Ahlm. 1996. Observations on the distribution and movements of Colorado squawfish, *Ptychocheilus lucius*, in the San Juan River, New Mexico, Colorado, and Utah. The Southwestern Naturalist 41:161-168.

Tyus, H. M. 1991. Chapter 19: Ecology and management of Colorado squawfish. *In*, Battle against extinction: native fish management in the American West. W. L. Minckley and J. E. Deacon (eds.). University of Arizona Press, Tucson. 517pp.

Wick, E. J, Stoneburner, D. L., and J. A. Hawkins. 1983. Observations on the ecology of Colorado squawfish (*Ptychocheilus lucius*) in the Yampa River, Colorado, 1982. United States National Park Service, Water Resources Field Support Laboratory, Technical Report 83-7, Fort Collins, Colorado.

Reviewers: Doug Osmundson, Joan Friedlander and Greg Hayward of U.S. Forest Service

GILA ROBUSTA

ROUNDTAIL CHUB

MINIMUM EO CRITERIA:
An element occurrence is defined by the presence of one or more individuals.

EO SEPARATION DISTANCE:
EO's are considered distinct when separated by a distance of greater than 52 km of continuous habitat or when separated by a barrier, such as a waterfall.

Justification: Based on radiotelemetry studies of roundtail and humbpack chub in the Colorado River, mean maximum movement for roundtail chub was 33.9 km (± 9.3 km) (Kaeding et al. 1990). To incorporate the maximum possible movement for roundtail chub, the mean plus two standard deviation for the population were used to assess the maximum movement expected.

GSPECS.AUTHOR: Schorr, R.A.
GSPECS.OFFICE: COHP-US
GSPECS.DATE: 2000-10-20

A RANK OCCURRENCE:
Size: Abundance greater than 6,000, with individuals greater than 200 mm in size and with representatives of all size classes, in greater than 10 km of suitable habitat with few nonnative fish species. Condition: Population should be composed of adults, juveniles, and young with relatively equal sex ratios. Landscape context: Surrounding habitat should be such that excessive siltation does not disrupt the hydrology of the system.

Justification: Anderson (1994) documented abundances of 752 individuals per km in the Debeque stretch of the Colorado River. Reproductive individuals sampled from the Gila River Basin, New Mexico, were between 110-344 mm in length, but fecundity is size dependent (Bestgen 1985). Adult roundtail chub greater than 200 mm will likely produce more individuals that survive to reproduction. Habitat stretches longer than 10 km will house populations greater than 6,000 individuals using the per km estimates of Anderson (1994). Little has been done comparing population sizes in a host of different stream stretches throughout the species range, though biologists believe populations in the 1,000's would constitute large populations (K. Bestgen, pers. comm.). Populations as large as 5,500 have been documented in the Debeque stretch of the Colorado River (Anderson 1997). A common recommendation for the conservation and management of this fish is the control of nonnative fish species (Propst 1999, Anderson 1997, Bestgen 1985). Due to possible competition and likely predation, conservation of the species may be hindered in systems with abundant populations of nonnative fishes.

Suitable habitat is river and stream systems with interspersed deep pools, surrounding bank vegetation, stable banks, and complex debris and structure. Sizes of roundtail chub are dependent upon the abundance of large, deep pool complexes (Bestgen 1985). Shallower, faster-moving stretches within stream systems provide habitat for juveniles and subadults (Propst 1999). These habitats can be found along undercut stream banks with overhanging vegetation (Propst 1999).

B RANK OCCURRENCE:
Size: Abundance between 5999 and 2000 individuals with representatives in all size (age classes) in at least 7 km of suitable habitat. Condition: Population should be composed of adults,

juveniles, and young with relatively equal sex ratios. Landscape context: Surrounding habitat should be such that excessive siltation does not disrupt the hydrology of the system.

C RANK OCCURRENCE:
Size: Abundance between 1999 and 500 individuals with representatives of adult age classes in at least 5 km of suitable habitat. Justification: Anderson (1997) documented abundances of between 200 and 300 individuals per km in the Parachute stretch of the Colorado River. Condition: Population should be composed of adults, juveniles, and young with relatively equal sex ratios. Landscape context: Surrounding habitat should be such that excessive siltation does not disrupt the hydrology of the system.

D RANK OCCURRENCE:
Size: Abundance less than 500 individuals. Condition: Population should be composed of adults, juveniles, and young with relatively equal sex ratios. Landscape context: Surrounding habitat should be such that excessive siltation does not disrupt the hydrology of the system.

Literature cited:
Anderson, R. M. 1997. An evaluation of fish community structure and habitat potential for Colorado squawfish and razorback sucker in the unoccupied reach (Palisade to Rifle) of the Colorado River, 1993-1995. Colorado River Recovery Implementation Program Project No. 18. Colorado Division of Wildlife, Fort Collins, CO. 73 pp.

Bestgen, K. R. 1985. Distribution, biology, and status of the roundtail chub, *Gila robusta*, in the Gila River Basin, New Mexico. M.S. Thesis, Colorado State University, Fort Collins, CO. 104 pp.

Kaeding, L. R., B. D. Burdick, P. A. Schrader, and C. W. McAda. 1990. Temporal and spatial relations between the spawning of humback chub and roundtail chub in the upper Colorado River. Transactions of the American Fisheries Society 119:135-144.

Propst, D. L. 1999. Threatened and endangered fishes of New Mexico. New Mexico Game and Fish Technical Report No. 1. Sante Fe, NM. 83 pp.

Potential reviewers: Kevin Bestgen Colorado State University
David Winters, U.S. Forest Service
R. Anderson, Colorado Division of Wildlife

THOMOMYS BOTTAE RUBIDUS

BOTTA'S POCKET GOPHER

EOSPECS:

MINIMUM EO CRITERIA: Occurrences (EOs) are defined by any collection or reliable observation of one or more individuals.

EO SEPARATION: EOs are separated by either (1) a major barrier to dispersal, such as a busy interstate highway, highway with impassable obstructions, soils with high clay content or extremely coarse soils, soils less than 1 foot deep, or mountain passes above 9000 ft., or; (2) a distance greater than 600 m between observation/capture locations.

MAPPING GUIDANCE: All observation/capture points within 600 m of other associated occurrences should be joined as a single occurrence if the intervening habitat is suitable. Observation/capture points that are more than 900 m apart should be separated as distinct occurrences.

SEPARATION JUSTIFICATION: Based on trapping information from Daly and Patton (1990) concerning the species *Thomomys bottae* in California, one individual was documented traveling 300 m. A distance of at least two times this maximum movement distance would ensure that occurrences are distinctly separated. *Thomomys bottae* have not been found in soils with heavy clay content, nor extremely coarse soils (Miller 1964). Also, the species has not been found in soils less than 1 ft. deep (Howards and Childs 1959). The species has usually been found below 8600 ft. (Miller 1964), thus mountain passes or elevations of 9000 ft. likely present major barriers.

GSPECS.AUTHOR: Schorr, R. A.
GSPECS.OFFICE: COHP-US
GSPECS.DATE: 2000-11-15

A RANK OCCURRENCE:
Size: Estimated density greater than 10 individuals per ha over an area of at least 50 ha of suitable habitat. Condition: Populations should show evidence of reproduction and recruitment by the presence of young and subadult individuals. Sex ratios should be skewed toward females. Landscape context: Little is known about how the surrounding land use affects pocket gophers, but ideally minimal disturbance to surrounding habitats would likely help sustain the population.

Justification: Along the Sangre de Christo, Hafner et al. (1983) documented average abundances of 2.5 individuals/ha which is well below other documented abundances (10-153 individuals/ha; Howard 1961, Howards and Childs 1959, Patton and Feder 1981), but may be consistent with populations in this physiographic region. A high abundance estimate from Hafner et al. (1983) and a low estimate from other accounts may be a reasonable A-rank occurrence for this subspecies. Ensuring that there is at least 50 ha of occupied habitat will ensure there is at least 500 individuals in the occurrence. Although this is a low estimate for some minimum population size theorists, pocket gopher populations have been known to persist at low effective population sizes (Daly and Patton 1990). There is no abundance information available for this subspecies. The condition of the population should include a normal sex-skewed weight of more females than males. Since the species is polygynous, it is best to ensure that the sex ratios match the breeding biology of the animal. Also, it is important to ensure that recruitment is documented since some populations show a distinct disparity in the number of subadults reaching adult age (Daly and Patton 1990).

B RANK OCCURRENCE
Size: Estimated density between 5-9 individuals per ha in at least 50 ha of suitable habitat or $\geq$ 10 individuals per ha in <50 ha of suitable habitat. Condition: Populations should show evidence of reproduction and recruitment by the presence of young and subadult individuals. Sex ratios should be skewed toward females. Landscape context: Little is known about how the surrounding land use affects pocket gophers, but ideally minimal disturbance to surrounding habitats would likely help sustain the population.

C RANK OCCURRENCE:
Size: Estimated density between 2-4 individuals per ha in at least 50 ha of suitable habitat or 5-9 individuals per ha in <50 ha of suitable habitat. Condition: Populations should show evidence of reproduction and recruitment by the presence of young and subadult individuals. Sex ratios should be skewed toward females. Landscape context: Little is known about how the surrounding land use affects pocket gophers, but ideally minimal disturbance to surrounding habitats would likely help sustain the population.

D RANK OCCURRENCE
Size: Estimated density <2 individuals per ha in at least 50 ha of suitable habitat or 2-4 individuals per ha in <50 ha of suitable habitat. Condition: Populations should show evidence of reproduction and recruitment by the presence of young and subadult individuals. Sex ratios should be skewed toward females. Landscape context: Little is known about how the surrounding land use affects pocket gophers, but ideally minimal disturbance to surrounding habitats would likely help sustain the population.

H SPECS: no observations/captures within the last 5 years.

Literature cited:

Daly, J. C. and J. L. Patton. 1990. Dispersal, gene flow, and allelic diversity between local populations of *Thomomys bottae* pocket gophers in the coastal ranges of California. Evolution 44:1283-1294.

Hafner, J. C., D. J. Hafner, J. L. Patton, and M. F. Smith. 1983. Contact zones and the genetics of differentiation in the pocket gopher *Thomomys bottae* (Rodentia: Geomyidae). Systematic Zoology 32:1-20.

Howard, W. E. 1961. A pocket gopher population crash. Journal of Mammalogy 42:258-260.

Howard, W. E. and H. E. Childs, Jr. 1959. Ecology of pocket gophers with emphasis on *Thomomys bottae.* Hilgardia 29:277-358.

Patton, J. L. and J. H. Feder. 1981. Microspatial genetic heterogeneity in pocket gophers: Non-random breeding and drift. Evolution 35:860-876.

Potential reviewers: Dave Lovell, Colorado Division of Wildlife
Dave Armstrong, University of Colorado

APPENDIX 24

TERRESTRIAL ECOLOGICAL SYSTEMS INTEGRITY GUIDELINES
(Renee Rondeau 2001)

TABLE OF CONTENTS

SOUTHERN ROCKY MOUNTAINS ECOREGION
ALPINE SUBSTRATE/ICE FIELD—SMALL PATCH

Sparse non-vascular vegetation (on rock and unconsolidated substrates)
Glacier
Snow Field
Aquilegia coerulea - Cirsium scopulorum Scree Herbaceous Vegetation

SCALE AND RANGE: LARGE PATCH AND WIDESPREAD

Alpine substrate/ice field ecological system is a small patch system that occurs at only the highest elevations (12,000-14,000 feet) within the Southern Rocky Mountains ecoregion. This system occupies less than 1% of the SRM ecoregion but is also found in other Rocky Mountain ecoregions from Canada to New Mexico.

The primary ecological processes include snow retention, wind dessication, and permafrost. The snow pack/ice field never melts or if so, then for only a few weeks. The alpine substrate/ice field ecological system is part of the alpine mosaic consisting of alpine tundra dry meadow, wet meadow, fell-fields, and dwarf shrubland.

Most likely the primary major threat to this system may be global warming as it occupies only the highest elevations of SRM.

Brown-capped rosy finch, a Southern Rocky Mountains endemic, nest in vertical cliffs and crags of the tundra and feed in the surrounding area. They often use snowfields for feeding, especially when strong winds cross snowfields the updrafts are cut off and insects fall stunned on the snow surface, where these finches forage on an abundant food source (Nelson 1998).

MINIMUM SIZE: 5 acres. (Connectivity is probably more important than size)

SEPARATION DISTANCES: 1) substantial barriers to natural processes or species movement, including, major highways, urban development, mining, ski industry development, 2) natural community from a different ecological system wider than one mile wide.

Justification: This system is probably most susceptible to global warming and altered chemical composition, especially excess nitrogen from pollution. Higher than normal nitrogen contents have been detected for Rocky Mountain National Park (Jeff Connors pers. com). Connectivity is probably of utmost importance for the alpine communities.

RANK PROCEDURE: 1) condition, 2) landscape context, 3) size. Occurrence size criteria may not be as critical for patch communities as it is for matrix-forming communities (Anderson 1999). Factors such as the current condition, landscape context, and historical continuity may contribute more to the diversity of an occurrence than does occurrence size, although the species-area relationship still holds up for patch type communities.

CONDITION SPECIFICATIONS:
A –rated condition: Not fragmented or impacted by roads, trails, or mines. Pollution fallout is limited.

B- rated condition: Unnatural fragmentation is limited to < 3 % of the occurrence. Pollution fallout may show an excess of nitrogen.

C-rated condition: Unnatural fragmentation is limited to < 5% of the occurrence. Pollution fallout shows a significant excess of nitrogen.

D –rated condition: Unnatural fragmentation is > 10% of the occurrence. Pollution fallout of nitrogen may have a long lasting effect on the lichen communities.
Justification for A-rated criteria: Alpine substrate ice fields are mostly dependent on global climate. Potentially chemical imbalances due to excess nitrogen from pollution may be altering this system. Otherwise the only other significant factor of condition is fragmentation.

Justification for C/D threshold: C-ranked occurrences have potential for restoration over several decades. D-ranked occurrences have little or no potential for restoration because of extensive degradation.

SIZE SPECIFICATIONS:
A – rated size: Very large (> 50 acres)
B –rated size: Large (20 - 50 acres)
C –rated size: Moderate (5 - 20 ac)
D –rated size: Small (<5 ac)

Justification for A-rated criteria: A-ranked occurrences are large enough to support small impacts and be able to buffer small changes in chemical imbalances and climate fluctuations.

Justification for C/D threshold: C-ranked occurrences may still be able to contain some snow pack even with global warming. D-ranked occurrences are subject to loss with global warming.

LANDSCAPE CONTEXT SPECIFICATIONS:
A-rated landscape context: Occurrence surrounded by unaltered, unfragmented landscape with very little to no human activities, e.g., trails, roads, mines, etc., (> 98% natural). No unnatural barriers present. Connectivity of adjacent systems allows natural migration to occur.

B-rated landscape context: Surrounding lands have been altered by human development but are > 90% natural. Examples of human development may include sheep grazing, mining, road building, etc. Connectivity to the surrounding alpine environment is very much intact.

C-rated landscape context: Surrounding landscape shows signs of fragmentation from either numerous trails, roads, mines, ski areas, or other human activities, but at least 75% natural. Significant disturbance but easily restorable.

D-rated landscape context: Major human-caused alteration of surrounding landscape. Adjacent systems surrounding occurrence are mined, heavily recreated (including skiing), or has numerous trails and roads. Connectivity is severely hampered.

Justification for A-rated criteria: These are occurrences with an intact alpine mosaic allowing for natural species migration and movement. Alpine substrate/ice fields are fully connected with natural intact alpine environment and fully buffered from human impact.

Justification for C/D threshold: C-ranked occurrences have some limited buffering from human impact to the alpine environment. D-ranked occurrences have little or no buffering, and are subject to altered species composition including loss on native species.

AUTHORSHIP: Renée Rondeau
Date: July 11, 2000 (edited February 26, 2001)

LITERATURE CITED:

Anderson M. G. 1999. Viability and spatial assessment of ecological communities in the northern Appalachian ecoregion. Phd. Dissertation. University of New Hampshire.
Nelson D. L. 1998. Brown-capped Rosy-Finch. Pages 522-523 in H. E. Kingery, ed., Colorado breeding bird atlas. Colorado Bird Atlas Partnership and Colorado Division of Wildlife, Denver, CO. 636.

ALPINE TUNDRA DRY MEADOW — MATRIX

Artemisia arctica ssp. *saxicola* Herbaceous Vegetation
Carex elynoides - Oreoxis spp. Herbaceous Vegetation
Carex foenea - Geum rossii Herbaceous Vegetation
Carex rupestris - Geum rossii Herbaceous Vegetation
Carex rupestris-Trifolium dasyphyllum Herbaceous Vegetation
Deschampsia cespitosa - Geum rossii Herbaceous Vegetation
Festuca brachyphylla - Geum rossii var. *turbinatum* Herbaceous Vegetation
Geum rossii - Trifolium spp. Herbaceous Vegetation

Kobresia myosuroides - Geum rossii Herbaceous Vegetation
Trifolium dasyphyllum Herbaceous Vegetation

SCALE AND RANGE: MATRIX AND WIDESPREAD

Alpine tundra dry meadow ecological system is the matrix-former of the Southern Rocky Mountains ecoregion alpine zone and occupies approximately 3% of the ecoregion. These dry meadows occur between 10,000 an 14,000 feet in elevation on gentle to moderate slopes, flat ridges, valleys, and basins, where the soil has become relatively stabilized and the water supply is more or less constant. The system is commonly comprised of a mosaic of large patch plant communities that are dominated by sedges, grasses, and forbs. Dominant species include *Artemisia arctica, Carex elynoides, C. foenea, C rupestris, Deschampsia cespitosa, Festuca brachyphylla, Geum rossii, Kobresia myosuroides,* and *Trifolium dasyphyllum*. Vegetation in these areas is controlled by snow retention, wind desiccation, permafrost, and a short growing season. Although alpine tundra dry meadow is the matrix of the alpine it typically intermingles with alpine substrate ice field, tundra fell-field, alpine dwarf shrubland, and alpine/subalpine wet meadow ecological systems. The alpine tundra dry meadow ecological system is also found in other Rocky Mountain ecoregions as well.

Viable populations of American pipits and Brown-capped rosy finches may be an indicator of a healthy and adequately large occurrence. In addition, Ptarmigan may use this system at different times in their life cycle and have been chosen as an additional indicator of a healthy occurrence of alpine systems.

The major threats to this system are surface disturbances such as roads, mining, and degradation from current and historic sheep grazing.

MINIMUM SIZE: 3,000 acres

SEPARATION DISTANCES: 1) substantial barriers to natural processes or species movement, including urban development greater than ½ mile wide, major highways, or 2) a different natural ecological system greater than 1 mile wide.

Justification: Primary criteria to be considered are the reaction of native species to fragmentation, seed dispersal by dominant forbs and graminoids and the connectivity for small mammals, e.g., pikas, marmots, pocket gophers, and shrews.

RANK PROCEDURE: 1) size, 2) condition, 3) landscape context**.** Size is the most important ranking factor for matrix communities. Condition is of secondary importance and while landscape context is still important, it is slightly less so than the overall size and condition of an occurrence.

CONDITION SPECIFICATIONS:
The following sources have good discussions about alpine condition: Schwan and Costello (1951) and Thilenius (1975).

A-rated conditions: A continuous mat of mulch in sheltered places. No sod breaks, scalped areas, trailing, hummocking, or gravel fans. Natural microrelief is undisturbed. Soil erosion is not accelerated by anthropogenic activities. No surficial disturbance is evident or if present than in only small, isolated areas and limited to <1% (e.g. mines or ranch activities and buildings; off-road vehicle use). Sheep grazing has not been present for the last ten years. There are few to no roads and trails found within the occurrence.

B-rated condition: Some limited exposed stony areas, are present. Minor sod breaks and snowbank trailing may be noticeable, but only where sheep tend to congregate. Scalped areas, pedestalling and gullying are absent. Native species that increase with sheep grazing have less than 10% cover. Ground cover is intact in at least 80% of the occurrence. Soil erosion may be slightly elevated due to anthropogenic activities. Surficial disturbance from mines, ranch activities, buildings, trails, and off-road vehicles if present is limited to less than 5% of the occurrence. There are only a few roads/trails found within the occurrence.

C-rated condition: Evidence of historic and current sheep grazing is distinctly noticeable but is capable of remedy in a reasonable length of time and with moderate management changes. Mulch may be in broken patches with as much as 30% bare ground showing. Sod breaks and scalped places may be locally present. Surficial disturbances occur on less than 20% of the area (e.g., mines, ranch activities, buildings, and off-road vehicle use). Roads and trails may be scattered throughout the occurrence.

D-rated condition: The severely depleted condition is seldom encountered over extensive areas in the alpine tundra. Destructive activities such as grazing or mining is usually confined to readily accessible areas. These disturbed areas present a ragged, broken, trailed-out appearance. Mulch is mostly depleted, although in less accessible places it may approach 30%. The ragged appearance of thinly vegetated summits and slopes, caused by sod-cutting, is a distinctive feature. Sod breaks and scalped places are usually common, and slopes are badly trailed. Numerous shallow to deep gullies are evident at the heads of drainages. Stream banks are cut, raw, and sharp. Often much snowbank trialing is evident. Surficial disturbances occur on more than 20% of the area (e.g., mines, ranch activities, buildings or off-road vehicle use). Many roads or trails may be found within the occurrence.

<u>Justification for A-rated criteria:</u> characteristic ecological gradients and variation remain intact supporting interactions among component species. Natural disturbances can occur on a scale that permits maintenance of a diverse mosaic of alpine communities.

<u>Justification for C/D threshold:</u> C-ranked occurrences would naturally improve in condition with a change in management practices, with significant recovery expected within 100 years. D-ranked occurrences will not likely improve and are prone to irreversible changes in composition. Significant emphasis is placed on the relative loss of the topsoil, which may take as long as 500 years to be replaced. Emphasis is also placed in the degree of fragmentation from roads and the amount of accelerated soil erosion.

SIZE SPECIFICATIONS:
A-rated size: Very large (>20,000 acres)
B-rated size: Large (8,000-20,000 acres)
C-rated size: Moderate (3,000-8,000 acres)
D-rated size: Small (<3,000 acres)

<u>Justification for A-rated criteria:</u> A-ranked occurrences of this size would likely contain sufficient internal variability to capture characteristic biophysical gradients and retain natural geomorphic disturbance, and would most likely survive accelerated erosion disturbance problems.

<u>Justification for C/D threshold:</u> stands smaller than C-ranked may be viable if they are surrounded by naturally occurring vegetation, or if it occupies all of the available habitat in an un-altered, unfragmented valley. As a rule, smaller stands lack variability, have largely disturbed or altered natural geomorphic disturbance processes and are surrounded by altered landscapes. The primary criteria considered are loss of diversity from livestock grazing and fragmentation by roads.

LANDSCAPE CONTEXT SPECIFICATIONS:
A-rated landscape context: Highly connected to the surrounding intact landscape which has been little altered, captures the characteristic ecological gradients and geomorphic processes. The occurrence is completely surrounded by other high quality communities. The alpine landscape provides habitat for indicator species such as Ptarmigan, Rosy finches, Water pipit, and Black-chinned hummingbird.

B-rated landscape context: occurrence is surrounded by moderate-low quality natural communities, some of which may have been logged or disturbed in the past; an expansive semi-natural landscape that has been used extensively for livestock grazing.

C-rated landscape context: Moderately fragmented and isolated -- occurrences are surrounded by a mix of intensive mining, logging, or ski industry development, and adjacent semi-natural communities.

D-rated landscape context: Highly fragmented and isolated -- area around the occurrence is entirely, or almost entirely, surrounded by mining, logging, or ski industry development.

<u>Justification for A-rated criteria:</u> Characteristic ecological gradients remain intact supporting interactions among component species. Natural disturbances can occur on a scale that permits maintenance of patches of the matrix-former in a variety of conditions.

Justification for C/D threshold: D-ranked occurrences have characteristic ecological gradients lacking or otherwise disrupted, with irretrievable impacts on habitat requirements for component species.

AUTHORSHIP: Renée Rondeau
Date: July 14, 2000

LITERATURE CITED:

Anderson M. G. 1999. Viability and spatial assessment of ecological communities in the northern Appalachian ecoregion. Phd. Dissertation. University of New Hampshire.

Schwan H. E. and D. F. Costello. 1951. The Rocky Mountain alpine type: Range conditions, trends and land use (a preliminary report). USDA, Forest Service, Fort Collins, CO.

Thilenius J. F. 1975. Alpine range management in the western United States--principles, practices, and problems: The status of our knowledge. USDA For. Serv. Res. Pap. RM-157, Rocky Mt. For. and Range Exp. Stn, Fort Collins, CO. 32 pp.

SOUTHERN ROCKY MOUNTAINS ECOREGION
ALPINE TUNDRA FELL-FIELD—SMALL PATCH

Minuartia obtusiloba Herbaceous Vegetation
Paronychia pulvinata - Silene acaulis Cushion plant vegetation
Saxifraga chrysantha Herbaceous Vegetation
Sparse cushion plant vegetation

SCALE AND RANGE: SMALL PATCH AND WIDESPREAD

Alpine tundra fell-field ecological system is a small patch system scattered throughout the alpine zone of the Southern Rocky Mountains ecoregion, usually between 11,000 to 14,000 feet. This system is characterized by immature soils with nearly imperceptible horizon layers. Gravel and sand dominate the top horizons. This system may be found on gentle to steep slopes with varying aspects. The primary factor dictating the sparse character of a fell-field is wind. Wind scoures fell-fields free of snow in the winter, exposing the plants to the severest environmental stress on the tundra. During the summer, wind also blasts across the open surface and the fell-fields broil under the intense solar radiation of high altitudes. The soil drains so rapidly and retains so little moisture that fell-field plants must be specifically adapted for survival in low moisture, high dessication regions. Most fell-field plants are cushioned or matted, frequently succulent, flat to the ground in rosettes and often densely haired and thickly cutinized. Plants cover 15-50%, while exposed rocks make up the rest. Dominant species include *Minuartia obtusiloba, Paronychia pulvinata, Saxifraga chrysantha, Silene acaulis, Polemonium* spp, and *Eriogonum* spp. A true fell-field remains stable for hundreds, maybe thousands, of years until the soil builds up. Fell-fields are usually within or adjacent to alpine tundra dry meadows. This system is also found in the alpine zones of the other Rocky Mountain ecoregions.

Major threats to this system are fragmentation by roads and degradation through mining and ski development.

MINIMUM SIZE: 5 acres

SEPARATION DISTANCES: 1) substantial barriers to natural processes or species movement, including, major highways, urban development, mining, and ski industry development, 2) natural community from a different ecological system wider than one mile wide.

<u>Justification:</u> Primary criteria to be considered are small mammal movement, e.g., marmots and pikas. The separation distance for intervening natural communities assumes different snow retention regime.

RANK PROCEDURE: 1) condition, 2) landscape context, 3) size. Condition and landscape context are the primary ranking factors, with size secondary.

CONDITION SPECIFICATIONS:
A –rated condition: Human disturbance from mining, road building, trails, ski development, or other human activity is non-existent.

B- rated condition: Human disturbance from mining, road building, trails, or ski development is limited to less than 3% of the occurrence.

C-rated condition: Human disturbance from mining, road building, trails, or ski development is limited to less than 5% of the occurrence.

D –rated condition: Human disturbance from mining, road building, trails, or ski development is greater than 10% of the occurrence.

<u>Justification for A-rated criteria</u>: Fell-fields in the Southern Rocky Mountains are generally undisturbed by livestock grazing and therefore phyisical disturbance is the primary alteration to condition. Disturbance to this fragile alpine environment may take over 500 years to recover. A-ranked occurrences are completely intact allowing for heavy winds to maintain little to no snow cover.

<u>Justification for C/D threshold:</u> C-ranked occurrences have potential for restoration over several decades. D-ranked occurrences have little or no potential for restoration because of extensive degradation such as from earth movement.

SIZE SPECIFICATIONS:
A – rated size: Very large (> 50 acres)
B –rated size: Large (20 - 50 acres)
C –rated size: Moderate (5 - 20 ac)
D –rated size: Small (<5 ac)

<u>Justification for A-rated criteria</u>: Occurrences of this size would likely contain sufficient internal variability to capture characteristic biophysical gradients and retain natural geomorphic and hydrologic disturbance. They are buffered from edge effects and small surface disturbances.

<u>Justification for C/D threshold</u>: C-ranked occurrences are large enough to sustain some natural or human caused perturbations. While D-ranked occurrences are too small to remain viable from surface disturbances. They may also be too small to harbor viable populations of small mammals, e.g., pikas.

LANDSCAPE CONTEXT SPECIFICATIONS:
A-rated landscape context: Surrounding lands are largely unaltered by human development (>98% natural). No unnatural barriers present. Connectivity of habitats allows natural processes and species migration to occur.

B-rated landscape context: Surrounding lands have been altered by human development but are > 90% natural. Examples of human development are sheep grazing, mining, road building, and ski development. Connectivity to the surrounding alpine environment is very much intact.

C-rated landscape context: Surrounding lands have been altered by human development but are > 75% natural. Connectivity to the surrounding alpine environment is hindered which curtails natural migration/movement of fell-field species, e.g., pikas.

D-rated landscape context: Lands surrounding occurrence have been severely altered by human development (<75% natural). Connectivity and natural processes are almost nonexistent. Restoration is not feasible within a reasonable time frame.

<u>Justification for A-rated criteria</u>: These occurrences are within an intact alpine mosaic allowing for natural species migration and movement. Fell-fields are fully connected with natural alpine environment and buffered from human impact.

<u>Justification for C/D threshold</u>: C-ranked occurrences have some limited buffering from human impact to the alpine environment and are within a mostly natural alpine mosaic. D-ranked occurrences have no buffering, and are subject to altered species composition which cannot be recolonized because of lack of connectivity with other patches.

AUTHORSHIP: Renée Rondeau
Date: July 14, 2000 (edited February 27, 2001)

SOUTHERN ROCKY MOUNTAINS ECOREGION
ALPINE DWARF SHRUBLAND — LARGE PATCH

Salix arctica - Salix reticulata ssp. *nivalis* Dwarf-shrubland
Salix arctica / Geum rossii Dwarf-shrubland
Vaccinium (cespitosum, scoparium) Dwarf-shrubland

SCALE AND RANGE: LARGE PATCH AND WIDESPREAD

Alpine dwarf shrubland is a large patch ecological system that occurs in less than 1% of the Southern Rocky Mountains ecoregion. This system is found only at the highest elevations of the ecoregion, usually above 12,000 feet. The system is commonly comprised of a mosaic of "large patch" plant communities, especially *Salix arctica, S. reticulata,* and *Vaccinium* spp. It occurs primarily on gentle slopes and depressions where the snow lingers and the soil has become relatively stabilized and the water supply is more or less constant. Vegetation in these areas is controlled by snow retention, wind desiccation, permafrost, and a short growing season. These large late-season snow fields are often found in the upper reaches of large bowls with coarser soils than the surrounding alpine tundra dry-meadow. Fell-fields often intermingle with the alpine dwarf shrubland.

The Uncompahgre fritillary (*Boloria improba* ssp. a*cronema*) uses *Salix reticulata* ssp. *nivalis* as a host plant. Therefore viable populations of the fritillary is an indicator of a healthy and adequately large occurrence of an alpine Dwarf-shrubland. In addition, Ptarmigan, Rosy finches, and American pipit may use this system at different times in their life cycle and have been chosen as indicators of a healthy occurrence of alpine systems.

MINIMUM SIZE: 1000 acres

SEPARATION DISTANCES: 1) substantial barriers to natural processes or species movement, including urban development greater than ½ mile wide, major highways, or 2) a different natural ecological system greater than 1 mile wide.

<u>Justification:</u> Primary criteria to be considered are the reaction of native species to fragmentation, seed dispersal by dominant forbs and graminoids and the connectivity for small mammals, e.g., pikas, marmots, pocket gophers, shrews, etc.

RANK PROCEDURE: 1) condition, 2) landscape context, 3) size. Occurrence size criteria may not be as critical for patch communities as it is for matrix-forming communities (Anderson 1999). Factors such as the landscape context current condition, and historical continuity may contribute more to the diversity of an occurrence than does occurrence size, although the species-area relationship still holds up for patch type communities.

CONDITION SPECIFICATIONS:
The following sources have good discussions about alpine condition: Schwan and Costello (1951) and Thilenius (1975).

A-rated conditions: A continuous mat of mulch in sheltered places. No sod breaks, scalped areas, trailing, hummocking, or gravel fans. Natural microrelief is undisturbed. Soil erosion is not accelerated by anthropogenic activities. No surficial disturbance is evident or if present than in only small, isolated areas and limited to <1% (e.g. mines or ranch activities and buildings; off-road vehicle use). Sheep grazing has not been present for the last ten years. There are few or no roads or trails found within the occurrence.

B-rated condition: Some limited exposed stony areas, are present. Minor sod breaks and snowbank trailing may be noticeable, but only where sheep tend to congregate. Scalped areas, pedestalling and gullying are absent. Native species that increase with sheep grazing have less than 10% cover. Ground cover is intact in at least 80% of the occurrence. Soil erosion may be slightly elevated due to anthropogenic activities. Surficial disturbance, e.g. mines, ranch activities, buildings, off-road vehicles, etc., if present, limited to less than 5% of the occurrence. There are only a few roads/trails found within the occurrence.

C-rated condition: Evidence of sheep grazing is distinctly noticeable but is capable of remedy in a reasonable length of time and with moderate management changes. Mulch may be in broken patches with as much as 30% bare ground showing. Sod breaks and scalped places may be locally present. Surficial disturbances occur on less than 20% of the area (e.g., mines or ranch activities and buildings; off-road vehicle use). Roads may be scattered throughout the occurrence.

D-rated condition: The severely depleted condition is seldom encountered over extensive areas in the alpine tundra. Destructive grazing/mining etc., is usually confined to readily accessible areas. These present a ragged, broken, trailed-out appearance. Mulch is mostly depleted, although in less accessible places it may approach 30%. The ragged appearance of thinly vegetated summits and slopes, caused by sod-cutting, is a distinctive feature. Sod breaks and scalped places are usually common, and slopes are badly trailed. Numerous shallow to deep gullies are evident at the heads of drainages. Stream banks are cut, raw, and sharp. There is often much snowbank trialing. Surficial disturbances occur on more than 20% of the area (e.g., mines or ranch activities and buildings; off-road vehicle use). Many roads or trails may be found within the occurrence.

<u>Justification for A-rated criteria:</u> characteristic ecological gradients and variation remain intact supporting interactions among component species. Natural disturbances can occur on a scale that permits maintenance of a diverse mosaic of communities.

<u>Justification for C/D threshold:</u> C-ranked occurrences would naturally improve in condition with a change in management practices, with significant recovery expected within 100 years. D-ranked occurrences will not likely to improve and are prone to irreversible changes in composition. Significant emphasis is placed on the relative loss of the topsoil, which may take as long as 500 years to be replaced. Emphasis is also placed in the degree of fragmentation from roads and the amount of accelerated soil erosion.

SIZE SPECIFICATIONS:
A – rated size: Very large (> 3000 acres)
B –rated size: Large (2000 to 3000 acres)
C –rated size: Moderate (1000 - 2000 ac)
D –rated size: Small (<1000 ac)

<u>Justification for A-rated criteria:</u> A-ranked occurrences of this size would likely contain sufficient internal variability to capture characteristic biophysical gradients and retain natural geomorphic disturbance, and would most likely survive accelerated erosion disturbance problems.

<u>Justification for C/D threshold:</u> stands smaller than C-ranked may be viable if they are surrounded by naturally occurring vegetation, or if it occupies all of the available habitat in an un-altered, unfragmented valley. As a rule, smaller stands lack variability, have largely disturbed or altered natural geomorphic disturbance processes and are surrounded by altered landscapes. The primary criteria considered are loss of diversity from livestock grazing and fragmentation by roads.

LANDSCAPE CONTEXT SPECIFICATIONS:
A-rated landscape context: Highly connected – surrounding landscape has been little altered, captures the characteristic ecological gradients and geomorphic processes, and the occurrences are completely surrounded by other high quality communities.

B-rated landscape context: occurrence is surrounded by moderate-low quality natural communities, some of which may have been disturbed in the past; an expansive semi-natural landscape that has been used extensively for livestock grazing.

C-rated landscape context: Moderately fragmented and isolated -- occurrences are surrounded by a mix of intensive mining, logging, or ski industry development, and adjacent semi-natural communities.

D-rated landscape context: Highly fragmented and isolated -- area around the occurrence is entirely, or almost entirely, surrounded by mining, logging, or ski industry development.

<u>Justification for A-rated criteria:</u> Characteristic ecological gradients remain intact supporting interactions among component species. Natural disturbances can occur on a scale that permits maintenance of patches of the community in a variety of conditions.

Justification for C/D threshold: Characteristic ecological gradients lacking or otherwise disrupted, with irretrievable impacts on habitat requirements for component species.

AUTHORSHIP: Renée Rondeau
Date: July 14, 2000

LITERATURE CITED:

Anderson M. G. 1999. Viability and spatial assessment of ecological communities in the northern Appalachian ecoregion. Phd. Dissertation. University of New Hampshire.

Schwan H. E. and D. F. Costello. 1951. The Rocky Mountain alpine type: Range conditions, trends and land use (a preliminary report). USDA, Forest Service, Fort Collins, CO.

Thilenius J. F. 1975. Alpine range management in the western United States--principles, practices, and problems: The status of our knowledge. USDA For. Serv. Res. Pap. RM-157, Rocky Mt. For. and Range Exp. Stn, Fort Collins, CO. 32 pp.

SOUTHERN ROCKY MOUNTAINS ECOREGION
ALPINE/SUBALPINE WET MEADOW—SMALL PATCH

Calamagrostis stricta Herbaceous Vegetation
Caltha leptosepala - Deschampsia cespitosa Herbaceous Vegetation
Caltha leptosepala - Polygonum bistortoides Herbaceous Vegetation
Caltha leptosepala - Sedum rhodanthum Herbaceous Vegetation
Caltha leptosepala Herbaceous Vegetation
Cardamine cordifolia - Caltha leptosepala Herbaceous Vegetation
Cardamine cordifolia - Mertensia ciliata Herbaceous Vegetation
Carex illota Herbaceous Vegetation
Carex microptera Herbaceous Vegetation
Carex scopulorum - Caltha leptosepala Herbaceous Vegetation
Carex vernacula Herbaceous Vegetation
Deschampsia cespitosa - Carex nebrascensis Herbaceous Vegetation
Deschampsia cespitosa - Ligusticum tenuifolium Herbaceous Vegetation
Deschampsia cespitosa - Phleum alpinum Herbaceous Vegetation
Deschampsia cespitosa Herbaceous Vegetation
Eleocharis quinqueflora *Herbaceous Vegetation*
Geum rossii - Sibbaldia procumbens Herbaceous Vegetation (often sign of disturbance)
Glyceria borealis Herbaceous Vegetation
Phippsia algida Herbaceous Vegetation
Rorippa alpina Herbaceous Vegetation
Saxifraga odontoloma Herbaceous Vegetation
Sibbaldia procumbens - Polygonum bistortoides Herbaceous Vegetation (often sign of disturbance)
Trifolium parryi Herbaceous Vegetation (often sign of disturbance)

SCALE AND RANGE: SMALL PATCH AND WIDESPREAD

Alpine/subalpine wet meadow ecological system is a small patch system confined to specific environments defined primarily by hydrology. Water levels are at or near the surface for much (or all) of the growing season, although some fluctuation may also occur as a function of precipitation and temperature patterns. Alpine/subalpine wet meadows may have surface water for part of the year, but depths rarely exceed a few centimeters. Soils of this system may be mineral or organic. In either case, soils show typical hydric soil characteristics, including high organic content and/or low chroma and redoximorphic features. This system often occurs as a mosaic of several plant associations with varying dominant herbaceous species that may include *Calamagrostis stricta, Caltha leptosepala, Cardamine cordifolia, Carex illota, C. microptera, C. scopulorum, C. vernacula, Deschampsia cespitosa, Eleocharis quinqueflora, Glyceria borealis, Phippsia algida, Rorippa alpina* and *Trifolium parryi.* Often alpine dwarf shrublands, especially those dominated by *Salix*, are immediately adjacent to the wet meadows. Wet meadows are tightly associated with snowmelt and typically not subjected to high disturbance events such as flooding.

Within the Southern Rocky Mountains ecoregion, this system is widely distributed, although usually limited to small areas. It is also found in the subalpine zones from Canada to southern New Mexico.

MINIMUM SIZE: 1 acre

SEPARATION DISTANCES: 1) substantial barriers to natural processes or species movement, including cultural vegetation greater than ¼ mile wide, major highways, urban development, or large bodies of water. 2) natural community from a different ecological system greater than ½ mile wide, 3) major break in environmental factors such as topography, soils, geology, etc., especially one resulting in a hydrologic break.

Justification: Primary criteria to be considered are the hydrologic system and the surrounding landscape. The separation distance for intervening natural or semi-natural communities assumes a different hydrologic regime that would inhibit movement of wetland associated species. Alpine/subalpine wet meadows are often isolated hydrologically from other wetlands, and easily impacted by surrounding land use.

RANK PROCEDURE: 1) condition, 2) landscape context, 3) size. Condition and landscape context are the primary ranking factors, with size secondary because even small examples of this system can have high biological significance.

CONDITION SPECIFICATIONS:
A –rated condition: Natural hydrologic regime intact. No or little evidence of wetland alteration due to increased or decreased drainage, clearing, livestock grazing, anthropogenic nutrient inputs, etc. No or very few exotic species present with no or little potential for expansion. Native species that increase with disturbance or changes in hydrology/nutrients are absent or low in abundance.

B- rated condition: Natural hydrologic regime nearly intact. Alteration from local drainage, clearing, livestock grazing, or nutrient inputs is easily restorable by ceasing such activities. Few exotic species with little potential for expansion if restoration occurs. Native species that increase with disturbance or changes in hydrology/nutrients are absent, low in abundance, or restricted to disturbed or high-nutrient microsites that represent less than 5% of the total wetland area.

C-rated condition: Natural hydrologic regime altered by local drainage or other disturbances. Alteration from local drainage, clearing, livestock grazing, etc., is extensive, but potentially restorable over several decades. Exotic species may be widespread but potentially manageable. Native species that increase with disturbance or changes in hydrology/nutrients may be very prominent.

D –rated condition: Natural hydrologic regime or disturbance to site not restorable. System remains fundamentally compromised despite restoration of some processes. Exotic species may be dominant. Native species that increase with disturbance or changes in hydrology/nutrients are prominent to dominant.

Justification for A-rated criteria: Alpine tundra wet meadows in the Southern Rocky Mountains depend on perennial water regime, largely from snowpack and seasonally to permanently saturated soils. Alteration of the hydrologic regime invariably compromises the natural communities. Other anthropogenic influences (grazing, nutrient inputs) can significantly alter community composition by shifting competitive interactions. Non-native species (e.g., *Poa pratensis*), when in sufficient number, can displace native species. A-ranked occurrences have these hydrologic processes intact, thereby supporting the historic species composition, nutrient status, or other natural components of the wetland.

Justification for C/D threshold: C-ranked occurrences have potential for restoration over several decades. D-ranked occurrences have little or no potential for restoration because of extensive degradation.

SIZE SPECIFICATIONS:
Condition and landscape context are the primary ranking factors, with size secondary because even small examples of this system can have high biological significance.
A – rated size: Very large (> 75 acres)
B –rated size: Large (20 to 75 acres)
C –rated size: Moderate (1 to 20 ac)
D –rated size: Small (< 1 ac)

Justification for A-rated criteria: Alpine/subalpine wet meadow ecological system is usually composed of a mosaic of different plant associations. Very large occurrences would likely contain the maximum diversity of species and plant associations. Occurrences of this size would also likely contain sufficient internal variability to capture characteristic biophysical gradients, retain natural geomorphic features, and allow for natural disturbance regimes (e.g., annual flooding). The core of very large occurrences are buffered from edge effects and small hydrology alterations along their periphery.

Justification for C/D threshold: C-ranked occurrences are large enough to contain moderate diversity of species and plant associations, and to sustain some natural or human caused perturbations. While D-ranked occurrences are noticeably lacking in diversity, and are too small to remain viable with even small changes to the hydrologic regime. They are also extremely susceptible to invasions by non-natives making them subject to loss of wet meadow plant associations and their associated plants and animals.

LANDSCAPE CONTEXT SPECIFICATIONS:
A-rated landscape context: Uplands surrounding occurrence are largely unaltered (>95% natural) by urban or agricultural uses such as clearcuts, crop cultivation, land development, or heavy grazing. There are no unnatural barriers present to inhibit movement of organisms and materials across system boundaries. Connectivity of habitats allows natural processes and species migration to occur.

B-rated landscape context:
Uplands within ¼ mile of the occurrence with minimal urban or agricultural alteration (>90% natural), and with no major barriers to water or organism movement across the system boundaries. The landscape has high connectivity, because there are few unnatural barriers present between patches of native vegetation that would inhibit species movement. Some natural processes on the landscape such as flooding, grazing, and fire may have altered frequencies or intensities

C-rated landscape context: Uplands surrounding occurrence are fragmented by urban or agricultural alteration (>80% natural), with limited connectivity between the occurrence and important components of the surrounding landscape. Some barriers are present that inhibit movement of organisms and materials across the landscape. Natural processes (e.g., fire, flood) have either been eliminated or have greatly altered frequencies and intensities. Activities (development, clearcuts, heavy grazing, etc.) in surrounding uplands alter the hydrologic regime. Restoration of the hydrologic regime and species composition resembling the historic composition is feasible.

D-rated landscape context: Uplands surrounding occurrence are mostly converted to agricultural or urban uses. Connectivity almost nonexistent and natural processes severly altered. Restoration is not feasible within reason.

Justification for A-rated criteria: These occurrences are within nearly intact watersheds with intact ecological processes resulting in natural system structure and function. Wetlands are fully connected with other occurrences of this system, and with natural intact uplands. The wetlands are fully buffered from upland influences.

Justification for C/D threshold: C-ranked occurrences have some limited buffering from upland influences, they are connected (although minimally) with other natural systems in the surrounding landscape, and the hydrologic regime and nutrient status has not been completed altered by upland influences. With some effort, system function for C-ranked occurrences could be improved. D-ranked occurrences have little or no buffering, and are subject to altered hydrology and invasive species. Natural hydrologic processes are severely altered causing a shift in species composition and altering the entire complex. D-ranked occurrences are missing fundamental components that prohibit restoration.

AUTHORSHIP: Renée Rondeau and John Sanderson
Date: July 14, 2000 (edited February 26, 2001)

SOUTHERN ROCKY MOUNTAINS ECOREGION
BRISTLECONE – LIMBER PINE FOREST AND WOODLAND ECOLOGICAL SYSTEM—LARGE PATCH

Pinus aristata / Festuca arizonica Woodland
Pinus aristata / Festuca thurberi Woodland
Pinus aristata / Ribes montigenum Woodland
Pinus aristata / Juniperus communis Woodland
Pinus aristata / Trifolium dasyphyllum Woodland
Pinus aristata / Vaccinium myrtillus Woodland
Pinus flexilis / Arctostaphylos uva-ursi Woodland

Pinus flexilis / Calamagrostis purpurascens Woodland
Pinus flexilis / Festuca kingii Woodland
Pinus flexilis / Juniperus communis Woodland

SCALE AND RANGE: LARGE PATCH AND WIDESPREAD
Bristlecone – limber pine forest and woodland ecological system is a large patch system that occurs in approximately 0.5% of the Southern Rocky Mountains (SRM) ecorgeion. Bristlecone pine is a near endemic to the SRM and is found in the Front, Mosquito, Sawatch, San Juan, and Sangre de Cristo ranges (Ranne 1995). Outside of SRM, it is only found on the San Francisco Peaks in Arizona. Bristlecone pine is also the oldest living tree species in the Rocky Mounatins (Ranne 1995). An ancient bristlecone pine forest in Park County was recently found to contain a tree over 2,400 years old (Brunstein and Yamaguchi 1992). Limber pine is more widely distributed and is found in many other ecoregions. It largely replaces bristlecone pine north of I-70.

The bristlecone – limber pine forest and woodland ecological system occupies dry, rocky, windswept ridges and slopes, primarily south-facing. While limber pine can be found at nearly all forested elevations within the ecoregion, bristlecone pine is found only above 9,000 feet.

Although limber and bristlecone pine may occur together, they appear to react very differently to fires. Baker (1992) states that the unimodal distribution of size classes in most mature stands and the near absence of seedlings in these stands, together with abundant seedlings in recently burned stands, suggest that bristlecone pine regenerates primarily following fires. Limber pine apparently does not withstand fires and primarily becomes established from Clark nutcraker caches. However these caches may be uncovered by fires (http://www.fs.fed.us/database/feis/).

J. Coles (pers. comm.) believes bristlecone/limber pine woodlands fall into one of two basic types 1) ancient woodlands on scree, talus, ashflow or other sparsely vegetated substrate, and 2) mixed forest with Douglas-fir, Engelmann spruce, aspen, lodgepole pine, etc. Fire is not a factor in the ancient stands, but nutcrackers (and possibly pine squirrels) are critical. The more closed mixed forest types differ ecologically, in composition, structure, and process than do the ancient forests. The ancient stands often occupy a small area from 5-10 acres.

MINIMUM SIZE: 300 acres.

SEPARATION DISTANCES: 1) substantial barriers to natural processes or species movement, including cultural vegetation greater than one mile wide, major highways, or urban development. 2) natural community from a different ecological system wider than one mile wide, or 3) major break in topography, soils, geology, etc.

<u>Justification:</u> Primary criteria to be considered are fires, snow avalanches, and Clarks nutcrackers. Fire appears to be necessary for bristlecone pine regeneration. Snow avalanches have removed large patches of *P. aristata* forests, resulting in forests with alternating strips of forest and treeless patches (Ranne 1995). The separation distance for intervening natural or semi-natural communities assumes a distinct landscape difference that is not conducive to species migration.

RANK PROCEDURE: 1) condition, 2) size, 3) landscape context. Equal weighting is given to all ranking factors.

CONDITION SPECIFICATIONS:
A –rated condition: No or little evidence of alteration of the system due to excessive livestock grazing, fire suppression, past or current mining operation, recreation, fragmentation, etc. If the occurrence is fragmented it is due to natural breaks, e.g., avalanche chute or aspect. No or very few exotic species present with no potential for expansion. Multiple age classes of bristlecone or limber pine are present, although many ancient stands naturally have little regeneration (J. Coles, pers. com.).

B- rated condition: Some evidence of an altered system due to excessive livestock grazing, fire suppression, past or current mining operation, recreation, etc. Occurrence may be slightly fragmented due to roads but these fragments are small enough that fires could still proceed. Few to no exotic species with little potential for expansion if restoration occurs.

C-rated condition: Excessive livestock grazing, fire suppression, or past or current mining operation, recreation, etc. is impacting the species composition and altering the natural fire regime.

D –rated condition: The site is not restorable within the next 25 years. System remains fundamentally compromised despite restoration of some processes. Exotic species may be dominant. Soil compaction and continued disturbance is extensive throughout the occurrence. Bristlecone pine or limber pine does not have the opportunity to regenerate, often due to the lack of fires.

Justification for A-rated criteria: Bristlecone pine and limber pine systems may be dependent on fires to open up the serotinous cones or Clarks nutcracker caches. Occurrences altered by livestock grazing, etc., may reduce chances of fire as well as alter the native species composition. A-ranked occurrences have processes, species composition, and the physical environment intact.

Justification for C/D threshold: C-ranked occurrences have potential for restoration over several decades. D-ranked occurrences have little or no potential for restoration because of extensive degradation.

SIZE SPECIFICATIONS:
A – rated size: Very large (> 2000 acres)
B –rated size: Large (1000 to 2000 acres)
C –rated size: Moderate (300 - 1000 ac)
D –rated size: Small (<300 ac)

Justification for A-rated criteria: Occurrences of this size would likely contain sufficient internal variability to capture characteristic biophysical gradients and retain natural geomorphic disturbance. They are buffered from edge effects. Occurrences of this size would most likely support a mosaic fire pattern.

Justification for C/D threshold: C-ranked occurrences maintain a size that will allow for a complex structure allowing for several plant associations to occur and natural ecological processes to occur. While D-ranked occurrences are too small to remain viable with natural or unnatural changes to the hydrology or surrounding landscape and are easily subject to loss of plant associations and their associated plants and animals.

LANDSCAPE CONTEXT SPECIFICATIONS:
A-rated landscape context: Adjacent systems are unaltered by urban, agricultural, or forestry uses (> 90% natural). No barriers present. Connectivity of adjacent systems allows natural ecological processes, e.g., fires and avalanches to occur.

B-rated landscape context: Limited or minor human-caused alteration of adjacent systems. Adjacent systems surrounding occurrence have moderate urban, agricultural or forestry use (60-90% natural) but retaining much connectivity. Few non-natural barriers present.

C-rated landscape context: Local or moderate human-caused alteration of adjacent systems. Adjacent systems surrounding occurrence are fragmented by alteration (20 – 60% natural), with limited connectivity. Some non-natural barriers are present. Significant, but easily restorable.

D-rated landscape context: Major human-caused alteration of adjacent systems. Adjacent systems surrounding occurrence are mostly converted to agricultural or urban uses or the surrounding forest has been clearcut. Connectivity is severely hampered.

Justification for A-rated criteria: The bristlecone – limber pine system exist in a natural fire regime that is necessary for seed germination. The system is fully connected with natural intact vegetation allowing for species migration and is fully buffered by a natural landscape.

Justification for C/D threshold: C-ranked occurrences have some limited buffering from invasive species and altered fire regime. While D-ranked occurrences have no buffering, and are subject to altered fire regime and invasive species.

AUTHORSHIP: Renée Rondeau
Date: July 6, 2000

LITERATURE CITED:

Baker W. L. 1992. Structure, disturbance, and change in the bristlecone pine forests of Colorado. Arctic and Alpine Research 24(1): 17-26.

Brunstein F. C. and D. K. Yamaguchi. 1992. The oldest known Rocky Mountain bristlecone pines (*Pinus aristata* Engelm.). Arctic and Alpine Research 24(3): 253-256.
Ranne B. M. 1995. Natural variability of vegetation, soils, and physiography in the bristlecone pine forests of the Rocky Mountains. University of Wyoming, Laramie, WY 68 pp.

SOUTHERN ROCKY MOUNTAINS ECOREGION
SPRUCE-FIR DRY – MESIC FOREST ECOLOGICAL SYSTEM --MATRIX

Abies lasiocarpa - Picea engelmannii Ribbon Forest
Abies lasiocarpa / Carex geyeri Forest
Abies lasiocarpa / Juniperus communis Woodland
Abies lasiocarpa / Mahonia repens Forest
Abies lasiocarpa / Moss Forest
Abies lasiocarpa / Vaccinium cespitosum Forest
Abies lasiocarpa / Vaccinium myrtillus Forest
Abies lasiocarpa / Vaccinium scoparium Forest
Picea engelmannii / Moss Forest
Picea engelmannii / Polemonium pulcherrimum Forest
Picea engelmannii / Vaccinium myrtillus Forest
Populus tremuloides - Abies lasiocarpa / Juniperus communis Forest

SCALE AND RANGE: MATRIX AND WIDESPREAD

Spruce–fir dry-mesic forest and spruce-fir moist-mesic forest ecological systems form the primary matrix systems of the montane and subalpine zones of the Southern Rocky Mountains (SRM) ecoregion. Over 10% of SRM is within these two systems occupying nearly 1.3 million hectares (Alexander et al. 1984, Alexander 1987, Whipple and Dix 1979). In addition to being the primary montane/subalpine matrix forming forest of SRM it is common in the subalpine region from Canada to southern New Mexico.

Individual community types may be matrix or large patch in character, though most typically occur as a mosaic of large patches across the landscape. Spruce-fir dominated stands occur on all but the most xeric sites above 3100 m, and in cool, sheltered valleys at elevations as low as 2500 m. The relative dominance of the two canopy tree species and the understory composition vary substantially over a gradient from excessively moist to xeric sites (Peet 1981). The mesic spruce-fir type occurs on cool, sheltered, but well-drained sites above 2700 m and is one of the most widespread forest types in the subalpine zone. Open slopes above 3000 m are typically characterized by Peet's (1981) xeric spruce-fir type, with varying amounts of lodgepole and limber pine. Towards lower elevations, the spurce-fir types give way, often along abrupt fire-induced boundaries, to lodgepole pine or aspen-dominated forests.

Spruce-fir forest also exhibit changes with latitude including treeline elevation, species composition, and dominance. Tree line occurs at over 3800 m at the southern end of the Southern Rocky Mountain ecoregion, whereas it does not exceed 3400 m at the northern end (Peet 1978). Fir increases in importance with increasing latitude, and shares dominance with spruce at tree line over the northern half of the Southern Rocky Mountains ecoregion. Possible explanations for this geographic variation include a genetic differentiation in *Abies* at the southern end of the ecoregion and variation in moisture or exposure conditions experienced by these high-elevation forests. That the degree of dominance by A*bies* could, in part, reflect the degree of drought stress or exposure of the site is suggested by the absence of *Abies* in the forests of Pikes Peak, a xeric mountain (Peet 1978).

Fire, spruce-beetle outbreaks, avalanches, and windthrow all play an important role in shaping the dynamics of spruce-fir forests. Fires in the subalpine forest are typically stand replacing, resulting in the extensive exposure of mineral soil and initiating the development of new forests. Fifty year return interval for high intensity surface fires and 100-400 years return interval for crown fires which cover 1000 to 10,000 acres are noted for this ecological system (Peet 1981, Mutch 1991 as cited in Rio Grande National Forest USDFA Forest Service –Vice Spero Final Environmental impact statement). Depending on site conditions, spruce and fir may share the post-fire site with shade-intolerant species such as lodgepole pine, limber pine, and quaking aspen. Many stands in the subalpine zone of the Colorado Front range are of post-fire origin from c. mid 1700's (Veblen 1986). In subalpine forests of Rocky Mountain National Park, Colorado, there was an estimated 1 fire /4ha per 8100 sq km per year, prior to 1870 (Clagg 1975).

Spruce beetle (*Dendroctonus rufipennis*) outbreaks may be as significant as fire in the development of spruce-fir forests. In addition to fires and beetle kill, wind disturbance in spruce-fir forests has been well documented (Schaupp et al. 1999). Blowdowns involving multiple treefalls add to the mosaic of spruce-fir stands.

Under a natural disturbance regime, subalpine forests were probably characterized by a mosaic of stands in various stages of recovery from disturbance, with old-growth just one part of the larger forest mosaic (Peet 1981). This mosaic was constantly changing and highly variable from place to place, so the extent of presettlement old-growth forest is uncertain. The current subalpine landscape is perhaps more homogeneous (in terms of stand age) than in the presettlement era, mainly due to the sychronizing effect of very extensive, regional disturbance (e.g., fires in the mid 1700s, beetle outbreak in the mid to late 1800's (Peet 1981)).

Pine martens (*Martes americana*) are mostly a spruce-fir obligate that require a healthy and sizeable occurrence of mature forest. Therefore a viable population of pine martens has been chosen as an indicator of a healthy and viable occurrence of the spruce-fir system.

MINIMUM SIZE: 30,000 acres (minimum size for pine martens). See text under "Size" for more information.

SEPARATION DISTANCES: 1) substantial barriers to natural processes or species movement, including cultural vegetation (includes clearcuts/tree plantations) greater than one wide, major highways (e.g., I-70), or urban development; 2) a non spruce-fir ecological system wider than 1 mile wide.

<u>Justification</u>: Many of these communities occur naturally in a mosaic much of the time so minor breaks or small barriers are probably a very common part of the natural distribution and variability. If the breaks are larger, barriers may exist for some species.

RANK PROCEDURE: 1) size, 2) condition, 3) landscape context. Size is the most important ranking factor for matrix communities. Condition is of secondary importance and while landscape context is still important, it is slightly less so than the overall size and condition of an occurrence given the large extent of these systems.

CONDITION SPECIFICATIONS:
Spruce-fir forests are climax in the range that it occupies. No other tree species will replace spruce-fir, not withstanding disturbance. In younger stands subalpine fir may be the major component of the forest type. However, it is shorter lived than Engelmann spruce. Consequently, most of the overstory in a spruce-fir old-growth stand is Engelmann spruce. The understory may still have an abundance of subalpine fir due to its high tolerance to shade and vegetative layering. Engelmann spruce life span average 350 to 400 years with 500 year old or more trees common. Trees over 250 years are common for subalpine fir but most are 150 to 200 years old.

Romme (1982) established six postfire seral stages in a spruce-fir climax types:

Stage	**Age Range, years**
Herbaceous	0-20
Seedling-sapling	20-40
Immature spruce-fir forest	150-300
Transitional	300-400
Climax Forest	>400 to >450

Although the above seral stages were developed for Yellowstone National Park, it is thought to hold throughout the spruce-fir range. All of these types should be well represented in an ecoregional portfolio the later seral stages have a higher premium for pine martens (Fitzgerald et al. 1994).

The following condition specifications apply mostly to the late seral stages that pine martens prefer.

A -rated condition: A mature stand (transitional to climax stage) of spruce-fir forest characterized by large-diameter trees (mainly spruce), abundant large snags and logs, and multistoried vegetation. Multiple canopies exist with a wide range of canopy heights, with moderate class diversity. Approximately 10 trees per acre with a minimum DBH of 16 inches and the minimum age of approx. 150 years. Usually this is an uneven aged stand with approximately 2 dead standing trees per acre with a minimum DBH of 10 inches (Mehl 1992). This is a large, intact, unfragmented occurrence with few to no roads or trails. Although most of the occurrence is comprised of mature stands, some 10% is in early seral stages resulting from natural disturbances (e.g., fire, pine-beetle kill, windthrow). Logging, if present is limited to less than 10% of occurrence. The understory is dominated by native species with less than 1% non-natives. Invasive species are absent.

B -rated condition: Little to no evidence of past logging disturbance over a major proportion of the occurrence and majority of stand is > 150 years old, may show evidence of selective logging that has altered their structure. Although most of the occurrence is comprised of mature stands, some 20% or less is in early seral stages resulting from natural disturbances (e.g., fire, pine-beetle kill, windthrow). The understory is dominated by native species with less than 3% non-natives (no to little impact on ecological processes). Invasive species are absent. The occurrence is relatively unfragmented with few to no roads.

C -rated condition: Stands regenerated naturally after logging or young to mature stands with significant history of selective logging disturbance that altered composition or structure; non-native species may be uncommon to frequent but do not dominate or co-dominate understory (5-10% cover). Young (< 25 years old) even aged stand of spruce or fir with very low species diversity. Roads or trails may be scattered throughout the occurrence. ***Note**: These types of stands are seral to climax spruce-fir forest and <u>must</u> be represented within an ecoregional portfolio. Therefore, a site should be large enough to hold a mosaic that would have at least 10-20% of the mosaic in early seral stage).*

D -rated condition: Highly fragmented from roads, logging, ski development, mining, or other human activities. Soil loss/erosion is high and therefore negatively impacts the water quality within the immediate watershed.

<u>Justification for A-rated criteria</u>: Frequency of old-growth stands has been much reduced in this ecoregion, so old-growth carries a premium for condition. Pine martens were chosen as an indicator mammal for this system. They prefer undisturbed stands with hollow trees, logs, and diverse structure (Fitzgerald et al. 1994).

<u>Justification for C/D threshold</u>: C-ranked occurrences have potential for restoration over several decades. D-ranked occurrences have little or no potential for restoration because of extensive degradation.

SIZE SPECIFICATION:
A -rated size: Very large (>90,000 ac)
B -rated size: Large (50,000-90,000 ac)
C -rated size: Moderate (30,000-50,000 ac)
D -rated size: Small (<30,000 ac)

<u>Justification for A-rated criteria</u>: Occurrences should be large enough to support a mosaic of stand conditions, ages, and disturbance patterns. The home range size of a female lynx in Alberta and Alaska is 12 km^2 (Brand et al. 1976 cited in Fitzgerald et al. 1994). Assuming you need an area large enough to support 25 mature females the acreage needed is 75,000 acres. An A-ranked size would support more than a minimum viable population of both lynx and pine martens.

<u>Justification for C/D threshold</u>: Occurrences smaller than 30,000 acres is subject to edge effects and total destruction from a catastrophic event, e.g., a crown fire. In addition there is little opportunity for a mosaic of disturbance patterns. Pine martens probably require a minimum of 30,000 acres of a mature (> 150 years old) contiguous patch of forest for a viable population (Major et al. 1981 as cited in Anderson 1999).

LANDSCAPE CONTEXT SPECIFICATIONS:
A -rated landscape context: Occurrence surrounded by a large area of natural vegetation. A few small roads may exist in the surrounding landscape. Fire suppression in surrounding ecological systems are minimal to moderate.

B -rated landscape context: Occurrence surrounded by at least 80% natural or semi-natural vegetation. Fire suppression in surrounding ecological systems may be moderate.

C -rated landscape context: Occurrence surrounded by a mosaic of agricultural or semi-developed areas and natural or semi-natural vegetation, the latter composing 25-80% of the landscape, or landscape is dominated by very young tree plantations (cut within last 20 years).

D -rated landscape context: Occurrence surrounded primarily by urban or agricultural landscape, with <25% landscape cover of natural or semi-natural vegetation.

Justification for A-rated criteria: Connectivity intact. Natural processes can function. Edge effect is a proportionally small area.

Justification for C/D threshold: Landscape connectivity seriously impacted below about 35% cover of natural/semi-natural vegetation.

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DATE: July 17, 2000 (edited February 26, 2001)

LITERATURE CITED:

Alexander B. G. Jr., F. J. Ronco Jr., E. L. Fitzhugh and J. A. Ludwig. 1984. A classification of forest habitat types of the Lincoln National Forest, New Mexico. Gen. Tech. Rep. RM-143, USDA, For. Ser., Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO. 29 pp.

Alexander R. R. and F. J. Ronco Jr. 1987. Classification of the forest vegetation on the National Forests of Arizona and New Mexico. USDA Forest Service Rocky Mountain Forest and Range Experiment Station Research note RM-469: 1-10.

Anderson M. G. 1999. Viability and spatial assessment of ecological communities in the northern Appalachian ecoregion. University of New Hampshire.

Brand C. J., L. B. Keith and C. A. Fischer. 1976. Lynx responses to changing snowshoe hare densities in central Alberta. J. Wildl. Mgmt. (40): 416-428.

Clagg H. B. 1975. Fire ecology in high-elevation forests in Colorado . Colorado State University. Fort Collins, CO 137 pp. M. S. Thesis.

Fitzgerald J. P., C. A. Meaney and D. M. Armstrong. 1994. Mammals of Colorado. Denver Museum of Natural History and University Press of Colorado, Denver, Colorado.

Major J. T., J. D. Steventon and K. M. Wynne. 1981. Comparison of marten home ranges calculated from recaptures and radio locations. Trans. Northeast Sect. Wildl. Soc. 38: 109.

Mehl M. S. 1992. Old-growth descriptions for the major forest cover types in the Rocky Mountain region. Pages 106-120. In Kaufmann M. R., W. H. Moir, R. L. Bassett. Old-growth forests in the southwest and Rocky Mountain regions. Proceedings of a workshop, March 9-13, 1992, Portal, Arizona. USDA Forest Service, General Technical Report RM-213, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO. 201.

Peet R. K. 1978. Latitudinal variation in southern Rocky Mountain forests. J. of Biogeography 5: 275-289.

-----. 1981. Forest vegetation of the Colorado Front Range. Vagetatio 45: 3-75.

Romme W. H. 1982. Fire and landscape diversity in subalpine forests of Yellowstone National Park. Ecological Monographs 52(2): 199-221.

Schaupp W. C. J. F. M. and S. Johnson. 1999. Title Evaluation of the spruce beetle in 1998 within the Routt Divide blowdown of October 1997, on the Hahns Peak and Bears Ears Ranger Districts, Routt National Forest, Colorado. USDA Forest Service, Renewable Resources, Rocky Mountain Region, Lakewood, CO. 15 pp.

Veblen T. T. 1986. Age and size structure of subalpine forests in the Colorado Front Range. Bulletin of the Torrey Botanical Club 113(3): 225-240.

Whipple S. A. and R. L. Dix. 1979. Age structure and successional dynamics of a Colorado subalpine forest. Amer. Midl. Nat. 101: 142-158.

SOUTHERN ROCKY MOUNTAINS ECOREGION
SPRUCE-FIR MOIST– MESIC FOREST ECOLOGICAL SYSTEM --MATRIX

Abies lasiocarpa / Actaea rubra Forest
Abies lasiocarpa / Erigeron eximius Forest
Abies lasiocarpa / Rubus parviflorus Forest
Abies lasiocarpa / Saxifraga bronchialis Scree Woodland
Picea engelmannii / Trifolium dasyphyllum Forest
Populus tremuloides - Abies lasiocarpa / Amelanchier alnifolia Forest
Populus tremuloides - Abies lasiocarpa / Carex geyeri Forest

SCALE AND RANGE: MATRIX AND WIDESPREAD

Spruce–fir dry-mesic forest and spruce-fir moist-mesic forest ecological systems form the primary matrix systems of the montane and subalpine zones of the Southern Rocky Mountains (SRM) ecoregion. Over 10% of SRM is within these two systems occupying nearly 1.3 million hectares (Alexander et al. 1984, Alexander 1987, Whipple and Dix 1979). In addition to being the primary montane/subalpine matrix forming forest of SRM it is common in the subalpine region from Canada to southern New Mexico.

Individual community types may be matrix or large patch in character, though most typically occur as a mosaic of large patches across the landscape. Spruce-fir dominated stands occur on all but the most xeric sites above 3100 m, and in cool, sheltered valleys at elevations as low as 2500 m. The relative dominance of the two canopy tree species and the understory composition vary substantially over a gradient from excessively moist to xeric sites (Peet 1981). The mesic spruce-fir type occurs on cool, sheltered, but well-drained sites above 2700 m and is one of the most widespread forest types in the subalpine zone. Open slopes above 3000 m are typically characterized by Peet's (1981) xeric spruce-fir type, with varying amounts of lodgepole and limber pine. Towards lower elevations, the spurce-fir types give way, often along abrupt fire-induced boundaries, to lodgepole pine or aspen-dominated forests.

Spruce-fir forest also exhibit changes with latitude including treeline elevation, species composition, and dominance. Tree line occurs at over 3800 m at the southern end of the Southern Rocky Mountain ecoregion, whereas it does not exceed 3400 m at the northern end (Peet 1978). Fir increases in importance with increasing latitude, and shares dominance with spruce at tree line over the northern half of the Southern Rocky Mountains ecoregion. Possible explanations for this geographic variation include a genetic differentiation in *Abies* at the southern end of the ecoregion and variation in moisture or exposure conditions experienced by these high-elevation forests. That the degree of dominance by A*bies* could, in part, reflect the degree of drought stress or exposure of the site is suggested by the absence of *Abies* in the forests of Pikes Peak, a xeric mountain (Peet 1978).

Fire, spruce-beetle outbreaks, avalanches, and windthrow all play an important role in shaping the dynamics of spruce-fir forests. Fires in the subalpine forest are typically stand replacing, resulting in the extensive exposure of mineral soil and initiating the development of new forests. Fifty year return interval for high intensity surface fires and 100-400 years return interval for crown fires which cover 1000 to 10,000 acres are noted for this ecological system (Peet 1981, Mutch 1991 as cited in Rio Grande National Forest USDFA Forest Service –Vice Spero Final Environmental impact statement). Depending on site conditions, spruce and fir may share the post-fire site with shade-intolerant species such as lodgepole pine, limber pine, and quaking aspen. Many stands in the subalpine zone of the Colorado Front range are of post-fire origin from c. mid 1700's (Veblen 1986). In subalpine forests of Rocky Mountain National Park, Colorado, there was an estimated 1 fire /4ha per 8100 sq km per year, prior to 1870 (Clagg 1975).

Spruce beetle (*Dendroctonus rufipennis*) outbreaks may be as significant as fire in the development of spruce-fir forests. In addition to fires and beetle kill, wind disturbance in spruce-fir forests has been well documented (Schaupp et al. 1999). Blowdowns involving multiple treefalls add to the mosaic of spruce-fir stands.

Under a natural disturbance regime, subalpine forests were probably characterized by a mosaic of stands in various stages of recovery from disturbance, with old-growth just one part of the larger forest mosaic (Peet 1981). This mosaic was constantly changing and highly variable from place to place, so the extent of presettlement old-growth forest is uncertain. The current subalpine landscape is perhaps more homogeneous (in terms of stand age) than in the presettlement era, mainly due to the sychronizing effect of very extensive, regional disturbance (e.g., fires in the mid 1700s, beetle outbreak in the mid to late 1800's (Peet 1981)).

Pine martens (*Martes americana*) are mostly a spruce-fir obligate that require a healthy and sizeable occurrence of mature forest. Therefore a viable population of pine martens has been chosen as an indicator of a healthy and viable occurrence of the spruce-fir system.

MINIMUM SIZE: 30,000 acres (minimum size for pine martens). See text under "Size" for more information.
SEPARATION DISTANCES: 1) substantial barriers to natural processes or species movement, including cultural vegetation (includes clearcuts/tree plantations) greater than one wide, major highways (e.g., I-70), or urban development; 2) a non spruce-fir ecological system wider than 1 mile wide.

Justification: Many of these communities occur naturally in a mosaic much of the time so minor breaks or small barriers are probably a very common part of the natural distribution and variability. If the breaks are larger, barriers may exist for some species.

RANK PROCEDURE: 1) size, 2) condition, 3) landscape context. Size is the most important ranking factor for matrix communities. Condition is of secondary importance and while landscape context is still important, it is slightly less so than the overall size and condition of an occurrence given the large extent of these systems.

CONDITION SPECIFICATIONS:
Spruce-fir forests are climax in the range that it occupies. No other tree species will replace spruce-fir, not withstanding disturbance. In younger stands subalpine fir may be the major component of the forest type. However, it is shorter lived than Engelmann spruce. Consequently, most of the overstory in a spruce-fir old-growth stand is Engelmann spruce. The understory may still have an abundance of subalpine fir due to its high tolerance to shade and vegetative layering. Engelmann spruce life span average 350 to 400 years with 500 year old or more trees common. Trees over 250 years are common for subalpine fir but most are 150 to 200 years old.

Romme (1982) established six postfire seral stages in a spruce-fir climax types:

Stage	**Age Range, years**
Herbaceous	0-20
Seedling-sapling	20-40
Immature spruce-fir forest	150-300
Transitional	300-400
Climax Forest	>400 to >450

Although the above seral stages were developed for Yellowstone National Park, it is thought to hold throughout the spruce-fir range. All of these types should be well represented in an ecoregional portfolio the later seral stages have a higher premium for pine martens (Fitzgerald et al. 1994).

The following condition specifications apply mostly to the late seral stages that pine martens prefer.

A -rated condition: A mature stand (transitional to climax stage) of spruce-fir forest characterized by large-diameter trees (mainly spruce), abundant large snags and logs, and multistoried vegetation. Multiple canopies exist with a wide range of canopy heights, with moderate class diversity. Approximately 10 trees per acre with a minimum DBH of 16 inches and the minimum age of approx. 150 years. Usually this is an uneven aged stand with approximately 2 dead standing trees per acre with a minimum DBH of 10 inches (Mehl 1992). This is a large, intact, unfragmented occurrence with few to no roads or trails.

Although most of the occurrence is comprised of mature stands, some 10% is in early seral stages resulting from natural disturbances (e.g., fire, pine-beetle kill, windthrow). Logging, if present is limited to less than 10% of occurrence. The understory is dominated by native species with less than 1% non-natives. Invasive species are absent.

B -rated condition: Little to no evidence of past logging disturbance over a major proportion of the occurrence and majority of stand is > 150 years old, may show evidence of selective logging that has altered their structure. Although most of the occurrence is comprised of mature stands, some 20% or less is in early seral stages resulting from natural disturbances (e.g., fire, pine-beetle kill, windthrow). The understory is dominated by native species with less than 3% non-natives (no to little impact on ecological processes). Invasive species are absent. The occurrence is relatively unfragmented with few to no roads.

C -rated condition: Stands regenerated naturally after logging or young to mature stands with significant history of selective logging disturbance that altered composition or structure; non-native species may be uncommon to frequent but do not dominate or co-dominate understory (5-10% cover). Young (< 25 years old) even aged stand of spruce or fir with very low species diversity. Roads or trails may be scattered throughout the occurrence. ***Note****: These types of stands are seral to climax spruce-fir forest and* *<u>must</u>* *be represented within an ecoregional portfolio. Therefore, a site should be large enough to hold a mosaic that would have at least 10-20% of the mosaic in early seral stage).*

D -rated condition: Highly fragmented from roads, logging, ski development, mining, or other human activities. Soil loss/erosion is high and therefore negatively impacts the water quality within the immediate watershed.

<u>Justification for A-rated criteria</u>: Frequency of old-growth stands has been much reduced in this ecoregion, so old-growth carries a premium for condition. Pine martens were chosen as an indicator mammal for this system. They prefer undisturbed stands with hollow trees, logs, and diverse structure (Fitzgerald et al. 1994).

<u>Justification for C/D threshold</u>: C-ranked occurrences have potential for restoration over several decades. D-ranked occurrences have little or no potential for restoration because of extensive degradation.

SIZE SPECIFICATION:
A -rated size: Very large (>90,000 ac)
B -rated size: Large (50,000-90,000 ac)
C -rated size: Moderate (30,000-50,000 ac)
D -rated size: Small (<30,000 ac)

<u>Justification for A-rated criteria</u>: Occurrences should be large enough to support a mosaic of stand conditions, ages, and disturbance patterns. The home range size of a female lynx in Alberta and Alaska is 12 km^2 (Brand et al. 1976 cited in Fitzgerald et al. 1994). Assuming you need an area large enough to support 25 mature females the acreage needed is 75,000 acres. An A-ranked size would support more than a minimum viable population of both lynx and pine martens.

<u>Justification for C/D threshold</u>: Occurrences smaller than 30,000 acres is subject to edge effects and total destruction from a catastrophic event, e.g., a crown fire. In addition there is little opportunity for a mosaic of disturbance patterns. Pine martens probably require a minimum of 30,000 acres of a mature (> 150 years old) contiguous patch of forest for a viable population (Major et al. 1981 as cited in Anderson 1999).

LANDSCAPE CONTEXT SPECIFICATIONS:

A -rated landscape context: Occurrence surrounded by a large area of natural vegetation. A few small roads may exist in the surrounding landscape. Fire suppression in surrounding ecological systems are minimal to moderate.

B -rated landscape context: Occurrence surrounded by at least 80% natural or semi-natural vegetation. Fire suppression in surrounding ecological systems may be moderate.

C -rated landscape context: Occurrence surrounded by a mosaic of agricultural or semi-developed areas and natural or semi-natural vegetation, the latter composing 25-80% of the landscape, or landscape is dominated by very young tree plantations (cut within last 20 years).

D -rated landscape context: Occurrence surrounded primarily by urban or agricultural landscape, with <25% landscape cover of natural or semi-natural vegetation.

Justification for A-rated criteria: Connectivity intact. Natural processes can function. Edge effect is a proportionally small area.

Justification for C/D threshold: Landscape connectivity seriously impacted below about 35% cover of natural/semi-natural vegetation.

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DATE: July 17, 2000

LITERATURE CITED:

Alexander B. G. Jr., F. J. Ronco Jr., E. L. Fitzhugh and J. A. Ludwig. 1984. A classification of forest habitat types of the Lincoln National Forest, New Mexico. Gen. Tech. Rep. RM-143, USDA, For. Ser., Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO. 29 pp.

Alexander R. R. and F. J. Ronco Jr. 1987. Classification of the forest vegetation on the National Forests of Arizona and New Mexico. USDA Forest Service Rocky Mountain Forest and Range Experiment Station Research note RM-469: 1-10.

Anderson M. G. 1999. Viability and spatial assessment of ecological communities in the northern Appalachian ecoregion. University of New Hampshire.

Brand C. J., L. B. Keith and C. A. Fischer. 1976. Lynx responses to changing snowshoe hare densities in central Alberta. J. Wildl. Mgmt. (40): 416-428.

Clagg H. B. 1975. Fire ecology in high-elevation forests in Colorado . Colorado State University. Fort Collins, CO 137 pp. M. S. Thesis.

Fitzgerald J. P., C. A. Meaney and D. M. Armstrong. 1994. Mammals of Colorado. Denver Museum of Natural History and University Press of Colorado, Denver, Colorado.

Major J. T., J. D. Steventon and K. M. Wynne. 1981. Comparison of marten home ranges calculated from recaptures and radio locations. Trans. Northeast Sect. Wildl. Soc. 38: 109.

Mehl M. S. 1992. Old-growth descriptions for the major forest cover types in the Rocky Mountain region. Pages 106-120. In Kaufmann M. R., W. H. Moir, R. L. Bassett. Old-growth forests in the southwest and Rocky Mountain regions. Proceedings of a workshop, March 9-13, 1992, Portal, Arizona. USDA Forest Service, General Technical Report RM-213, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO. 201.

Peet R. K. 1978. Latitudinal variation in southern Rocky Mountain forests. J. of Biogeography 5: 275-289.

-----. 1981. Forest vegetation of the Colorado Front Range. Vagetatio 45: 3-75.

Romme W. H. 1982. Fire and landscape diversity in subalpine forests of Yellowstone National Park. Ecological Monographs 52(2): 199-221.

Schaupp W. C. J. F. M. and S. Johnson. 1999. Title Evaluation of the spruce beetle in 1998 within the Routt Divide blowdown of October 1997, on the Hahns Peak and Bears Ears Ranger Districts, Routt National Forest, Colorado. USDA Forest Service, Renewable Resources, Rocky Mountain Region, Lakewood, CO. 15 pp.

Veblen T. T. 1986. Age and size structure of subalpine forests in the Colorado Front Range. Bulletin of the Torrey Botanical Club 113(3): 225-240.

Whipple S. A. and R. L. Dix. 1979. Age structure and successional dynamics of a Colorado subalpine forest. Amer. Midl. Nat.

101: 142-158.

SOUTHERN ROCKY MOUNTAINS ECOREGION

LODGEPOLE PINE FOREST ECOLOGICAL SYSTEM --MATRIX

Pinus contorta / Arctostaphylos uva-ursi Forest
Pinus contorta / Carex geyeri Forest
Pinus contorta / Carex rossii Forest
Pinus contorta / Juniperus communis Woodland
Pinus contorta / Shepherdia canadensis Forest
Pinus contorta / Vaccinium scoparium Forest

SCALE AND RANGE: MATRIX AND WIDESPREAD

Lodgepole pine forest ecological system is a matrix-former that occupies nearly 6% of the Southern Rocky Mountain ecoregion. This system is also well represented in the Rocky Mountain ecoregions to the north but not to the south. In fact, lodgepole pine reaches the southernmost extension of its range at about the middle of the upper Gunnison Basin (Johnston 1997) and therefore the southern half of the Southern Rocky Mountains (SRM) ecoregion is void of lodgepole pine entirely. In the SRM ecoregion, lodgepole pine forests generally occur between 8,000-10,000 feet from gentle to steep slopes on all aspects. This system consists of extensive stands of pure lodgepole pine or, to a lesser extent, stands in association with other conifer species. Lodgepole pine is a successional species par excellence but may be climax under certain edaphic conditions, especially cold microclimate and thin, excessively drained soils (Hess and Alexander 1986). Lodgepole pine is shade intolerant and is an aggressive pioneer developing on sites recently opened up due to fire, insects, disease, windstorms, clearcutting, or other major stand removing disturbance. Lodgepole pine stands that are 350 to 400 years old exist but are uncommon (Mehl 1992). The average life span of lodgepole pine is probably closer to 250 years or less because of the frequency of stand replacing disturbances such as fire (Mehl 1992). Fires are more frequent in lodgepole pine than spruce-fir as they occur in a warmer and drier environment.

Lodgepole pine is generally considered a seral species. That is, it will be replaced by the more shade tolerant spruce or fir at the upper elevations and Douglas fir at the lower elevations. Most lodgepole pine stands become established after stand replacing events. There are instances when lodgepole pine can be considered climax (Mehl 1992). In areas where a seed source of more shade tolerant trees species does not exist or the site is marginal for other tree species, the lodgepole pine stand will not be replaced (Mehl 1992). Over successive generations the stand would develop a structure more consistent of old growth in shade tolerant species (Mehl 1992). Prior to fire suppression few stands would have had the opportunity to reach this structure (Mehl 1992).

Shrub and herbaceous layers are often poorly developed in lodgepole pine forests, and plant species diversity is low. This low understory diversity is probably related to the single age class and dense canopy of many stands.

Brown creeper, Williamson sapsucker, Boreal owl, Three-toed woodpecker, and Gray jay are indicators of a functioning lodgepole pine system (Pague, C. pers. com.).

MINIMUM SIZE: 30,000 acres (see Anderson 1999 for a good explanation for choosing size for matrix communities).

SEPARATION DISTANCES: 1) substantial barriers to natural processes or species movement, including cultural vegetation (includes clearcuts/tree plantations) greater than ½ wide, major highways, or urban development; 2) a different ecological system wider than ½ mile wide; 3) a major break or change in the ecological land unit (e.g. topography, soils, geology).

<u>Justification</u>: Many of these lodgepole pine forests occur naturally in a mosaic much of the time so minor breaks or small barriers are part of the natural distribution and variability. If the breaks are larger, barriers may exist for some species.

RANK PROCEDURE: 1) size, 2) condition, 3) landscape context**.** Size is the most important ranking factor for matrix communities. Condition is of secondary importance and while landscape context is still important, it is slightly less so than the overall size and condition of an occurrence.

CONDITION SPECIFICATIONS:
A -rated condition: A mature stand of lodgepole pine consists of approximately 10 trees per acre with a minimum DBH of 10 inches and the minimum age of approximately 150 years. Usually this is an even aged stand with approx. 2 dead standing trees per acre with a minimum DBH of 8 inches. Multiple tree species exist, e.g., *Picea engelmanii, Abies lasiocarpa, Populus tremuloides* (Mehl 1992). Stand is open enough to have multiple canopy cover, e.g., *Sheperdia canadensis, Vaccinium* spp., or grasses. Fragmentation due to roads, logging, mining, or other human development is limited to less than 1% of the occurrence.

B -rated condition: Little to no evidence of past logging disturbance over a major proportion of the occurrence. Majority of stand is > 100 years old and may show evidence of selective logging that has altered their structure; non-native species may be present with low to moderate frequency in the understory, but have low percent cover. Fragmentation due to roads, logging, mining, or other human development is limited to less than 3% of the occurrence.

C -rated condition: Stands regenerated naturally after fire, logging, or young to mature stands with significant history of selective logging disturbance that altered composition or structure; non-native species may be uncommon to frequent but do not dominate or co-dominate understory (<10-20% cover). Fragmentation due to roads, logging, mining, or other human development is limited to less than 5% of the occurrence.

D -rated condition: Fragmentation due to roads, recent logging, mining, or other human development occupies more than 5% of the occurrence. Dog-hair stands of lodgepole pine with very low species diversity that were created due to human disturbance or fire suppression.

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Note: Dog-hair stands are within the natural variation of a lodgepole forest and frequently occur after fires. While placing goals for an ecoregion plan it is important to include this natural variation.

<u>Justification for A-rated criteria</u>: Frequency of old-growth stands has been much reduced in this ecoregion, so old-growth carries a premium for condition. Occurrences that have not been logged represent a natural state, often with high species richness and diversity that are free from non-native species.

<u>Justification for C/D threshold</u>: C-ranked occurrences have potential for restoration over several decades. Given enough time (approx. 75 years), even D-ranked occurrences of lodgepole pine have an excellent chance of becoming a high ranked occurrence, especially if fire suppression is ceased.

SIZE SPECIFICATIONS:
A -rated size: Very large (>90,000 ac)
B -rated size: Large (50,000-80,000 ac)
C -rated size: Moderate (30,000-50,000 ac)
D -rated size: Small (<30,000 ac)

<u>Justification for A-rated criteria</u>: A 90,000 acre stand is large enough to support a mosaic of stand conditions, ages, and disturbance patterns.

<u>Justification for C/D threshold</u>: A 30,000 acre stand is estimated to be as small as matrix communities can be and still support minimum viable populations of pine martens (Anderson 1999). Smaller than 30,000 acres is subject to edge effects and stand destroying events, e.g., fire, beetle kill.

LANDSCAPE CONTEXT SPECIFICATIONS:
A -rated landscape context: Occurrence surrounded by a large area (>2000 ac/800 ha) of natural vegetation. Few small roads in the surrounding landscape. Frequency and intensities of fires are within expected range.

B -rated landscape context: Landscape composed of at least 80% natural or semi-natural vegetation; or landscape has very little development or agriculture but has major components of non-native vegetation in at least one physiognomic layer or is composed primarily of tree plantations. Frequencies and intensities of fires are within expected range.

C -rated landscape context: Landscape is a mosaic of agricultural or semi-developed areas and natural or semi-natural vegetation, the latter composing 25-80% of the landscape, or landscape is dominated by very young tree plantations (cut within last 20 years). Frequencies and intensities of fires may be out of expected range, but are easily restorable.

D -rated landscape context: Occurrence surrounded primarily by urban or agricultural landscape, with <25% landscape cover of natural or semi-natural vegetation. Frequencies and intensities of fires are out of expected range and not restorable.

Justification for A rated criteria: Connectivity intact. Natural processes can function.

Justification for C/D threshold: Landscape connectivity seriously impacted below about 35% cover of natural/semi-natural vegetation.

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Anderson M. G. 1999. Viability and spatial assessment of ecological communities in the northern Appalachian ecoregion. Phd. Dissertation, University of New Hampshire.

Hess K. and R. R. Alexander. 1986. Forest vegetation of the Arapaho and Roosevelt National Forests in north-central Colorado: A habitat type classification. USDA Forest service Research Paper RM-208, Rocky Mountain forest and Range Experiment Station, Fort Collins, CO. 48 pp.

Johnston B. C. 1997. Ecological types of the Upper Gunnison Basin. Review draft. USDA, Forest Service, Gunnison, CO. 539 pp.

Kingery H. E., Ed. 1998. Colorado breeding bird atlas. Colorado Bird Atlas Partnership and Colorado Division of Wildlife, Denver, CO. 636 pp.

Mehl MS. 1992. Old-growth descriptions for the major forest cover types in the Rocky Mountain region. In: Kaufmann MR, Moir WH, Bassett RL, Technical Coordinators. Old-growth forests in the southwest and Rocky Mountain regions. Proceedings of a workshop; 1992 Mar 9-1992 Mar 13; Portal, Arizona. Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO: USDA Forest Service, General Technical Report RM-213. 106-120.

SOUTHERN ROCKY MOUNTAINS ECOREGION

ASPEN FOREST--MATRIX

Populus tremuloides - Pinus ponderosa Rocky Mountain Forest
Populus tremuloides (Pinus ponderosa) / Danthonia parryi
Populus tremuloides / Acer glabrum Forest
Populus tremuloides / Amelanchier alnifolia - Symphoricarpos oreophilus / Thalictrum fendleri Forest
Populus tremuloides / Calamagrostis rubescens Forest
Populus tremuloides / Carex foenea Forest
Populus tremuloides / Carex geyeri Forest
Populus tremuloides / Ceanothus velutinus Forest
Populus tremuloides / Corylus cornuta Forest
Populus tremuloides / Festuca thurberi Forest
Populus tremuloides / Juniperus communis Forest
Populus tremuloides / Lonicera involucrata Forest
Populus tremuloides / Pteridium aquilinum Forest
Populus tremuloides / Senecio bigelovii var. *bigelovii* Forest
Populus tremuloides / Shepherdia canadensis Forest
Populus tremuloides / Symphoricarpos oreophilus / Calamagrostis rubescens Forest
Populus tremuloides / Symphoricarpos oreophilus / Festuca thurberi Forest
Populus tremuloides / Symphoricarpos oreophilus / Thalictrum fendleri Forest
Populus tremuloides / Symphoricarpos oreophilus Forest
Populus tremuloides / Tall Forbs Forest
Populus tremuloides / Thalictrum fendleri Forest
Populus tremuloides / Vaccinium myrtillus Forest

SCALE AND RANGE: MATRIX AND WIDESPREAD

Montane aspen forest ecological system is a matrix-former found throughout the Southern Rocky Mountains ecoregion between 8,000-10,000 feet in elevation. Nearly 7% of SRM has montane aspen forest. Aspen forest are matrix communities usually maintained by fires. They usually occur as a mosaic of many plant associations and may be surrounded by a diverse array of other systems, including grasslands, wetlands, coniferous forests, etc. Within the Southern Rocky Mountains ecoregion, this system is extremely prevalent on the West slope, with smaller stands represented on the East slope.

Quaking aspen is the most widely distributed native North American tree species and can be found from eastern to western U.S. (Little 1971). Although widespread it often is not a dominant. In the Colorado Plateau and the Southern Rocky Mountains ecoregion aspen reaches its highest abundance and develops expansive forests, with over 3.2 million acres in the Southern Rocky Mountains ecoregion. In contrast Montana has approximately 255,000 acres (Jones 1986). In the Southern Rocky Mountains ecoregion, aspen forests are most prominent west of the Front Range and Sangre de Cristo ranges. Aspen commonly reaches its lowest elevations in canyons and ravines and may be found as low as 5,500 feet. In the Southern Rocky Mountain ecoregion aspen is confined to relatively moist sites (16 to 40 plus inches annual precipitation) that have cold winters and a reasonably long growing season. These conditions restrict aspen to low elevations in the northern and eastern portions of its range. Aspen grows at progressively higher elevations southward along the Rocky Mountains.

Aspen is usually a seral tree in climax sub-alpine fir associations at the higher elevations. In such situations it may dominate the forest community for many decades following severe disturbance, such as fire or clearcutting, but will gradually decline as the conifers become reestablished. At lower elevations aspen can occur either as a temporarily dominant seral species in a variety of climax conifer associations, or it can achieve permanent dominance as the climax forest type. The environmental conditions related to aspen's role as a seral and as a climax species remain ill-defined (Mueggler and Camplell 1986).

In montane aspen forests, aspen comprise at least 50% of the tree canopy. It typically is less shade tolerant and shorter lived than most conifers. Thus, aspen stands that contain a substantial element of conifers are considered to be at a seral stage leading toward a conifer climax. Stands with a substantial element of conifers are catergorized as conifer-aspen types.

Aspen lands have provided prime summer range for both sheep and cattle in Colorado since settlement in the latter half of the 19th century. Some 100 years of grazing at varying intensity and by different classes of livestock have left their mark in often severe alteration of undergrowth composition and production. Some of these alterations are pronounced; others are subtle and difficult to assess (Mueggler and Campbell 1986).

The aspen ecosystem is rich in number and species of animals, especially in comparison to associated coniferous forest types. This natural species diversity and richness has been both increased and influenced by the introduction of domestic livestock. The high value of the aspen type as a forage resource for livestock and as forage and cover for wildlife makes the subject of animal impacts important to understanding and management of this ecosystem (DeByle and Winokur 1985).

MINIMUM SIZE: 5,000 acres

SEPARATION DISTANCES: 1) substantial barriers to natural processes or species movement, including urban development greater than ½ mile wide, major highways, 2) a different natural ecological system greater than 1 mile wide, 3) areas of cultural vegetation greater than 1 mile wide.

Justification: Primary criteria to be considered are the reaction of native species to fragmentation, seed dispersal by dominant trees, shrubs, grasses, and forbs and the connectivity for fires and requirements for large native ungulates.

RANK PROCEDURE: 1) condition, 2) size, 3) landscape context**.** Size is the most important ranking factor for matrix communities. Condition is of secondary importance and while landscape context is still important, it is slightly less so than the overall size and condition of an occurrence.

CONDITION SPECIFICATIONS:
A-rated conditions: A mosaic of aspen plant communities and a diverse age class structure within these communities. Native species dominant, non-native species may be present but in small amounts, <3% total cover. Invasive exotics with major potential to alter structure and composition are absent, e.g., *Bromus inermis*. Native species that increase with disturbance, e.g., *Balsmorizza* and *Wyethia,* have less than 3% cover. Ground cover is > 65%. Natural microrelief is undisturbed. Soil erosion is

not accelerated by anthropogenic activities. No surficial disturbance is evident or if present than in only small, isolated areas (e.g. mines or ranch activities and buildings; off-road vehicle use). There are few or no roads found within the occurrence.

B-rated condition: A mosaic of aspen plant communities and a diverse age class structure within these communities. Native species dominant, non-native species may be present and even dominant in spots, but not throughout the occurrence and only in disturbed areas. Invasive exotics with major potential to alter structure and composition are nearly absent, e.g., *Bromus inermis*. Native species that increase with disturbance, e.g., *Wyethia* and *Balsmorhiza,* have less than 10% cover. Ground cover is intact in at least 80% of the occurrence. Soil erosion may be accelerated in small patches, or lightly so throughout the occurrence. Natural microrelief is undisturbed. Soil erosion is not accelerated by anthropogenic activities. No surficial disturbance is evident or if present than in only small, isolated areas (e.g. mines or ranch activities and buildings; off-road vehicle use). Surficial disturbances are limited to less than 20% of the occurrence area (e.g., mines or ranch activities and buildings; off-road vehicle use). There are only a few roads found within the occurrence.

C-rated condition: Occurrence is dominated by native species; non-natives can be present and quite abundant in small and large patches. Ground cover is below 60% in more than 25% of the area, or in various stages of degradation throughout the occurrence. Surficial disturbances occur on more than 20% of the area (e.g., mines or ranch activities and buildings; off-road vehicle use).
There are more than a few roads found within the occurrence.

D-rated condition: Occurrence is dominated by native perennial increasers or non-natives. Ground cover has been removed from 75% of the area, occurring only in small pockets naturally protected from livestock and off-road vehicle use. Surficial disturbances occur on more than 50% of the area (e.g., mines or ranch activities and buildings; off-road vehicle use). Many roads are found within the occurrence.

<u>Justification for A-rated criteria:</u> characteristic ecological gradients remain intact supporting interactions among component species. Natural disturbances can occur on a scale that permits maintenance of a diverse community patches.

<u>Justification for C/D threshold:</u> C-ranked occurrences would naturally improve in condition resulting from anthropogenic disturbances with a change in the management practices, with significant recovery expected within 25 years. D-ranked occurrences will not likely improve and are prone to irreversible changes in composition. Significant emphasis is placed on the relative extent of introduced plant species and the loss of the topsoil. Emphasis is also placed in the degree of fragmentation from roads and the amount of accelerated soil erosion.

SIZE SPECIFICATIONS:
A-rated size: Very large (>30,000 acres)
B-rated size: Large (10,000-30,000 acres)
C-rated size: Moderate (5,000-10,000 acres)
D-rated size: Small (<5,000 acres)

<u>Justification for A-rated criteria:</u> A-ranked occurrences of this size would likely contain sufficient internal variability to capture characteristic biophysical gradients and retain natural geomorphic disturbance, and may survive accelerated erosion disturbance problems.

<u>Justification for C/D threshold:</u> stands smaller than C-ranked may be viable if they are surrounded by naturally occurring montane vegetation, or if it occupies all of the available habitat in an un-altered, unfragmented valley. As a rule, smaller stands lack variability, have largely disturbed or altered natural geomorphic disturbance processes and are surrounded by altered landscapes. The primary criteria considered are loss of diversity from livestock grazing, fragmentation by roads, and the likelihood of an area completely burning in a single event.

LANDSCAPE CONTEXT SPECIFICATIONS:
A-rated landscape context: Highly connected – surrounding landscape has been little altered, captures the characteristic ecological gradients (including nested patch communities) and geomorphic processes, and the occurrences are completely surrounded by other high quality communities. Provides habitat for indicator species such as grouse, purple martin, etc.

B-rated landscape context: occurrence is surrounded by moderate-low quality natural communities, some of which may have been logged or disturbed in the past; an expansive semi-natural landscape that has been used extensively for grazing.

C-rated landscape context: Moderately fragmented and isolated -- occurrences are surrounded by a mix of intensive agriculture, small scale urban development, and adjacent semi-natural communities, or the occurrence is a relatively small area (total area smaller than twice the minimum occurrence size (see Fair under size criteria) surrounded by an agriculturally fragmented landscape.

D-rated landscape context: Highly fragmented and isolated -- area around the occurrence is entirely, or almost entirely, surrounded by agricultural or urban land use; occurrence is at best buffered on one side by natural communities. The surrounding landscape is primarily intensive agriculture or urban development.

Justification for A-rated criteria: Characteristic ecological gradients remain intact supporting interactions among component species. Natural disturbances can occur on a scale that permits maintenance of patches of the community in a variety of conditions.

Justification for C/D threshold: Characteristic ecological gradients lacking or otherwise disrupted, with irretrievable impacts on habitat requirements for component species.

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LITERATURE CITED

DeByle N. V. and R. P. Winokur, Eds. 1985. Aspen: ecology and management in the western United States. USDA Forest Service General Technical Report RM-119, Rocky Mountain Forest and range Experiment Station, Fort Collins, CO. 283 pp.

Jones J. R. 1985. Distribution. Pages 9-10 in N. V. DeByle and R. P. Winokur, eds., Aspen: ecology and management in the western United States. General Tech Report RM-119, USDA For. Ser., Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO . 283 pp.

Little E. L. Jr. 1971. Atlas of United States trees: Vol. 1. Conifers and imprtant hardwoods. USDA For. Ser. Miscellaneous Publication 1146, Washington, D.C. 9p + 202 maps pp.

Mueggler W. F. and R. B. Jr. Campbell. 1986. Aspen community types of Utah. U.S.D.A. Forest Service, Intermountain research Station, Research Paper INT-362, Ogden, UT. 69 pp.

SOUTHERN ROCKY MOUNTAINS ECOREGION
MONTANE MOIST - MESIC MIXED CONIFER FOREST ECOLOGICAL SYSTEM--MATRIX

Abies concolor / Arctostaphylos uva-ursi Forest
Abies concolor / Holodiscus dumosus Scree Woodland
Abies concolor / Mahonia repens Forest
Abies concolor / Quercus gambelii Forest
Abies concolor / Robinia neomexicana Woodland
Picea pungens / Arctostaphylos uva-ursi Forest
Picea pungens / Festuca arizonica Woodland
Pseudotsuga menziesii / Bromus ciliatus Forest

Mixed conifer mesic-dry forest ecological system is a matrix-former that occurs in approximately 3% of the Southern Rocky Mountains ecoregion, primarily in the southern portion, and especially in New Mexico. *Abies concolor, Picea pungens, Pinus ponderosa,* and *Pseudotsuga menziesii* are the common conifer trees. In the Rocky Mountain, mature white fir trees rarely exceed 125 feet in height or 3 feet dbh and mostly reach ages of 250 to 275 years (Fowells 1965). Within the mixed conifer type, white fir is primarily the climax dominant on moist sites such as northern exposures, while ponderosa pine, Douglas-fir, or juniper tend to dominate at climax on warm and dry sites. On intermediate sites, white fir may co-dominate at climax with these conifers (www.fs.fed.us/database/feis/).

White fir will eventually dominate if the fire-free interval is sufficiently long to allow trees to grow to a fire-resistant size. Each one of these species has a slightly different reaction to the presence of fires and therefore fire history helps to determine the cover of each species. *Pinus ponderosa* and *Pseudotsuga menziesii* are the most fire tolerant, while *Picea pungens* is fire intolerant. *Abies concolor* sapling and pole-sized classes are fire sensitive (Hopkins 1982 in www.fs.fed.us/database/feis/). Trees progressively become more fire resistant as they attain 8 to 10 inch dbh (Hopkins 1982 in www.fs.fed.us/database/feis/).

Presettlement fire frequency in mixed conifer forest of the southern Rocky Mountains was from 7 to 22 years (Alexander et al. 1984, Dieterich 1983 in www.fs.fed.us/database/feis/). In cool, moist white fir habitat types in New Mexico, naturally occurring fires are mostly light, erratic, and infrequent (DeVelice and Ludwig 1983, Moir and Ludwig 1979 in www.fs.fed.us/database/feis/). These frequently occurring fires were generally of low intensity because of the short time span between fires resulted in low accumulations of dead and down fuels. High-intensity, stand-replacing fires were uncommon (Dieterich 1983 in www.fs.fed.us/database/feis/). Before fire suppression began in mixed conifer forests, ponderosa pine and Douglas-fir, often dominated the overstory (Agee 1982, Hopkins 1982 in www.fs.fed.us/database/feis/). As a result of fire suppression since the turn of the century, white fir density has greatly increased in mixed conifer forests. Today, unnatural, heavy accumulations of dead fuels and abundant young white fire (which often form "dog-hair" thickets) greatly increase the chances for high-intensity, stand-replacing crown fires (Parsons and DeBenedetti 1979 in www.fs.fed.us/database/feis/).

The Jemez Mountains salamander and the Sacramento Mountains salamander are endangered species that occur primarily in mixed conifer forests of New Mexico. Other sensitive and endangered species that use mixed conifer stands, especially with blue spruce, include Flammulated owls and Northern goshawks.

MINIMUM SIZE: 30,000 acres (see Anderson 1997 for a review of minimum size for matrix forming communities)

SEPARATION DISTANCES: 1) substantial barriers to natural processes or species movement, including cultural vegetation (includes clearcuts/tree plantations) greater than ½ wide, major highways, or urban development; 2) a different ecological system wider than ½ mile wide; 3) a major break or change in the ecological land unit (e.g. topography, soils, geology).

Justification: Many of these communities occur naturally in a mosaic much of the time so minor breaks or small barriers are probably a very common part of the natural distribution and variability. If the breaks are larger, barriers may exist for some species.

RANK PROCEDURE: 1) condition, 2) size, 3) landscape context**.** Size is the most important ranking factor for matrix communities. Condition is of secondary importance and while landscape context is still important, it is slightly less so than the overall size and condition of an occurrence.

CONDITION SPECIFICATIONS:
A -rated condition: A mature stand of mixed conifer that consists of 10 trees per acre that have an age of at least 150 years old. Usually this is a multi-aged stand with some dead standing trees as well as some fallen mature trees. Where the site is mesic, the stand would be more open-grown compared to a cooler, more moist site such as a north facing slope or drainage bottom. Some of the overstory trees would have large and open branched, flattened or dead tops and contain some rot. Few to no invasive species are present.

B -rated condition: Little to no evidence of past logging disturbance over a major proportion of the occurrence and majority of stand is > 100 years old, may show evidence of selective logging that has altered their structure; non-native species may be present with low to moderate frequency in the understory, but have low percent cover.

C -rated condition: Stands regenerated naturally after logging or young to mature stands with significant history of selective logging disturbance that altered composition or structure; non-native species may be uncommon to frequent but do not dominate or co-dominate understory (<10-20% cover).

D -rated condition: Immature, "dog-hair" stand of conifers, especially white fir with very low species diversity.

Justification for A-rated criteria: Frequency of old-growth stands has been much reduced in this ecoregion, so old-growth carries a premium for condition. In addition, occurrences that have been unaltered by logging, fire suppression, and are primarily dominated by native species are priority stands for conservation of biodiversity.

Justification for C/D threshold: C-ranked occurrences have potential for restoration over several decades. D-ranked occurrences have little or no potential for restoration because of extensive degradation.

SIZE.SPECS
A -rated size: Very large (>90,000 ac)
B -rated size: Large (50,000-80,000 ac)
C -rated size: Moderate (30,000-50,000 ac)
D -rated size: Small (<30,000 ac)

Justification for A-rated criteria: Large enough to support a mosaic of stand conditions, ages, and disturbance patterns. The home range size of a female lynx in Alberta and Alaska is 12 km^2 (Brand et al. 1976 cited in Fitzgerald et al. 1994). Assuming you need an area large enough to support 25 mature females the acreage needed is 75,000 acres. An A-ranked size would support more than a minimum viable population of both lynx and pine martens.

Justification for AC/D@ threshold: Smaller than 30,000 acres is subject to edge effects and total destruction from a catastrophic event, e.g., a crown fire. In addition there is little opportunity for a mosaic of disturbance patterns. Pine martens probably require a minimum of 30,000 acres of a mature (> 150 years old) contiguous patch of forest for a viable population (Major et al. 1981 as cited in Anderson 1999).

LANDSCAPE.CONTEXT.SPECS

A -rated landscape context: Occurrence surrounded by a large area (>2000 ac/800 ha) of natural vegetation. Few small roads in the surrounding landscape.

B -rated landscape context: Landscape composed of at least 80% natural or semi-natural vegetation; or landscape has very little development or agriculture but has major components of non-native vegetation in at least one physiognomic layer or is composed primarily of young tree plantations.

C -rated landscape context: Landscape is a mosaic of agricultural or semi-developed areas and natural or semi-natural vegetation, the latter composing 25-80% of the landscape, or landscape is dominated by very young tree plantations (cut within last 20 years).

D -rated landscape context: Occurrence surrounded primarily by urban or agricultural landscape, with <25% landscape cover of natural or semi-natural vegetation.

Justification for A-rated criteria: Connectivity intact. Natural processes can function.

Justification for C/D threshold: Landscape connectivity seriously impacted below about 35% cover of natural/semi-natural vegetation.

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LITERATURE CITED:

Agree J. K. 1982. True fir management for wilderness, water, recreation and wildlife values. Pages 227-237. In Oliver D. C., R. M. Kenady. Prodeedings of the biology and management of true fire in the Pacific Northwest symposium, 1981 February 24-26, Seattle-Tacoma, WA. Universiy of Washington, College of Forest Resources: Contribution No. 5, Seattle, WA.

Alexander B. G. Jr., F. Ronco Jr., E. L. Fitzhugh and J. A. Ludwig. 1984. A classification of forest habitat types of the Lincoln National Forest, New Mexico. Gen. Tech. Rep. RM-104, USDA, For. Ser., Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO. 29 pp.

Anderson M. G. 1999. Viability and spatial assessment of ecological communities in the northern Appalachian ecoregion.

Dissertation. University of New Hampshire.

DeVilce R. L., J. Ludwig. 1983. Climax forest series of northern New Mexico and southern Colorado. Pages 45-53. In Moir W. H., L. Hendzel. Proceedings of the workshop on southwestern habitat types, April 6-8, 1983, Albuquerque, NM. USDA, For. Ser., Southwestern Region, Albuquerque, NM.

Dieterich J. H. 1983. Fire history of southwestern mixed conifer: a case study. Forest Ecology 6: 13-31.

Fowells H. A., compiler. 1965. Silvics of forest trees of the United States. Agric. Hand. 271, U.S. Dept. of Agric., Forest Service, Washington, D.C. 762 pp.

Hopkins W. E. 1982. Ecology of white fire. Pages 35-41. In Oliver D. C., R. M. Kenady. Prodeedings of the biology and management of true fire in the Pacific Northwest symposium, 1981 February 24-26, Seattle-Tacoma, WA. Universiy of Washington, College of Forest Resources: Contribution No. 5, Seattle, WA.

Moir W. H. and J. A. Ludwig. 1979. A classification of spruce-fir and mixed conifer habitat types of Arizona and New Mexico. Res. Pap. RM-207 U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO. 47 pp.

Parson D. J. and S. H. DeBenedetti. 1979. Impact of fire suppression in a mixed-conifer forest. Forest Ecology and Management 2: 21-33.

Youngblood A. P. and R. Mauk. 1985. Coniferous forest habitat types of central and southern Utah. General Technical Report INT-187, USDA Forest Service, Intermountain Research Station, Ogden UT. 89 pp.

SOUTHERN ROCKY MOUNTAINS ECOREGION
MONTANE DRY-MESIC MIXED CONIFER FOREST ECOLOGICAL SYSTEM--MATRIX

Abies concolor / Robinia neomexicana Woodland
Abies concolor / Arctostaphylos uva-ursi Forest
Abies concolor / Mahonia repens Forest
Abies concolor / Quercus gambelii Forest
Picea pungens / Arctostaphylos uva-ursi Forest
Picea pungens / Festuca arizonica Woodland

SCALE AND RANGE: MATRIX AND WIDESPREAD

Mixed conifer mesic-dry forest ecological system is a matrix-former that occurs in approximately 3% of the Southern Rocky Mountains ecoregion, primarily in the southern portion, and especially in New Mexico. *Abies concolor, Picea pungens, Pinus ponderosa,* and *Pseudotsuga menziesii* are the common conifer trees. In the Rocky Mountain, mature white fir trees rarely exceed 125 feet in height or 3 feet dbh and mostly reach ages of 250 to 275 years (Fowells 1965). Within the mixed conifer type, white fir is primarily the climax dominant on moist sites such as northern exposures, while ponderosa pine, Douglas-fir, or juniper tend to dominate at climax on warm and dry sites. On intermediate sites, white fir may co-dominate at climax with these conifers (www.fs.fed.us/database/feis/).

White fir will eventually dominate if the fire-free interval is sufficiently long to allow trees to grow to a fire-resistant size. Each one of these species has a slightly different reaction to the presence of fires and therefore fire history helps to determine the cover of each species. *Pinus ponderosa* and *Pseudotsuga menziesii* are the most fire tolerant, while *Picea pungens* is fire intolerant. *Abies concolor* sapling and pole-sized classes are fire sensitive (Hopkins 1982 in www.fs.fed.us/database/feis/). Trees progressively become more fire resistant as they attain 8 to 10 inch dbh (Hopkins 1982 in www.fs.fed.us/database/feis/).

Presettlement fire frequency in mixed conifer forest of the southern Rocky Mountains was from 7 to 22 years (Alexander et al. 1984, Dieterich 1983 in www.fs.fed.us/database/feis/). In cool, moist white fir habitat types in New Mexico, naturally occurring fires are mostly light, erratic, and infrequent (DeVelice and Ludwig 1983, Moir and Ludwig 1979 in www.fs.fed.us/database/feis/). These frequently occurring fires were generally of low intensity because of the short time span between fires resulted in low accumulations of dead and down fuels. High-intensity, stand-replacing fires were uncommon (Dieterich 1983 in www.fs.fed.us/database/feis/). Before fire suppression began in mixed conifer forests, ponderosa pine and Douglas-fir, often dominated the overstory (Agee 1982, Hopkins 1982 in www.fs.fed.us/database/feis/). As a result of fire suppression since the turn of the century, white fir density has greatly increased in mixed conifer forests. Today, unnatural, heavy accumulations of dead fuels and abundant young white fire (which often form “dog-hair” thickets) greatly increase the chances for high-intensity, stand-replacing crown fires (Parsons and DeBenedetti 1979 in www.fs.fed.us/database/feis/).

The Jemez Mountains salamander and the Sacramento Mountains salamander are endangered species that occur primarily in mixed conifer forests of New Mexico. Other sensitive and endangered species that use mixed conifer stands, especially with blue spruce, include Flammulated owls and Northern goshawks.

MINIMUM SIZE: 30,000 acres (see Anderson 1997 for a review of minimum size for matrix forming communities)

SEPARATION DISTANCES: 1) substantial barriers to natural processes or species movement, including cultural vegetation (includes clearcuts/tree plantations) greater than ½ wide, major highways, or urban development; 2) a different ecological system wider than ½ mile wide; 3) a major break or change in the ecological land unit (e.g. topography, soils, geology).

Justification: Many of these communities occur naturally in a mosaic much of the time so minor breaks or small barriers are probably a very common part of the natural distribution and variability. If the breaks are larger, barriers may exist for some species.

RANK PROCEDURE: 1) condition, 2) size, 3) landscape context**.** Size is the most important ranking factor for matrix communities. Condition is of secondary importance and while landscape context is still important, it is slightly less so than the overall size and condition of an occurrence.

CONDITION SPECIFICATIONS:
A -rated condition: A mature stand of mixed conifer that consists of 10 trees per acre that have an age of at least 150 years old. Usually this is a multi-aged stand with some dead standing trees as well as some fallen mature trees. Where the site is mesic, the stand would be more open-grown compared to a cooler, more moist site such as a north facing slope or drainage bottom. Some of the overstory trees would have large and open branched, flattened or dead tops and contain some rot. Few to no invasive species are present.

B -rated condition: Little to no evidence of past logging disturbance over a major proportion of the occurrence and majority of stand is > 100 years old, may show evidence of selective logging that has altered their structure; non-native species may be present with low to moderate frequency in the understory, but have low percent cover.

C -rated condition: Stands regenerated naturally after logging or young to mature stands with significant history of selective logging disturbance that altered composition or structure; non-native species may be uncommon to frequent but do not dominate or co-dominate understory (<10-20% cover).

D -rated condition: Immature, “dog-hair” stand of conifers, especially white fir with very low species diversity.

Justification for A-rated criteria: Frequency of old-growth stands has been much reduced in this ecoregion, so old-growth carries a premium for condition. In addition, occurrences that have been unaltered by logging, fire suppression, and are primarily dominated by native species are priority stands for conservation of biodiversity.

Justification for C/D threshold: C-ranked occurrences have potential for restoration over several decades. D-ranked occurrences have little or no potential for restoration because of extensive degradation.

SIZE.SPECS
A -rated size: Very large (>90,000 ac)
B -rated size: Large (50,000-80,000 ac)
C -rated size: Moderate (30,000-50,000 ac)
D -rated size: Small (<30,000 ac)

Justification for A-rated criteria: Large enough to support a mosaic of stand conditions, ages, and disturbance patterns. The home range size of a female lynx in Alberta and Alaska is 12 km^2 (Brand et al. 1976 cited in Fitzgerald et al. 1994). Assuming you need an area large enough to support 25 mature females the acreage needed is 75,000 acres. An A-ranked size would support more than a minimum viable population of both lynx and pine martens.

Justification for AC/D@ threshold: Smaller than 30,000 acres is subject to edge effects and total destruction from a catastrophic event, e.g., a crown fire. In addition there is little opportunity for a mosaic of disturbance patterns. Pine martens probably require a minimum of 30,000 acres of a mature (> 150 years old) contiguous patch of forest for a viable population (Major et al. 1981 as cited in Anderson 1999).

LANDSCAPE.CONTEXT.SPECS

A -rated landscape context: Occurrence surrounded by a large area (>2000 ac/800 ha) of natural vegetation. Few small roads in the surrounding landscape.

B -rated landscape context: Landscape composed of at least 80% natural or semi-natural vegetation; or landscape has very little development or agriculture but has major components of non-native vegetation in at least one physiognomic layer or is composed primarily of young tree plantations.

C -rated landscape context: Landscape is a mosaic of agricultural or semi-developed areas and natural or semi-natural vegetation, the latter composing 25-80% of the landscape, or landscape is dominated by very young tree plantations (cut within last 20 years).

D -rated landscape context: Occurrence surrounded primarily by urban or agricultural landscape, with <25% landscape cover of natural or semi-natural vegetation.

Justification for A-rated criteria: Connectivity intact. Natural processes can function.

Justification for C/D threshold: Landscape connectivity seriously impacted below about 35% cover of natural/semi-natural vegetation.

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LITERATURE CITED:

Agree J. K. 1982. True fir management for wilderness, water, recreation and wildlife values. Pages 227-237. In Oliver D. C., R. M. Kenady. Prodeedings of the biology and management of true fire in the Pacific Northwest symposium, 1981 February 24-26, Seattle-Tacoma, WA. Universiy of Washington, College of Forest Resources: Contribution No. 5, Seattle, WA.

Alexander B. G. Jr., F. Ronco Jr., E. L. Fitzhugh and J. A. Ludwig. 1984. A classification of forest habitat types of the Lincoln National Forest, New Mexico. Gen. Tech. Rep. RM-104, USDA, For. Ser., Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO. 29 pp.

Anderson M. G. 1999. Viability and spatial assessment of ecological communities in the northern Appalachian ecoregion. Dissertation. University of New Hampshire.

DeVelice R. L., J. Ludwig. 1983. Climax forest series of northern New Mexico and southern Colorado. Pages 45-53. In Moir W. H., L. Hendzel. Proceedings of the workshop on southwestern habitat types, April 6-8, 1983, Albuquerque, NM. USDA, For. Ser., Southwestern Region, Albuquerque, NM.

Dieterich J. H. 1983. Fire history of southwestern mixed conifer: a case study. Forest Ecology 6: 13-31.

Fowells H. A., compiler. 1965. Silvics of forest trees of the United States. Agric. Hand. 271, U.S. Dept. of Agric., Forest

Service, Washington, D.C. 762 pp.

Hopkins W. E. 1982. Ecology of white fire. Pages 35-41. In Oliver D. C., R. M. Kenady. Prodeedings of the biology and management of true fire in the Pacific Northwest symposium, 1981 February 24-26, Seattle-Tacoma, WA. Universiy of Washington, College of Forest Resources: Contribution No. 5, Seattle, WA.

Moir W. H. and J. A. Ludwig. 1979. A classification of spruce-fir and mixed conifer habitat types of Arizona and New Mexico. Res. Pap. RM-207 U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO. 47 pp.

Parson D. J. and S. H. DeBenedetti. 1979. Impact of fire suppression in a mixed-conifer forest. Forest Ecology and Management 2: 21-33.

Youngblood A. P. and R. Mauk. 1985. Coniferous forest habitat types of central and southern Utah. General Technical Report INT-187, USDA Forest Service, Intermountain Research Station, Ogden UT. 89 pp.

SOUTHERN ROCKY MOUNTAINS ECOREGION
MONTANE/SUBALPINE GRASSLAND—LARGE PATCH

Danthonia intermedia Herbaceous Vegetation
Danthonia parryi Herbaceous Vegetation
Festuca arizonica – Muhlenbergia filiculmis Herbaceous Vegetation
Festuca arizonica – Muhlenbergia montana Herbaceous Vegetation
Festuca idahoensis – Pseudoroegneria spicata Herbaceous Vegetation
Festuca thurberi - Lathyrus lanszwertii var. *leucanthus* Herbaceous Vegetation
Leymus cinereus Herbaceous Vegetation [Provisional]
Muhlenbergia filiculmis Herbaceous Vegetation
Pseudoroegneria spicata - Bouteloua gracilis Herbaceous Vegetation
Pseudoroegneria spicata - Poa secunda Lithosolic Herbaceous Vegetation
Pseudoroegneria spicata Herbaceous Vegetation

SCALE AND RANGE: LARGE PATCH AND WIDESPREAD

Montane/subalpine grassland ecological system is a large patch system that occupies less than 3% of the Southern Rocky Mountains ecoregion. Although the largest occurrences are primarily within Colorado it is scattered throughout the region from Wyoming to New Mexico. This system is usually between 8,000 and 10,000 feet on flat to rolling plains or lower side slopes that are dry. An occurrence usually consists of a mosaic of two or three plant associations with one of the following dominant bunch grasses: *Danthonia* spp., *Festuca* spp., *Muhlenbergia filiculmis,* or *Pseudoroegneria spicata*. The sub-dominants include *Muhlenbergia montana, Bouteloua gracilis,* and *Poa secunda*. Soils resemble prairie soils in that the A-horizon is dark brown, relatively high in organic matter, slightly acid, and usually well-drained (Turner 1975). Frequent fires help to maintain the grassland dominants and may play an important role in restricting the invasion of trees and shrubs (Turner 1975). These large patch grasslands are intermixed with matrix stands of spruce-fir, lodgepole, ponderosa pine, and aspen forests.

Floristic composition varies with site characteristics and grazing history (Turner 1975). Forbs tend to be more prominent at higher elevations, and shrubs at lower elevations (Turner 1975). Forbs are characteristically absent from bunch grass dominated grasslands with a long history of heavy sheep use (Turner 1975). Annual plants seldom are abundant except on recently disturbed or severely overgrazed areas (Turner 1975).

Montane grasslands were initially grazed by domestic livestock about 100 years ago and by 1900 practically all of the available high elevation lands were being grazed, and some already had been overgrazed (Turner 1975). Regulation of grazing on these lands began with establishment of the National Forests in the early 1900's. However, these and other rangelands received maximum use in meeting the demands of World War I. Present use of National Forest rangeland in the West is only about one-fourth the numbers of the former high level (Turner 1975).

Grassland deterioration may be indicated by many changes. In its early stages, an increase in forbs or secondary smaller grasses usually accompanies a decrease in primary grasses such as *Festuca thurberi* and *Danthonia parryi* (Tuner 1975). With continued degredation bare soil increases, soil stability decreases, and plant vigor may decrease (Turner 1975). A grassland that is occupied by Gunnison prairie dog, a natural and expected animal of these grasslands, may maintain heavily grazed patches that exhibit the above characters. When this occurs, usually only part of the occurrence exhibits the above characters, whereas an area that has heavy livestock grazing may show these characters throughout the occurrence.

Occurrences of grasslands that are lightly grazed can be noted by an accumulation of ground litter (Turner 1975). Buildup of litter lowers soil temperature, which in turn reduces bacterial activity, ties up nutrients, and slows the general nitrogen cycling process, particularly during cool, wet years (Tuner 1975). Certain native rodents tend to be more abundant with increases in litter (Turner 1975). Fires will burn the litter and release nutrients.

MINIMUM SIZE: 25 acres.

SEPARATION DISTANCES: 1) substantial barriers to natural processes or species movement, including cultural vegetation greater than ¼ mile wide, major highways, or urban development, 2) a different natural community from a different ecological system wider than one mile wide or continuous forest wider than ¼ mile, 3) a major break or change in the ecological land unit (e.g., topography, soils, geology).

<u>Justification:</u> Large patch communities are susceptible to fragmentation by cultural vegetation or forest/shrub invasion. Forests are likely to be more significant barriers than woodlands or non-forested wetlands for many species. Primary criteria to be considered is the invasion of woody vegetation, seed dispersal by dominant grasses and forbs, and the dispersal behavior and requirements of invertebrates and small mammals.

RANK PROCEDURE: 1) condition, 2) landscape context, and 3) size. Occurrence size criteria may not be as critical for patch communities as it is for matrix-forming communities (Anderson 1999). Factors such as the landscape context current condition, and historical continuity may contribute more to the diversity of an occurrence than does occurrence size, although the species-area relationship still holds up for patch type communities.

CONDITION SPECIFICATIONS: (Part of the following condition specifications follow the BLM, NRCS, and USGS "Interpreting indicators of rangeland health" (Shaver et al. 2000).
A –rated condition: Native bunchgrasses are dominant, non-native species occupy less than 3% canopy cover. Invasive species with major potential to alter structure and composition are absent. Native species that increase with disturbance, e.g., *Koelaria micrantha,* and *Artemisia frigida* have less than 3% cover. If trees or shrubs are present, these are widely scattered and mature. Species richness is often high and includes several native grasses as well as a diverse forb component. Soils have a distinct A-horizon. Water flow patterns show minimal evidence of past or current soil deposition or erosion. Terracettes absent or uncommon. Drainages are represented as natural stable channels; no signs of unnatural erosion. Fairly uniform distribution of litter. Surface soil is stabilized by organic matter decomposition products and/ or a biological crust. Plant cover is adequate to protect from excess soil erosion. Soils are not compacted and are very stable (low erosion rate). Plant vigor is high. Fires are still part of this system. Livestock grazing is light and seasonally compatible.

B- rated condition: Native bunchgrasses dominant, non-native species are present but in small amounts (< 10% total canopy cover). Invasive exotics with major potential to alter structure and composition occupy less than 1% of occurrence. Native species that increase with disturbance, e.g., *Koelaria micrantha,* and *Artemisia frigida* have less than 10% cover. If trees or shrubs are present, these are widely scattered and mature. Species richness is often high, and native bunchgrasses (non-increasers) are dominant. Soils may be slightly modified and may be less stable than for an "A" ranked occurrence. Soils have a distinct A-horizon. Water flow patterns nearly matches what is expected for the site; erosion is minor with some instability and deposition. Slight active pedestalling; most pedestals are in flow paths and interspaces or on exposed slopes. Occasional terracettes present. Bare areas are of moderate size and sporadically connected. Drainages may indicate unnatural active erosion; vegetation is intermittent on drainage slopes. Occasional headcuts may be present. Litter may show some movement of smaller size classes in scattered concentrations around obstructions and in depressions. Soil surfaces resistance to erosion is significantly reduced in at least half of the plant canopy interspaces, or moderately reduced thoughout the site. Soil surface loss or degradation is moderate in plant interspaces with some degradation beneath plant canopies. Soil structure is degraded and soil organic matter content is significantly reduced. Water infiltration is moderately reduced due to adverse changes in plant community composition and or distribution. Soil compaction moderately widespread and moderately restricts water movement and root penetration.

C-rated condition: Native bunchgrasses present but may be nearly equal in canopy cover to non-native species. Non-native species have less than 20% cover. Native species that increase with livestock grazing may be co-dominant or dominant. Invasive exotics with major potential to alter structure and composition may be prominent in small and discrete patches; trees and shrubs may have seedlings, juveniles, or saplings present. Alteration is extensive but potentially restorable over several decades. Vehicle use or livestock grazing disturbance, if present, is extensive and significant enough to have notable impact on species composition, soil compaction and stability. Rill formation may be moderately active and well defined throughout most of the occurrence. Water flow patterns are more numerous than expected; deposition and cut areas common; occasionally connected. Moderate active pedestalling; terracettes common. Some rocks and plants are pedestaled with occasional exposed roots. Bare ground is moderate to much higher than expected for the site. Bare areas are large and often connected. Gullies may be present with indications of active erosion; vegetation is intermittent on slopes. Headcuts are active; downcutting is apparent. Litter movement is moderate to extreme; loosely concentrated near obstructions. Moderate to small size classes of litter have been displaced. Soil surface resistance to erosion significantly reduced in most plant canopy interspaces and moderately reduced beneath plant canopies. Stabilizing agents present only in isolated patches. Soil surface loss or degradation may be severe throughout the site. Minimal differences in soil organic matter content and structure of surface and subsurface layers. Infiltration is greatly decreased due to adverse changes in plant community composition or soil compaction. Detrimental plant cover changes have occurred. Soil compaction may be widespread and greatly restricts water movement and root penetration. Dead plants or decadent plants may be common. Litter is greatly reduced or increased relative to site potential and climate. Reproductive capability of native perennial plants is greatly reduced. Fire frequency may have been altered, although easily restored.

D –rated condition: Non-native species are dominant, native species have less than 10% canopy cover and 20% relative cover. Alteration is extensive and restoration potential is low. Vehicle use or livestock grazing disturbance, if present, is extensive and significant enough to have notable impact on species composition, soil compaction and stability. System remains fundamentally compromised despite restoration of some processes. Soil compaction and stability is extensive throughout the occurrence. Rill formation may be severe and well defined throughout most of the occurrence. Water flow patterns may be extensive and numerous; unstable with active erosion; usually connected. Abundant active pedestalling and numerous terracettes. Many rocks and plants are pedestaled; exposed plant roots are common. Bare ground is much higher than expected for the site. Bare areas are large and generally connected. Gullies may be common with indications of active erosion and downcutting; vegetation is infrequent on slopes or bed of gully. Nickpoints and headcuts are numerous and active. Litter movement may be extreme and concentrated around obstructions. Most size classes of litter have been displaced. Soil surface resistance to erosion may be extemely reduced throughout the site. Biological stabilization agents including organic matter and biological crusts virtually absent. Soil surface horizon may be absent. Soil structure near surface is similar to, or more degraded, than that in subsurface horizons. No distinquishable difference in subsurface organic matter content. Infiltration may be severely decreased due to adverse changes in plant community composition and/or distribution. Adverse plant cover changes have occurred. Soil compaction layer extensive; severely restricting water movement and root penetration. Plant vigor may be poor and dead or decadent plants are common. Litter largely absent relative to site potential. Reproductive capability of native perennial plants severely reduced. Fire frequency may be greatly altered and difficult to restore.

Justification for A-rated criteria: Montane grasslands are dependent on fires and limited grazing. In order to have a healthy and intact invertebrate and small mammal composition an occurrence must be dominated by native grasses with high species richness. A-ranked occurrences have processes, species composition, and the physical environment intact.

Justification for C/D threshold: C-ranked occurrences have potential for restoration over several decades. D-ranked occurrences have little or no potential for restoration because of extensive degradation.

SIZE SPECIFICATIONS:

For all but South Park:
A – rated size: Very large (> 500 acres)
B –rated size: Large (50 to 500 acres)
C –rated size: Moderate (25 - 50 ac)
D –rated size: Small (<25 ac)

Justification for A-rated criteria: A-ranked occurrences are large enough to support viable populations of grassland birds as well as a mosaic of several plant associations. Occurrences of this size would likely contain sufficient internal variability to capture characteristic biophysical gradients and retain natural geomorphic disturbance. They are buffered from edge effects. Occurrences of this size will support fires and grazing animals and allow for a mosaic of different fire and grazing regimes.

Justification for C/D threshold: C-ranked occurrences may still support a small number of grassland birds, small mammals, and a diverse insect fauna. While D-ranked occurrences are subject to loss of plant associations and their associated plants and animals.

LANDSCAPE CONTEXT SPECIFICATIONS:

A-rated landscape context: Occurrence surrounded by a native and unaltered landscape with very little to no urban development or agriculture, and little to no industrial forestry (> 90% natural). No unnatural barriers present. Connectivity of adjacent systems allows natural ecological processes, e.g., fire to occur.

B-rated landscape context: Landscape composed of at least 75% natural or semi-natural vegetation, with any urban development not directly adjacent to the occurrence. Limited or minor human-caused alteration of landscape. Adjacent systems surrounding occurrence have moderate urban or agricultural alteration (60-90% natural) but retaining much connectivity. Few non-natural barriers present.

C-rated landscape context: Surrounding landscape is a mosaic of agricultural or semi-developed areas with natural or semi-natural vegetation. Adjacent systems surrounding occurrence are fragmented by alteration (20 – 60% natural), with limited connectivity. Some non-natural barriers are present. Significant disturbance, but easily restorable.

D-rated landscape context: Major human-caused alteration of surrounding landscape. Adjacent systems surrounding occurrence are mostly converted to agricultural or urban uses. Connectivity is severely hampered.

Justification for A-rated criteria: The montane grassland and its adjacent landscape is intact; connectivity to adjacent and nearby systems is intact; non-native species not a landscape threat; no obvious hindrances to use of prescribed fire, e.g., urban development. The occurrence is fully buffered by a natural landscape. Migration of grassland species remains viable.

Justification for C/D threshold: C-ranked occurrences have some limited buffering from invasive species. D-ranked occurrences have no buffering, and are subject to altered fire and grazing regimes causing a shift in species composition and altering the entire occurrence.

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LITERATURE CITED:

Anderson M. G. 1999. Viability and spatial assessment of ecological communities in the northern Appalachian ecoregion. Phd. Dissertation. University of New Hampshire.
Shaver P., M. Pellant, D. A. Pyke and J. E. Herrick. 2000. Interpreting indicators of rangeland health, ver. 3.0.
Turner G. T. 1975. Mountain grassland ecosystem. USDA Forest Service Research Paper RM-161, Rocky Mt. For. and Range Esp. Stn., Fort Collins, CO.

SOUTHERN ROCKY MOUNTAINS ECOREGION
SAGEBRUSH SHRUBLAND --MATRIX

Artemisia cana / Festuca idahoensis Shrub Herbaceous Vegetation
Artemisia cana / Festuca thurberi Shrubland
Artemisia tridentata ssp. vaseyana / Carex geyeri Shrubland
Artemisia tridentata ssp. vaseyana / Festuca idahoensis Shrub Herbaceous Vegetation
Artemisia tridentata ssp. vaseyana / Festuca kingii Shrub Herbaceous Vegetation
Artemisia tridentata ssp. vaseyana / Festuca thurberi Shrubland
Artemisia tridentata ssp. vaseyana / Pascopyrum smithii Shrubland
Artemisia tridentata ssp. vaseyana / Pseudoroegneria spicata Shrubland
Artemisia tridentata ssp. wyomingensis / Leymus ambiguus Shrubland

Artemisia tridentata ssp. wyomingensis / Pascopyrum smithii Shrubland
Artemisia tridentata ssp. tridentata / Leymus cinereus Shrubland
Artemisia tridentata ssp. tridentata / Pascopyrum smithii Shrubland

SCALE AND RANGE: MATRIX AND WIDESPREAD

Sagebrush shrubland ecological system is a matrix-former that occupies nearly 10% of the Southern Rocky Mountains ecoregion. Although it can be found on the east slope of the ecoregion the largest occurrences are on the western slope. North Park, Middle Park, and the upper Gunnison Basin are areas with very large and continuous stands of sagebrush shrublands. This system is usually found on flat to rolling hills with well-drained clay soils slopes between 7,000 to 10,000 feet in elevation. It is characterized by a dense shrubland with a significant herbaceous understory. The dominant shrub species include *Artemesia tridentata* or *A. cana,* with occasional component shrubs, e.g., *Chrysothamnus* spp., *Purshia tridentata*, and *Krascheninnikovia lanata*. Dominant herbaceous species include: *Festuca idahoensis, F. thurberi, Leymus cinereus, Pseudoroegneria spicata, Stipa comata, Pascopyrum smithii*, *Carex geyeri,* and *Bouteloua gracilis*.

Presettlement stand-replacing fire frequency was 40-60 years, with smaller fires every 20-25 years (Wright et al. 1979 as cited in Johnston 1997). Repeated burning every few years or burning in summer will deplete a stand of perennial grasses and allow weeds, invasive forbs, and cheatgras to increase (Wright et al. 1979 as cited in Johnston 1997).

Cheatgrass (*Bromus tectorum*) increases the likelihood of fire in mixed sagerush-cheatgrass sites, but burning may produce dominance by cheatgrass and weeds (Bunting et al. 1987 as cited in Johnston 1997). Following a fire sagebrush must reestablish itself by seeds, growth is slow and recovery is slow (Bunting et al. 1997 as cited in Johnston 1997). Fire favors shrubs like *Chrysothamnus nauseosus* that can re-sprout after fire (Wambolt et al. 1999). However, fire supression of the montane grasslands could lead to conversion to *Artemisia tridentata* shrublands.

Heavy grazing increases soil water losses, so heavily grazed sites are dryer; grazing also reduces the biomass of deep (>40 cm) roots and reduces the depth and cover of litter. Trampling from livestock grazing significantly decreases the number of sagebrush and grass seedlings (Eckert et al.1978, Pearson 1965 as cited in Johnston 1997). Watts and Wambolt (1996 as cited in Johnston 1997) conclude that exclusion of grazing has no effect on sagebrush canopy cover after 30 years.

This system differs from the sagebrush steppe in that the steppe is dominated by dwarf sagebrush. Due to the low shrub stature of *Artemisia arbuscula* and *A. nova* these dwarf-shrublands are less susceptible to natural fire than taller *Artemisia* spp. shrublands. Although if burnt, these sagebrush will also die (Bunting et al. 1987 as cited in Johnston 1997). These dwarf shrublands are often found on poorly drained, low areated soils whereas the big sagebrush shrublands are usually on well drained and areated soils (Johnston 1997, Fosberg and Hironaka 1964 as cited in Johnston 1997).

MINIMUM SIZE: 30,000 acres (minimum size needed for Gunnison sage grouse)

SEPARATION DISTANCES: 1) substantial barriers to natural processes or species movement, including cultural vegetation greater than 1 mile wide, major highways, or urban development greater than ½ mile wide, 2) different ecological system greater than 5 miles wide.

<u>Justification:</u> Sagebrush shrubland communities are susceptible to fragmentation by cultural vegetation or tree invasion. Primary criteria to be considered is the invasion of trees, non-native forbs, seed dispersal by dominant species and the dispersal behavior and requirements of shrubland fauna, especially sage sparrow, Gunnison sage grouse, and sharp-tailed grouse.

RANK PROCEDURE: For Matrix communities size is the most important factor. Condition is of secondary importance and while landscape context is still important, it is slightly less so than the overall size and condition of an occurrence.

CONDITION SPECIFICATIONS:
A –rated condition: Native species dominant, non-native species may be present but in small amounts (< 5% total cover). Native species that increase with disturbance, e.g., *Wyethia, Balsmorhizza,* and *Gutierrezia sarothrae,* have less than 3% relative cover. Invasive exotics with major potential to alter structure and composition are absent or less than 1% cover, e.g., non-native thistle, *Bromus inermis*, *Poa pratensis, Bromus tectorum.* If trees are present, these are widely scattered and mature. Species richness is often high, and native bunch grasses or sedges (non-increasers) are the dominant herbaceous cover. Soil erosion is not accelerated by anthropogenic activities. There are few to no roads found within the occurrence.

B- rated condition: Native species dominant, non-native species are present but in small amounts (< 10% total cover). Native species that increase with disturbance, e.g., *Wyethia, Balsmorhizza,* and *Gutierrezia sarothrae* have less than 5% relative cover. Invasive exotics with major potential to alter structure and composition may be present, but with less than 3% cover. If trees are present, these are widely scattered and mature. Species richness is often high, and native grasses (non-increasers) are dominant. Accelerate soil erosion may be present in isolated patches. There are few roads fragmenting the occurrence.

C-rated condition: Herbaceous cover is co-dominated by native and non-native species. Alteration of vegetation is extensive but potentially restorable over several decades. Vehicle use or livestock grazing disturbance, if present, is extensive and significant enough to have notable impact on species composition, soil compaction, and soil erosion.

D –rated condition: Non-native species are dominant. Alteration of vegetation is extensive and restoration potential is low. Vehicle use or livestock grazing disturbance, if present, is extensive and significant enough to have notable impact on species composition and soil compaction. System remains fundamentally compromised despite restoration of some processes. Soil compaction and continued disturbance is extensive throughout the occurrence.

<u>Justification for A-rated criteria</u>: Sagebrush shrublands are dependent on periodic fires that provide a diverse mosaic of shrubs, graminoids, and forbs. In order to have a healthy and intact native fauna composition an occurrence must have an intact and diverse shrub and herbaceous canopy cover dominated by native species. A-ranked occurrences have processes, species composition, and the physical environment intact and may support indicator species, esp. Sage grouse and Sage sparrow that require high quality sagebrush habitat.

<u>Justification for C/D threshold:</u> C-ranked occurrences have potential for restoration over several decades. D-ranked occurrences have little or no potential for restoration because of extensive degradation.

SIZE SPECIFICATIONS:
A -rated size: Very large (>90,000 ac)
B -rated size: Large (50,000-80,000 ac)
C -rated size: Moderate (30,000-50,000 ac)
D -rated size: Small (<30,000 ac)

<u>Justification for A-rated criteria</u>: A-ranked occurrences are predicted to be large enough to support an A-ranked occurrence of Gunnison sage grouse (3 times the minimum viable size) as well as a mosaic of several plant associations. Sage grouse depend primarily upon sagebrush-dominated habitats and prefer large contiguous areas of sagebrush on flat or gently rolling terrain (Levad 1998). Occurrences of this size would likely contain sufficient internal variability to capture characteristic biophysical gradients and retain natural geomorphic disturbance. They are buffered from edge effects. Occurrences of this size will support fires and allow for a mosaic of different fire regimes.

<u>Justification for C/D threshold</u>: C-ranked occurrences would support a minimum viable population of sage grouse. The mean estimated breeding home range size for Gunnison Sage Grouse is 1379 ha (Commons 1997). I used the Dry Creek site as the smallest area needed to maintain a viable population of Gunnison Sage Grouse. This site is 30,000 acres.

LANDSCAPE CONTEXT SPECIFICATIONS:
A-rated landscape context: Occurrence surrounded by at least 90% native and unaltered landscape with very little to no urban development or agriculture, and little to no industrial forestry. No unnatural barriers present. Connectivity of adjacent systems allows natural ecological processes, e.g., fire and species migrations to occur.

B-rated landscape context: Surrounding landscape composed of at least 75% natural or semi-natural vegetation, with little urban development within or adjacent to the occurrence. Adjacent systems surrounding occurrence retain much connectivity. Few non-natural barriers present.

C-rated landscape context: Adjacent systems surrounding occurrence are fragmented by alteration with limited connectivity. Surrounding landscape is a mosaic of agricultural or semi-developed areas with >50% natural or semi-natural vegetation. Some non-natural barriers are present. Significant disturbance, but easily restorable.

D-rated landscape context: Major human-caused alteration of surrounding landscape. Adjacent systems surrounding occurrence are mostly converted to agricultural or urban uses. Connectivity is severely hampered.

Justification for A-rated criteria: The sagebrush shrubland and its adjacent landscape is intact; connectivity to adjacent and nearby systems is intact; non-native species not a landscape threat; no obvious hindrances to fires, e.g., urban development. The occurrence is fully buffered by a natural landscape. Migration of shrubland species remains viable.

Justification for C/D threshold: C-ranked occurrences have some limited buffering from invasive species. D-ranked occurrences have no buffering, and are subject to altered fire regimes and invasive species causing a shift in species composition and altering the entire occurrence.

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Date: July 2, 2000

LITERATURE CITED:

Bunting S. C., B. M. Kilgore and C. L. Bushey. 1987. Guidelines for prescribed burning sagebrush-grass rangelands in the northern Great Basin. U. S. Department of Agriculture Forest Service, Intermountian Research Station, Gen. Tech. Report INT-231. Ogeden, UT. 33 pp.

Eckert R. E. Jr., F. F. Peterson, M. S. Meurisse and J. L. Stephens. 1986. Effects of soil-surface morphology on emergence and survival of seedlings in big sagebrush communities. J. Range Management 39(5): 414-420.

Fosberg M. A. and M. Hironaka. 1964. Soil properties affecting the distribution of big and low sagebrush communities in southern Idaho. Pages 230-236 in J. E. McClelland and others Eds., Forage plant physiology and soil-range relationships. American Society of Agronomy, Special Publication No. 5 Madison, WI .

Johnston B. C. 1997. Ecological types of the Upper Gunnison Basin. Review draft. USDA, Forest Service, Gunnison, CO. 539 pp.

Pearson L. C. 1965. Primary production in grazed and ungrazed desert communities of eastern Idaho. Ecology 46(3): 278-285.

Wambolt C. L., T. L. Hoffman, C. A. Mehus. 1999. Response of shrubs in big sagebrush habitats to fire on the northern Yellowstone winter range. Pages 238-242. In McArthur E. D., W. K. Ostler, C. L. Wambolt. Proceedings: shrubland ecotones, August 12-14 1998, Ephraim, UT. U. S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Proc. RMRS-P-11, Ogden, UT. 299.

Watts M. J. and C. L. Wambolt. 1996. Long-term recovery of Wyoming big sagebrush after four treatments. J. Environmental Management 46(1): 95-102.

Wright J. R., H. G. Fisser, C. L. Hanson. 1986. Biology and ecology of sagebrush in Wyoming: IV. Validation of a rangeland porductin model (ERHYM) for sagerush sites. Pages 320-330. In McArthur E. D., B. L. Welch. Proceedings - Symposium on the biology of *Artemisia* and *Chrysothamnus*. U.S. Department of Agriculture, Forest Service, Gen. Tech. Report INT-200. Odgen, UT. 398.

SOUTHERN ROCKY MOUNTAINS ECOREGION
SAGEBRUSH STEPPE --MATRIX

Artemisia arbuscula / Pseudoroegneria spicata Dwarf-shrub Herbaceous Vegetation
Artemisia nova Dwarf-shrubland [Provisional]
Artemisia nova / Pseudoroegneria spicata Dwarf-shrubland
Artemisia nova / Stipa comata Dwarf-shrubland
Artemisia nova Dwarf-shrubland [Provisional]
Artemisia nova - Gutierrezia sarothrae / Bouteloua gracilis - Hilaria jamesii Dwarf-shrubland
Artemisia tripartita / Festuca idahoensis Shrub Herbaceous Vegetation

SCALE AND RANGE: MATRIX AND WIDESPREAD

Sagebrush steppe ecological system is a matrix-former that occupies nearly 3% of the Southern Rocky Mountains ecoregion. Although it can be found on the east slope of the ecoregion the largest occurrences are on the western slope. North Park, Middle Park, and the upper Gunnison Basin are areas with very large and continuous stands of sagebrush steppe. This system is usually found on flat to rolling hills between 7,000 to 10,000 feet in elevation. It is characterized by a dwarf shrubland with an herbaceous component. The dominant shrub species include *Artemisia nova, A. arbuscula* or *A. tripartita* with occasional component shrubs, e.g., *Chrysothamnus* spp.and *Krascheninnikovia lanata*. Dominant herbaceous species include: *Festuca idahoensis, Pseudoroegneria spicata, Stipa comata, Pascopyrum smithii*, *Carex geyeri,* and *Bouteloua gracilis*.

Due to the low shrub stature of *Artemisia arbuscula* and *A. nova* these dwarf-shrublands are less susceptible to natural fire than taller *Artemisia* spp. shrublands. Although if burnt, these sagebrush will also die (Bunting et al. 1987 as cited in Johnston 1997). These dwarf shrublands are often found on poorly drained, low areated soils whereas the big sagebrush shrublands are usually on well drained and areated soils (Johnston 1997, Fosberg and Hironaka 1964 as cited in Johnston 1997).

MINIMUM SIZE: 30,000 acres

SEPARATION DISTANCES: 1) substantial barriers to natural processes or species movement, including cultural vegetation greater than 1 mile wide, major highways, or urban development greater than ½ mile wide, 2) different ecological system greater than 5 miles wide.

Justification: Sagebrush shrubland communities are susceptible to fragmentation by cultural vegetation or tree invasion. Primary criteria to be considered is the invasion of trees, non-native forbs, seed dispersal by dominant species and the dispersal behavior and requirements of shrubland fauna, especially sage sparrow, Gunnison sage grouse, and sharp-tailed grouse.

RANK PROCEDURE: For Matrix communities size is the most important factor. Condition is of secondary importance and while landscape context is still important, it is slightly less so than the overall size and condition of an occurrence.

CONDITION SPECIFICATIONS:
A –rated condition: Native species dominant, non-native species may be present but in small amounts (< 5% total cover). Native species that increase with disturbance, e.g., *Wyethia, Balsmorhizza,* and *Gutierrezia sarothrae,* have less than 3% relative cover. Invasive exotics with major potential to alter structure and composition are absent or less than 1% cover, e.g., non-native thistle, *Bromus inermis*, *Poa pratensis, Bromus tectorum.* If trees are present, these are widely scattered and mature. Species richness is often high, and native bunch grasses or sedges (non-increasers) are the dominant herbaceous cover. Soil erosion is not accelerated by anthropogenic activities. There are few to no roads found within the occurrence.

B- rated condition: Native species dominant, non-native species are present but in small amounts (< 10% total cover). Native species that increase with disturbance, e.g., *Wyethia, Balsmorhizza,* and *Gutierrezia sarothrae* have less than 5% relative cover. Invasive exotics with major potential to alter structure and composition may be present, but with less than 3% cover. If trees are present, these are widely scattered and mature. Species richness is often high, and native grasses (non-increasers) are dominant. Accelerate soil erosion may be present in isolated patches. There are few roads fragmenting the occurrence.

C-rated condition: Herbaceous cover is co-dominated by native and non-native species. Alteration of vegetation is extensive but potentially restorable over several decades. Vehicle use or livestock grazing disturbance, if present, is extensive and significant enough to have notable impact on species composition, soil compaction, and soil erosion.

D –rated condition: Non-native species are dominant. Alteration of vegetation is extensive and restoration potential is low. Vehicle use or livestock grazing disturbance, if present, is extensive and significant enough to have notable impact on species composition and soil compaction. System remains fundamentally compromised despite restoration of some processes. Soil compaction and continued disturbance is extensive throughout the occurrence.

Justification for A-rated criteria: Sagebrush shrublands are dependent on periodic fires that provide a diverse mosaic of shrubs, graminoids, and forbs. In order to have a healthy and intact native fauna composition an occurrence must have an intact and diverse shrub and herbaceous canopy cover dominated by native species. A-ranked occurrences have processes, species composition, and the physical environment intact and may support indicator species, esp. Sage grouse and Sage sparrow that require high quality sagebrush habitat.

Justification for C/D threshold: C-ranked occurrences have potential for restoration over several decades. D-ranked occurrences have little or no potential for restoration because of extensive degradation.

SIZE SPECIFICATIONS:
A -rated size: Very large (>90,000 ac)
B -rated size: Large (50,000-80,000 ac)
C -rated size: Moderate (30,000-50,000 ac)
D -rated size: Small (<30,000 ac)

Justification for A-rated criteria: A-ranked occurrences are predicted to be large enough to support an A-ranked occurrence of sage grouse (3 times the minimum viable size) as well as a mosaic of several plant associations. Sage grouse depend primarily upon sagebrush-dominated habitats and prefer large contiguous areas of sagebrush on flat or gently rolling terrain Occurrences of this size would likely contain sufficient internal variability to capture characteristic biophysical gradients and retain natural geomorphic disturbance. They are buffered from edge effects. Occurrences of this size will support fires and allow for a mosaic of different fire regimes.

Justification for C/D threshold: C-ranked occurrences would support a minimum viable population of sage grouse.

LANDSCAPE CONTEXT SPECIFICATIONS:
A-rated landscape context: Occurrence surrounded by at least 90% native and unaltered landscape with very little to no urban development or agriculture, and little to no industrial forestry. No unnatural barriers present. Connectivity of adjacent systems allows natural ecological processes, e.g., fire and species migrations to occur.

B-rated landscape context: Surrounding landscape composed of at least 75% natural or semi-natural vegetation, with little urban development within or adjacent to the occurrence. Adjacent systems surrounding occurrence retain much connectivity. Few non-natural barriers present.

C-rated landscape context: Adjacent systems surrounding occurrence are fragmented by alteration with limited connectivity. Surrounding landscape is a mosaic of agricultural or semi-developed areas with >50% natural or semi-natural vegetation. Some non-natural barriers are present. Significant disturbance, but easily restorable.

D-rated landscape context: Major human-caused alteration of surrounding landscape. Adjacent systems surrounding occurrence are mostly converted to agricultural or urban uses. Connectivity is severely hampered.

Justification for A-rated criteria: The sagebrush shrubland and its adjacent landscape is intact; connectivity to adjacent and nearby systems is intact; non-native species not a landscape threat; no obvious hindrances to fires, e.g., urban development. The occurrence is fully buffered by a natural landscape. Migration of shrubland species remains viable.

Justification for C/D threshold: C-ranked occurrences have some limited buffering from invasive species. D-ranked occurrences have no buffering, and are subject to altered fire regimes and invasive species causing a shift in species composition and altering the entire occurrence.

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Date: July 2, 2000

LITERATURE CITED:

Bunting S. C., B. M. Kilgore and C. L. Bushey. 1987. Guidelines for prescribed burning sagebrush-grass rangelands in the northern Great Basin. U. S. Department of Agriculture Forest Service, Intermountian Research Station, Gen. Tech. Report INT-231. Ogeden, UT. 33 pp.

Fosberg M. A. and M. Hironaka. 1964. Soil properties affecting the distribution of big and low sagebrush communities in southern Idaho. Pages 230-236 in J. E. McClelland and others Eds., Forage plant physiology and soil-range relationships. American Society of Agronomy, Special Publication No. 5 Madison, WI .

Johnston B. C. 1997. Ecological types of the Upper Gunnison Basin. Review draft. USDA, Forest Service, Gunnison, CO. 539 pp.

SOUTHERN ROCKY MOUNTAINS ECOREGION
MONTANE FEN—SMALL PATCH

Carex aquatilis -Sphagnum spp.
Betula glandulosa/ Sphagnum spp.
Kobresia myosuroides - Thalictrum alpinum
Kobresia simplicuscula - Scirpus pumilus

SCALE AND RANGE: SMALL PATCH AND LIMITED

Montane fen ecological system is a small patch system confined to specific environments defined by ground water discharge, soil chemistry, and peat accumulation of at least 40 cm. This system includes extreme rich fens and iron fens, both rare within the Southern Rocky Mountains ecoregion. Fens form at low points in the landscape or near slopes where ground water intercepts the soil surface. Ground water inflows maintain a fairly constant water level year-round, with water at or near the surface most of the time. Constant high water levels lead to accumulation of organic material. In addition to peat accumulation and perennially saturated soils, the extreme rich and iron fens have distinct soil and water chemistry, with high levels of one or more minerals such as calcium, magnesium, or iron. They usually occur as a mosaic of several plant associations dominated by either *Carex aquatilis, Betula glandulosa, Kobresia myosuroides, K. simpliciuscula* and *Scirpus pumilus*. Moss (*Sphagnum* spp.) is indicative of iron fens. The surrounding landscape may be ringed with other wetland systems, e.g., riparian shrublands, or a variety of upland systems from grasslands to forest. Within the Southern Rocky Mountains ecoregion, this system is limited to a few small areas, notably South Park, Mount Evans, Grand Mesa, and Iron Creek.

The montane fen ecological system is rare in the Southern Rocky Mountains ecoregion. Since this system is reliant on groundwater any disturbances that impact water quality or quantity are a threat. These treats include groundwater pumping, mining, and improper placement of septic systems.

MINIMUM SIZE: 0.5 acre

SEPARATION DISTANCES: 1) substantial barriers to natural processes or species movement, including cultural vegetation greater than ¼ mile wide, major highways, urban development, or large bodies of water. 2) natural community from a different ecological system wider than ½ mile wide, 3) major break in topography, soils, geology, etc., especially one resulting in a hydrologic break.

Justification: Primary criteria to be considered are the hydrologic system and the surrounding landscape. The separation distance for intervening natural or semi-natural communities assumes a different hydrologic regime. They are often isolated hydrologically from other wetlands, and easily impacted by surrounding land use.

RANK PROCEDURE: 1) condition, 2) landscape context, 3) size. Condition and landscape context are the primary ranking factors, with size secondary.

CONDITION SPECIFICATIONS:
A –rated condition: Natural hydrologic regime intact. No or little evidence of wetland alteration due to increased or decreased drainage, clearing, livestock grazing, mining (esp. peat mining), etc. Native species that increase with hydrologic and surface disturbance e.g., *Deschampsia cespitosa* and *Carex aquatilis* are present in typical proportions in diverse communities, rather than in expansive, low diversity stands. Non-native species are generally not a problem in fens of the Southern Rockies, and A-ranked occurrences should exemplify this pattern by having no or very few exotic species present. Roads or other anthropogenically induced fragmentation is limited to less than 1% of the occurrence.

B- rated condition: Natural hydrologic regime nearly intact. Alteration from local drainage, upstream water diversions, groundwater pumping, haying, or livestock grazing is easily restorable by ceasing such activities. Alterations that are generally recognized as unrestorable (e.g., peat mining) may be present, but on less than 10% of the occurrence. Native species that increase with hydrologic and physical disturbance are absent, low in abundance, or very restricted. Few exotic species are present, with little potential for expansion if restoration occurs. The occurrence is virtually intact with fragmentation from roads, etc. limited to less that 3% of the occurrence.

C-rated condition: Natural hydrologic regime altered by local drainage or groundwater pumping. Alteration may be from clearing, mining or livestock grazing and may be locally severe. Native species that increase with disturbance or changes in hydrology/nutrients may be prominent, but with restoration activities diversity in these communities can potentially be enhanced.

D –rated condition: Natural hydrologic regime or disturbance not restorable. Fundamental structure of the substrate has been destroyed to such an extent that the occurrence is effectively unrestorable. System remains fundamentally compromised despite restoration of some processes. Native species that increase with disturbance or changes in hydrology/nutrients are prominent to dominant. Exotic species may be present in significant numbers.

<u>Justification for A-rated criteria</u>: Montane fens in the Southern Rocky Mountains depend on perennial water regime, seasonally to permanently saturated soils, and occasional flooding disturbance. A-ranked occurrences have these processes intact, with no history of alteration to the hydrology or surface structure.

<u>Justification for C/D threshold:</u> C-ranked occurrences have potential for restoration over several decades with significant resources. In D-ranked occurrences, hydrologic alterations and surface structure have been altered so extensively that there is little or no potential for restoration of these fundamental aspects of fens.

SIZE SPECIFICATIONS:
A – rated size: Very large (> 2 acres)
B –rated size: Large (1 to 2 acres)
C –rated size: Moderate (.5 to 1 ac)
D –rated size: Small (< .5 ac)

<u>Justification for A-rated criteria</u>: Fens are usually composed of mosaics of different plant associations included within this system. Very large fen complexes contain the maximum diversity of species and plant associations. Occurrences of this size would likely contain sufficient internal variability to capture characteristic biophysical gradients, natural geomorphic features, and hydrologic variation. In A-ranked occurrences, the majority of the occurrence is buffered from edge effects (e.g., cattle grazing along the edges of the wetlands) and small hydrology alterations.

<u>Justification for C/D threshold</u>: C-ranked occurrences generally contain moderate species and plant association diversity, and are large enough to sustain some natural or human caused perturbations. D-ranked occurrences have noticeably reduced species and plant association diversity, and are to small to remain viable with changes to the hydrology. They are also extremely susceptible to invasions by native and non-native ruderal species making them subject to loss of typical fen plant associations and their associated plants and animals.

LANDSCAPE CONTEXT SPECIFICATIONS:
A-rated landscape context: Uplands or any other system within the ground watershed are largely unaltered by urban or agricultural uses (>90% natural), and include few to no recent clearcuts, peat or gravel mines, pastures that are excessively grazed, or roads. There are no barriers to movement of species, water, nutrients, or other natural forms of energy and material between the occurrence and the surrounding systems. There are also few barriers to movement between this occurrence and other occurrence of the same system that may be necessary to maintain population dynamics.

B-rated landscape context: Uplands surrounding occurrence and within ground watershed may have moderate urban or agricultural alteration (60 to 90% natural), or natural vegetation is heavily managed (e.g., grazing, haying). There are few unnatural barriers to the movement of species and materials, and the occurrence retains much connectivity with adjacent systems and nearby occurrences of the same system. Some natural processes such as flooding and fire may be compromised.

C-rated landscape context: Uplands surrounding occurrence and within ground watershed are fragmented by urban or agricultural alteration (20 to 60% natural). However sufficient upland allows some degree of natural interactions between wetland and upland systems. Sufficient natural or semi-natural vegetation around the occurrence esists that the occurrence is not heavily influenced by human induced changes in hydrologic regimes, nutrient cycles, or in the uplands. Some barriers to movement of species and materials are present limited connectivity exists among upland fragments. Natural patterns of water flow, fire, or nutrient cycling have been heavily altered by human influences. Restoration of most of these natural processes to near their historic patterns is feasible.

D-rated landscape context: Uplands surrounding occurrence within ground watershed are mostly converted to agricultural or urban uses. Connectivity among natural vegetation patches and natural processes are almost nonexistent. Restoration is not feasible within reason.

<u>Justification for A-rated criteria</u>: These occurrences are within nearly intact watersheds and ecological processes, fully supporting the occurrences natural structure, composition, and function. Native systems surrounding the occurrence buffer the fens from any unnatural human influences resulting from changes in water flows, nutrient status, or other hydrologic alterations. Connectivity of habitats allows natural processes and species migration to occur.

<u>Justification for C/D threshold</u>: C-ranked occurrences receive at least some benefit from adjacent natural or semi-natural vegetation (e.g., there is movement across wetland and native upland boundaries), and there is limited buffering from upland influences. D-ranked occurrences receive very little benefit from natural surroundings, so they are subject to altered hydrology, nutrient influxes, invasive species, and population and diversity declines resulting from a cessation of organismal immigration

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SOUTHERN ROCKY MOUNTAINS ECOREGION
UPPER MONTANE/SUBALPINE RIPARIAN FOREST AND WOODLAND ECOLOGICAL SYSTEM—LINEAR

Abies concolor - Picea pungens - Populus angustifolia / Acer glabrum Forest
Abies lasiocarpa / Acer glabrum Forest
Abies lasiocarpa / Calamagrostis canadensis Forest
Abies lasiocarpa / Mertensia ciliata Forest
Abies lasiocarpa / Trautvetteria caroliniensis Forest
Abies lasiocarpa-Picea engelmannii/Alnus incana Woodland
Abies lasiocarpa-Picea engelmannii/Salix drummondiana Woodland
Picea engelmannii / Calamagrostis canadensis Forest
Picea engelmannii / Caltha leptosepala Forest
Picea engelmannii / Cornus sericea Forest
Picea engelmannii / Equisetum arvense Forest
Picea pungens / Alnus incana Woodland
Picea pungens / Cornus sericea Woodland
Picea pungens / Equisetum arvense Woodland
Populus tremuloides / Alnus incana - Cornus sericea Forest
Populus tremuloides / Betula occidentalis Forest
Populus tremuloides / Calamagrostis canadensis Forest
Populus tremuloides / Cornus sericea Forest
Populus tremuloides / Corylus cornuta Forest
Populus tremuloides / Ribes montigenum Forest
Populus tremuloides / Salix drummondiana Forest

SCALE AND RANGE: LINEAR AND WIDESPREAD

Upper montane/subalpine riparian forest and woodland ecological system is a linear system confined to specific environments occurring on floodplains or terraces of rivers and streams. This ecological system is widespread and found in other Rocky Mountain ecoregions as well as the Southern Rocky Mountains ecoregion. Although this system occupies less than 1% of the Southern Rocky Mountains ecoregion it can be found throughout the region, primarily between 8,000 and 11,000 feet. It is also the primary riparian matrix of the Southern Rocky Mountain ecoregion. The montane/subalpine riparian shrubland ecological system forms small patches within this linear-matrix system. Occurrences often contain a mosaic of one or two communities dominated by one of the following trees: *Abies concolor, A. lasiocarpa, Picea engelmannii, P. pungens,* or *Populus tremuloides.*

Generally the vegetation surrounding these riparian systems is dominated by the same tree as that in the riparian area, e.g., if the riparian forest is *Picea engelmannii* the dominant upland vegetation is a *Picea engelmannii* forest.

The primary ecological process necessary to maintain this ecological system is hydrology and more specifically surface flow, although ground water is important. Annual and episodic flooding is important in maintaining this system. Alteration of the flooding regime due to water impoundment, diversions, etc. may produce changes to plant composition as well as community composition (Kittel et al. 1999). In addition, upstream activities that effect water quality, e.g., mining, may be important to the vertebrates and invertebrate species that use this system.

Aquatic species and water quality may be as important an indicator of health of the system as is the vegetation. For example one study on ptarmigan show that what appears to be a healthy willow community is in reality a sink for ptarmigan due to the excessive heavy metals that are found in the willows below mining areas.

MINIMUM SIZE: 3 miles by 30 feet.

SEPERATION DISTANCES: 1) substantial barriers to natural processes or species movement, including cultural vegetation or very degraded example of same community greater than ¼ mile long, major highways, urban development, large bodies of water, 2) different natural community (system) longer than 1 mile along a river corridor, or ¼ mile in other situations, 3) major break in topography, soils, geology, etc., especially one resulting in a hydrologic break. Natural breaks include changes in the stream gradient and other features of the geomorphic setting (e.g. waterfalls). Unnatural breaks are bridges, roads, channelized sections, and heavily degraded reaches that alter the natural hydrologic flow, scour and deposition dynamics of the stream/river.

<u>Justification:</u> Primary criteria to be considered is the reaction to natural flooding/seasonal saturation of the soil profile. The separation distance for intervening natural or semi-natural communities assumes dynamic movements due to natural flooding regimes.

RANK PROCEDURE: 1) condition, 2) size, 3) landscape context. Equal weighting should be given to all ranking factors.

CONDITION SPECIFICATIONS:
A –rated condition: Natural hydrologic regime intact, including an unaltered floodplain. No or little evidence of alteration due to drainage, flood control, irrigation canals, livestock grazing, soil compaction, digging, burming, mining or vehicle use. No or very few exotic species present with no potential for expansion. Species composition is primarily of native species with a diverse physiognomic structure. Stream banks are not overly steepened, the channel not widened, nor unvegetated by excessive livestock grazing.

B- rated condition: Natural hydrologic regime intact or slightly altered by local drainage, flood control, irrigation canals, livestock grazing, digging, mining, vehicle use or roads. Alteration is easily restorable by ceasing such activities. Few exotic species with little potential for expansion if restoration occurs. Although species composition is primarily of native species, the physiognomic structure is less diverse than above. Stream banks may show some local deleterious effects from excessive livestock grazing.

C-rated condition: Natural hydrologic regime altered by upstream dams, local drainage, diking, filling, digging, mining, or dredging. Alteration may be extensive but potentially restorable over several decades. Vehicle use or grazing disturbance, if present, is extensive and significant enough to have notable impact on species compostion and soil compaction, causing excessive erosion. Exotic species (e.g., *Taraxacum officianalis, Poa pratensis, Agrostis stolonifiera*) may be widespread but potentially manageable with restoration of most natural processes. Stream banks have been severely altered by excessive grazing or other human caused reasons, e.g, channeling, or road construction.

D –rated condition: Natural hydrologic regime or disturbance to site not restorable. System remains fundamentally compromised despite restoration of some processes. Invasive exotic species, e.g, *Tamarix*, may be dominant over significant portions of area, with little potential for control.

<u>Justification for A-rated criteria</u>: Subalpine riparian forest and woodlands are dependent on specific hydrologic regimes, soils, and ability to move both up and down the stream as well as side to side within the floodplain. A-ranked occurrences have natural flooding processes, species composition, and physical environment intact.

Justification for C/D threshold: C-ranked occurrences have potential for restoration over several decades. D-ranked occurrences have little or no potential for restoration because of extensive degradation.

SIZE SPECIFICATIONS:
A – rated size: Very large (> 5 linear miles)
B –rated size: Large (4 to 5 linear miles)
C –rated size: Moderate (3 to 4 linear miles)
D –rated size: Small (< 3 linear mile)

Justification for A-rated criteria: Subalpine riparian woodlands are often composed of one or two different plant associations, and may include small patches of shrublands and herbaceous vegetation. Occurrences of this size have a wide range of plant associations within the complex that show a wide range of variation in hydrology, soil texture, and geomorphology. Occurrences of this size would likely contain sufficient internal variability to capture characteristic biophysical gradients and retain natural geomorphic and hydrologic disturbance. They are buffered from edge effects by the intact surrounding upland forest and can withstand small hydrologic alterations.

Justification for C/D threshold: C-ranked occurrences are large enough to sustain some natural or human caused perturbations. While D-ranked occurrences are too small to remain viable with changes to the hydrology. They are also extremely susceptible to invasions by non-natives making them subject to loss of plant associations and their associated plants and animals.

LANDSCAPE CONTEXT SPECIFICATIONS:
A-rated landscape context: No evidence of human-caused alteration of hydrology, especially upstream of occurrence and within the watershed. Uplands surrounding occurrence and within the watershed are largely unaltered by urban or agricultural uses (> 90% natural), and have few to no recent (< 20 years) clearcuts adjacent to occurrence. No unnatural barriers present. Connectivity to habitats allows natural processes and species migration to occur.

B-rated landscape context: Little evidence of human-caused alteration of hydrology, especially upstream of occurrence and within the watershed. Uplands surrounding occurrence and within the watershed are largely unaltered by urban or agricultural uses (60 to 90% natural), but retaining much connectivity, or uplands are heavily managed forest landscape with clearcuts, mining, or numerous roads. Few barriers present. Some natural processes such as flooding may be slightly compromised. No regional dam upstream.

C-rated landscape context: Uplands surrounding occurrence or upstream watershed are fragmented by urban or agricultural alteration (20 to 60% natural), with limited connectivity. Some barriers are present, and natural ecological processes are altered. For example, local or moderate human-caused alteration of hydrology may be present including small dams or irrigation ditches.

D-rated landscape context: Major human-caused alteration of hydrology. Uplands surrounding occurrence mostly converted to agricultural or urban uses, including ski area development. Riparian occurrence may be reduced to a narrow strip with a significant edge effect. Connectivity and natural processes are nonexistent. Large dams and numerous diversions are within watershed.

Justification for A-rated criteria: These are occurrences with nearly intact watersheds and natural flooding processes in place. Riparian areas are fully connected with uplands, and fully buffer upland influences.

Justification for C/D threshold: C-ranked occurrences have some limited buffering from upland influences. D-ranked occurrences have no buffering, and are subject to siltation, pollutions, or invasive species. Large dams disrupt the natural flooding process as well as regulating the annual flows.

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SOUTHERN ROCKY MOUNTAINS ECOREGION
MONTANE/SUBALPINE RIPARIAN SHRUBLAND ECOLOGICAL SYSTEM—LINEAR

Alnus incana - Salix drummondiana Shrubland
Alnus incana -(mixed *Salix*) Shrubland
Alnus incana / Cornus sericea Shrubland
Alnus incana / Equisetum arvense Shrubland
Alnus incana / Mesic Forbs Shrubland
Alnus incana / Mesic Graminoids Shrubland
Betula glandulosa / Mesic forb-mesic graminoid
Betula occidentalis / Cornus sericea Shrubland
Betula occidentalis / Mesic Forb Shrubland
Betula occidentalis / Mesic Graminoid Shrubland
Cornus sericea Shrubland [Provisional]
Pentaphylloides floribunda / Deschampsia cespitosa Shrubland
Pentaphylloides floribunda Shrubland [Provisional]
Salix bebbiana / Mesic Graminoids Shrubland
Salix bebbiana Shrubland
Salix boothii / Calamagrostis canadensis Shrubland
Salix boothii / Carex rostrata Shrubland
Salix boothii / Deschampsia cespitosa-Geum rossii Shrubland
Salix boothii / Mesic Forbs Shrubland
Salix boothii / Mesic Graminoids Shrubland
Salix brachycarpa / Calamagrostis canadensis Shrubland
Salix brachycarpa / Carex aquatilis Shrubland
Salix brachycarpa / Mesic Forbs Shrubland
Salix drummondiana - Salix monticola / Mesic Forbs Shrubland
Salix drummondiana - Salix planifolia / Calamagrostis canadensis Shrubland
Salix drummondiana / Calamagrostis canadensis Shrubland
Salix drummondiana / Carex rostrata Shrubland
Salix eriocephala var. *ligulifolia* Shrubland
Salix geyeriana - Salix monticola / Calamagrostis canadensis Shrubland
Salix geyeriana - Salix monticola / Carex aquatilis Shrubland
Salix geyeriana - Salix monticola / Mesic graminoid Shrubland
Salix geyeriana / Calamagrostis canadensis Shrubland
Salix geyeriana / Carex aquatilis Shrubland
Salix geyeriana / Carex rostrata Shrubland
Salix geyeriana / Mesic Graminoids Shrubland
Salix ligulifolia - Cornus sericea Shrubland
Salix lucida ssp. *caudata* Shrubland [Provisional]
Salix monticola / Calamagrostis canadensis Shrubland
Salix monticola / Carex aquatilis Shrubland
Salix monticola / Carex rostrata Shrubland
Salix monticola / Mesic Forb Shrubland
Salix monticola / Mesic Graminoids Shrubland
Salix planifolia / Calamagrostis canadensis Shrubland
Salix planifolia / Caltha leptosepala Shrubland
Salix planifolia / Carex aquatilis Shrubland
Salix planifolia / Carex scopulorum Shrubland
Salix planifolia / Deschampsia caespitosa Shrubland
Salix planifolia / mesic forb Shrubland
Salix pseudomonticola Thicket Shrubland
Salix wolfii / Carex aquatilis Shrubland
Salix wolfii / Carex rostrata Shrubland
Salix wolfii / Deschampsia cespitosa Shrubland
Salix wolfii / Mesic Forbs Shrubland

Shepherdia argentea Shrubland [Provisional]

SCALE AND RANGE: LINEAR AND SMALL PATCH; WIDESPREAD

Montane/subalpine riparian shrubland ecological system is a linear and small patch system, confined to specific environments occurring on floodplains or terraces of rivers and streams and shallow broad valleys. This ecological system is also found in other Rocky Mountain ecoregions. Although the montane/subalpine riparian shrubland ecological system occupies less than 1% of the Southern Rocky Mountains ecoregion it can be found throughout the region within a broad elevation range from approximately 8,000 to 11,000 feet. This system often occurs as a mosaic of multiple communities that are shrub dominated. The dominant shrubs reflect the large elevational gradient and include *Alnus incana, Betula glandulosa, B. occidentalis, Cornus sericea, Salix bebbiana, S. boothii, S. brachycarpa, S. drummondiana, S. eriocephala, S. geyeiriana, S. moniticola, S. planifolia,* and *S. wolfii.* Generally the upland vegetation surrounding these riparian systems are of either conifer or aspen forests, while adjacent riparian systems range from herbaceous dominated communities to tree dominated communities.

Beavers are primary users as well as maintainers to this system. In addition to beavers, the primary abiotic ecological process necessary to maintain this ecological system is hydrology and more specifically surface flow. Annual and episodic flooding is important in maintaining this system. Alteration of the flooding regime due to water impoundment, diversions, etc. may produce changes to plant composition as well as community composition (Kittel et al. 1999). In addition, upstream activities that effect water quality, e.g., mining, may be important to the vertebrates and invertebrate species that use this system.

Aquatic species and water quality may be as important an indicator of health of the system as is the vegetation. For example one study on ptarmigan show that what appears to be a healthy willow community is in reality a sink for ptarmigan due to the excessive heavy metals that are found in the willows below mining areas.

MINIMUM SIZE: 0.5 mile by 30 feet.

SEPERATION DISTANCES: 1) substantial barriers to natural processes or species movement, including cultural vegetation or very degraded example of same community greater than ¼ mile long, major highways, urban development, large bodies of water, 2) different natural community (system) longer than 1 mile along a river corridor, or ¼ mile in other situations, 3) major break in topography, soils, geology, etc., especially one resulting in a hydrologic break. Natural breaks include changes in the stream gradient and other features of the geomorphic setting (e.g. waterfalls). Unnatural breaks are bridges, roads, channelized sections, and heavily degraded reaches that alter the natural hydrologic flow, scour and deposition dynamics of the stream/river.

Justification: Primary criteria to be considered is the reaction to natural flooding. The separation distance for intervening natural or semi-natural communities assumes dynamic movements due to natural flooding regimes.

RANK PROCEDURE: 1) condition, 2) size, 3) landscape context. Equal weighting should be given to all ranking factors.

CONDITION SPECIFICATIONS:
A –rated condition: Natural hydrologic regime intact, including an unaltered floodplain. No or little evidence of alteration due to drainage, flood control, irrigation canals, livestock grazing, digging, burming, mining, or vehicle use. No or very few exotic species present with no potential for expansion. Species composition is primarily of native species with a diverse physiognomic structure. Stream banks are not overly steepened, the channel not overly widened, nor unvegetated by excessive grazing.

B- rated condition: Natural hydrologic regime intact or slightly altered by local drainage, flood control, irrigation canals, livestock grazing, digging, mining, vehicle use, or roads. Alteration is easily restorable by ceasing such activities. Few exotic species with little potential for expansion if restoration occurs. Although species composition is primarily of native species, the physiognomic structure is less diverse than above. Stream banks may show some local deleterious effects from excessive livestock grazing or other human activity.

C-rated condition: Natural hydrologic regime altered by upstream dams, local drainage, diking, filling, digging, mining, or dredging. Alteration is extensive but potentially restorable over several decades. Vehicle use or grazing disturbance, if present, is extensive and significant enough to have notable impact on species composition and soil compaction, causing excessive erosion. Exotic species (e.g., *Taraxacum officianalis, Trifolium repens, Poa pratensis, Agrostis stolonifiera*) may be widespread but potentially manageable with restoration of most natural processes. Stream banks have been severely altered by excessive grazing or other human activity, e.g, channeling, or road construction.

D –rated condition: Natural hydrologic regime or disturbance to site not restorable. System remains fundamentally compromised despite restoration of some processes. Invasive exotic species, e.g, *Phalaris arundinaceae*, may be dominant over significant portions of area, with little potential for control.

Justification for A-rated criteria: Subalpine/montane riparian shrublands are dependent on specific hydrologic regimes, soils, and ability to move both up and down the stream as well as side to side within the floodplain. A-ranked occurrences have natural flooding processes, species composition, and physical environment intact.

Justification for C/D threshold: C-ranked occurrences have potential for restoration over several decades. D-ranked occurrences have little or no potential for restoration because of extensive degradation.

SIZE SPECIFICATIONS:
A – rated size: Very large (> 1.5 linear miles)
B –rated size: Large (1 to 1.5 linear miles)
C –rated size: Moderate (.5 to 1 linear miles)
D –rated size: Small (< .5 linear mile)

Justification for A-rated criteria: Subalpine/montane riparian shrublands are often composed of a mosaic of different plant associations, often including patches of herbaceous vegetation dictated by soils and hydrology. Occurrences of this size have a wide range of plant associations within the complex that show a wide range of variation in hydrology, soil texture, and geomorphology. Occurrences of this size would likely contain sufficient internal variability to capture characteristic biophysical gradients and retain natural geomorphic and hydrologic disturbance. They are long enough to respond to inundations, burial and scour disturbance, and wide enough to allow for lateral migration of the active channel and associated response of the vegetation to that change. Riparian areas of this size can adequately buffer runoff, sedimentation and non-point pollution from uplands. In addition, stands of this size can withstand the impacts of small hydrologic alterations.

Justification for C/D threshold: C-ranked occurrences are large enough to sustain some natural or human caused perturbations. While D-ranked occurrences are too small to remain viable with a catastrophic event. They are also extremely susceptible to invasions by non-natives making them subject to loss of plant associations and their associated plants and animals.

LANDSCAPE CONTEXT SPECIFICATIONS:
A-rated landscape context: No evidence of human-caused alteration of hydrology, especially upstream of occurrence and within the watershed. Uplands surrounding occurrence and within the watershed are largely unaltered by urban or agricultural uses (> 90% natural), and have few to no recent (< 20 years) clearcuts (<25% of landscape). No unnatural barriers present. Connectivity to habitats allows natural processes and species migration to occur.

B-rated landscape context: Little evidence of human-caused alteration of hydrology, especially upstream of occurrence and within the watershed. Uplands surrounding occurrence and within the watershed are largely unaltered by urban or agricultural uses (60 to 90% natural), and retain much connectivity. Uplands may be managed forest landscape with limited clearcuts, mining, or numerous roads. Few barriers present. Some natural processes, such as flooding, may be slightly compromised. No regional dam upstream.

C-rated landscape context: Uplands surrounding occurrence or upstream watershed are fragmented by urban or agricultural alteration (20 to 60% natural), with limited connectivity. Some barriers are present, and natural processes few. Local or moderate human-caused alteration of hydrology may be present, for example small tributary dams or irrigation ditches.

D-rated landscape context: Major human-caused alteration of hydrology. Uplands surrounding occurrence mostly converted to agricultural or urban uses, including ski area development. Riparian occurrence may be reduced to a narrow strip with a significant edge effect. Connectivity and natural processes are nonexistent. Large dams and numerous diversions are within watershed.

Justification for A-rated criteria: These are occurrences with nearly intact watersheds exhibiting excellent water quality and natural hydrologic regime. Riparian areas are fully connected with uplands, and can fully buffer upland influences.

Justification for C/D threshold: C-ranked occurrences have limited buffering capacity from upland influences. D-ranked occurrences offer no buffering capacity, and are subject to siltation, pollutions, and invasive species. Large dams disrupt the natural flooding process as well as regulating the annual flows.

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Date: July 19, 2000 (edited February 24, 2001)

LITERATURE CITED:

Kittel G., E. VanWie, M. Damm, R. Rondeau, S. Kettler and J. Sanderson. 1999. A classification of the riparian vegetation of the Rio Grande and Closed Basin watersheds, Colorado. Colorado State University, Fort Collins, CO: Colorado Natural Heritage Program.

SOUTHERN ROCKY MOUNTAINS ECOREGION
DOUGLAS FIR-PONDEROSA PINE FOREST ECOLOGICAL SYSTEM –LARGE PATCH

Pseudotsuga menziesii / Acer glabrum Forest
Pseudotsuga menziesii / Arctostaphylos uva-ursi Forest
Pseudotsuga menziesii / Carex geyeri Forest
Pseudotsuga menziesii / Carex rossii Forest
Pseudotsuga menziesii / Festuca arizonica Forest
Pseudotsuga menziesii / Festuca idahoensis Woodland
Pseudotsuga menziesii / Festuca kingii Woodland
Pseudotsuga menziesii / Holodiscus dumosus Scree Woodland
Pseudotsuga menziesii / Jamesia americana Forest
Pseudotsuga menziesii / Juniperus communis Forest
Pseudotsuga menziesii / Mahonia repens Forest
Pseudotsuga menziesii / Muhlenbergia montana Forest
Pseudotsuga menziesii / Paxistima myrsinites Forest
Pseudotsuga menziesii / Physocarpus monogynus Forest
Pseudotsuga menziesii / Purshia tridentata Woodland
Pseudotsuga menziesii / Quercus gambelii Forest
Pseudotsuga menziesii / Symphoricarpos oreophilus Forest
Pinus ponderosa / Arctostaphylos uva-ursi Woodland
Pinus ponderosa / Physocarpus monogynus Forest

SCALE AND RANGE: LARGE PATCH AND WIDESPREAD

Douglas fir – ponderosa pine ecological system is a large patch system that occurs in approximately 2% of the Southern Rocky Mountains ecoregion, primarily in the Colorado portion. It is also distributed in other western U.S. mountain ecoregions. It has a rather large elevation range from 6,000 to 10,000 feet. Douglas fir plant associations are found over a wide range of aspects, slopes, landforms, and soils. Often, Douglas fir occurs on north-facing slopes while ponderosa pine occupies south-facing slopes. Douglas-fir is more shade tolerant than pine and aspen but less tolerant than Engelmann spruce or subalpine fir (Mehl 1992). When growing in association with spruce-fir, Douglas fir will be seral giving way eventually to the more shade tolerant spruce-fir (Mehl 1992). When growing in association with ponderosa pine, lodgepole pine or aspen it often dominates becoming the climax if succession is not interrupted by a major disturbance such as fire (Mehl 1992).

Douglas-fir is shade tolerant, reproducing under its own canopy (Mehl 1992). This results in old stands of pure Douglas-fir that tend to be mixed-aged (Mehl 1992). While old Douglas-fir develop a resistance to fire due to a thick corky bark, the young trees are easily killed by fires. The oldest stands generally reach a maximum age of 400 years old although some have reached an age of 700 years (Mehl 1992). Trees 200 to 300 years old are commonly 100 to 120 feet tall and between 15 and 40 inches dbh. (http://www.fs.fed.us/database/feis/).

Mature Douglas fir is generally more fire resistant than spruces and true firs, and equally or slightly less fire resistant than ponderosa pine (http://www.fs.fed.us/database/feis/). Douglas-fir saplings are more susceptible to mortality from surface fires than ponderosa pine saplings (Arno et al. 1983 and Weaver 1970 as cited in http://www.fs.fed.us/database/feis). Mature trees can survive moderately severe ground fires because the lower bole is covered by thick, corky bark that insulates the cambium from heat damage (Revill Associates 1978 and Fischer and Bradley 1987 as cited in http://www.fs.fed.us/database/feis). Frequent low intensity fires keep Douglas-fir from becoming established in the ponderosa pine type (http://www.fs.fed.us/database/feis/).

In general trees that survive a fire tend to be taller and have larger bole diameters than trees that died (Bevins 1980 as cited in http://www.fs.fed.us/database/feis). Following a fire in Colorado, live trees averaged 9.5 inches dbh and 32 feet in height, while dead trees averaged 5.6 inches dbh and 22.6 feet in height (Wyant et al. 1986 as cited in http://ww.fs.fed.us/database/feis).

Fire suppression has altered the distribution and frequency of Douglas fir in the Southern Rocky Mountains ecoregion. J. Coles (pers. com.) believes that historically, Douglas fir stands that are nearly pure were limited to the Roan/Piceance Basin region and to north-facing slopes in a narrow elevational belt along the east slope of the Front Range. Along with fire frequency and intensity, insects (tussock moth, spruce budworm, Douglas-fir beetle) are major factors in stand structure and density of Douglas-fir plant communities (J. Coles pers. com.).

Three-toed woodpeckers are primarily associated with spruce-fir forests but will also inhabit Ponderosa pine, Douglas-fir, and Lodgepole pine forests when insect infestations or fires occur. The three-toed woodpecker thrives in conifer forests that have either just burned or succumbed to an insect infestation (Andrews and Righter 1992). From three to five years after a fire, the burned area will support a local increase in woodpeckers, including the three-toed woodpecker (Spahr et al. 1991). The three-toed woodpecker gleans insects from the trunks of dead trees, for this reason, local burns and insect kills should be considered part of a natural and healthy forest ecosystem.

Major threats to this system include fire suppression, clear-cut logging, and fragmentation by development and roads.

MINIMUM SIZE: 30,000 acres (See Anderson (1999) for a review of minimum size criteria for matrix communities.

SEPARATION DISTANCES: 1) substantial barriers to natural processes or species movement, including cultural vegetation (includes clearcuts/tree plantations) greater than ½ wide, major highways, or urban development; 2) a different ecological system wider than ½ mile wide; 3) a major break or change in the ecological land unit (e.g. topography, soils, geology).

Justification: Many of these communities occur naturally in a mosaic much of the time so minor breaks or small barriers are probably a very common part of the natural distribution and variability. If the breaks are larger, barriers may exist for some species.

RANK PROCEDURE: 1) condition, 2) size, 3) landscape context**.** Size is the most important ranking factor for matrix communities. Condition is of secondary importance and while landscape context is still important, it is slightly less so than the overall size and condition of an occurrence.

CONDITION SPECIFICATIONS:
A -rated condition: Compiled from Mehl (1992) and http://www.fs.fed.us/database/feis/. A mature stand of Douglas fir consists of approximately 10 trees per acre with a minimum DBH of 18 inches and the minimum age of approximately 200 years. Usually this is a multi-aged stand with approx. 2 dead standing trees per acre with a minimum DBH of 15 inches. Some downed trees are evident. An old-growth Douglas-fir stand would consist of an overstory of trees that are predominately or entirely Douglas-fir. On the cooler more moist, north-facing slopes Douglas fir may be growing in association with spruce-fir or white fir. On drier sites old-growth Douglas fir could be associated with ponderosa pine, lodgepole pine and aspen. Where the site is dry, the stand would be more open compared to a cooler, moister, site such as a north facing slopes or drainage bottoms. Some dead standing trees and down dead trees should be present. Some of the overstory trees would have large and open branched, flattened or dead tops and contain some rot. Roads occupy less than 1% of the occurrence; no evidence of logging; no development.

B -rated condition: Little to no evidence of past logging disturbance over a major proportion of the occurrence and majority of stand is > 100 years old, may show evidence of selective logging that has altered the structure; non-native species may be present with low to moderate frequency in the understory, but have low percent cover. Multi-aged stands with some dead and down trees. Roads occupy less than 5% of the occurrence; logging occupies less than 5% of the occurrence, and development is less than 1% of the occurrence.

C -rated condition: Stands regenerated naturally after logging or fire or young to mature stands with significant history of selective logging disturbance that altered composition or structure; non-native species may be uncommon to frequent but do not dominate or co-dominate understory (<10-20% cover). Roads occupy less than 15% of the occurrence; logging occupies less than 15 % of the occurrence, and development is less than 5% of the occurrence.

D -rated condition: Immature stand of Douglas fire with very low species diversity. Logging and other surface disturbance is evident throughout.

Justification for A-rated criteria: Frequency of old-growth stands has been much reduced in this ecoregion, so old-growth carries a premium for condition. In addition, occurrences that have been unaltered by logging, fire suppression, and are primarily dominated by native species are priority stands for conservation of biodiversity.

Justification for C/D threshold: C-ranked occurrences have potential for restoration over several decades. D-ranked occurrences have little or no potential for restoration because of extensive degradation.

SIZE.SPECS
A -rated size: Very large (>90,000 ac)
B -rated size: Large (50,000-80,000 ac)
C -rated size: Moderate (30,000-50,000 ac)
D -rated size: Small (<30,000 ac)

Justification for A-rated criteria: A 90,000 acre stand is large enough to support a mosaic of stand conditions, ages, and disturbance patterns.

Justification for C/D threshold: A 30,000 acre stand is estimated to be as small as matrix communities can be and still support minimum viable populations of pine martens (Anderson 1999). Smaller than 30,000 acres is subject to edge effects and stand destroying events, e.g., fire, beetle kill.

LANDSCAPE.CONTEXT.SPECS

A -rated landscape context: Occurrence surrounded by a large area (>2000 ac/800 ha) of natural vegetation. None to a few small roads in the surrounding landscape. Little to no development or logging is evident in surrounding systems.

B -rated landscape context: Landscape composed of at least 90% natural or semi-natural vegetation; or landscape has very little development or agriculture but has major components of non-native vegetation in at least one physiognomic layer or is composed primarily of young tree plantations.

C -rated landscape context: Landscape is a mosaic of agricultural or semi-developed areas and natural or semi-natural vegetation, the latter composing 25-90% of the landscape, or landscape is dominated by very young tree plantations (cut within last 20 years).

D -rated landscape context: Occurrence surrounded primarily by urban or agricultural landscape, with <25% landscape cover of natural or semi-natural vegetation.

Justification for A-rated criteria: Connectivity is intact and allows for natural migration of flora and fauna as well as completely buffered from perturbations outside of the occurrence. Landscape also allows fire to sweep naturally from adjacent ecological systems.

Justification for C/D threshold: C-ranked occurrences have some limited buffering from adjacent system perturbations, they are connected (although minimally) with other natural systems in the surrounding landscape. With some effort, system function for C-ranked occurrences could be improved. D-ranked occurrences have no buffering, and are subject to altered hydrology and invasive species. D-ranked occurrences are missing fundamental components that prohibit restoration.

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DATE: July 20, 2000

LITERATURE CITED:

Anderson M. G. 1999. Viability and spatial assessment of ecological communities in the northern Appalachian ecoregion. Phd. Dissertation, University of New Hampshire.

Andrews, R. R. and Righter, R. R. Colorado birds. 1992. Denver, Colorado: Denver Museum of Natural History.

Arno S. F. and G. E. Gruell. 1983. Fire history at the forest-grassland ecotone in southwestern Montana. Journal of Range Management 36(3): 332-336.

Bevins C. D. 1980. Estimating survival and salvage potential of fire-scarred Douglas-fir. Res. Note INT-287, USDA, For. Ser., Intermtn. For. and Range Experment Stn, Ogden, UT. 8 pp.

Fischer W. C. and A. F. Bradley. 1987. Fire ecology of western Montana forest habitat types. Gen. Tech. rep. INT-223, USDA, For. Ser., Intermtn For. and Range Experment Stn, Ogden, UT. 95 pp.

Mehl, M.S. 1992. Old-growth descriptions for the major forest cover types in the Rocky Mountain region. In: Kaufmann M.R., Moir W.H., Bassett R.L., Technical Coordinators. Old-growth forests in the southwest and Rocky Mountain regions. Proceedings of a workshop; Mar 9-1992 Mar 13; Portal, Arizona. Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO: USDA Forest Service, General Technical Report RM-213. 106-120.

Revill A. D. Associates. 1978. Ecological effects of fire and its management in Canada's national parks: a synthesis of the literature, Vol 1 &2. Parks Canada, National Parks Branch Natural Resources Division, Ottawa, Ontario, Canada. 345 pp.

Spahr R., D. A. Armstrong and M. Rath. 1991. Threatened, endangered, and sensitive species of the Intermountain region. U.S. Forest Service, Ogden UT.

Weaver H. 1970. Fire and its relationship to ponderosa pine. Proceddings, California tall timbers fire ecology conference; 1970 Oct; Missoula, MT: Intermountain Fire Research Council. University of Montana, School of Forestry: 127-149.

Wyant J. G., P. N. Omi and R. Laven. 1986. Fire induced tree mortality in a Colorado ponderosa pine/Douglas-fir stand. Forest Science 32(1): 49-59.

SOUTHERN ROCKY MOUNTAINS ECOREGION
MONTANE / FOOTHILL CLIFF AND CANYON ECOLOGICAL SYSTEM –LARGE PATCH

Sparse non-vascular vegetation (on rock and unconsolidated substrates)
Pseudotsuga menziesii / Holodiscus dumosus Scree Woodland
Pseudotsuga menziesii / Jamesia americana Forest
Pseudotsuga menziesii / Physocarpus monogynus Forest
Pinus ponderosa / Rockland Woodland
Abies concolor / Holodiscus dumosus Scree Woodland

Montane/foorthill cliff and canyons form are large patches in lower, middle, and upper elevations, generally from 6,000 to 10,000 feet in the Southern Rocky Mountains. Douglas-fir, ponderosa pine, or white fir are widely spaced with a limited shrubland understory of *Holodiscus, Jamesia,* or *Physocarpus.* Soil development is limited as is herbaceous cover. Due to the sparse nature of the vegetation, fires seldom occur, therefore the trees can be quite old.

MINIMUM SIZE: 100 acres

SEPARATION DISTANCES: 1) substantial barriers to natural processes or species movement, including cultural vegetation (includes clearcuts/tree plantations) greater than ½ wide, major highways, or urban development; 2) a different ecological system wider than ½ mile wide; 3) a major break or change in the ecological land unit (e.g. topography, soils, geology).

Justification: Many of these communities occur naturally in a mosaic much of the time so minor breaks or small barriers are probably a very common part of the natural distribution and variability. If the breaks are larger, barriers may exist for some species.

RANK PROCEDURE: 1) condition, 2) size, 3) landscape context. Occurrence size criteria may not be as critical for these patch communities, primarily delimited by landscape features. Factors such as the landscape context current condition, and historical continuity may contribute more to the diversity of an occurrence than does occurrence size, although the species-area relationship still holds up for patch type communities.

CONDITION SPECIFICATIONS:
A -rated condition: A mature and widely scatted stand of conifers. Usually this is a multi-aged stand with a few dead standing trees per acre. Some downed trees are evident.
B -rated condition: More work is needed to evaluate occurrences and document secifications
C -rated condition: More work is needed to evaluate occurrences and document secifications
D -rated condition: Immature stand of conifers with very low species diversity.

Justification for A-rated criteria: More work is needed to evaluate occurrences and document secifications
Justification for C/D threshold: More work is needed to evaluate occurrences and document secifications

SIZE.SPECS
A – rated size: Very large (> 600 acres)
B –rated size: Large (200 to 600 acres)
C –rated size: Moderate (100 - 200 ac)
D –rated size: Small (<100 ac)

Justification for A-rated criteria: Large enough to support a mosaic of stand conditions, ages, and disturbance patterns.

Justification for C/D@ threshold: Occurrences smaller than 100 acres are subject to catastrophic events that may eliminate the entire occurrence and leave little to no opportunity for a mosaic of disturbance patterns.

LANDSCAPE.CONTEXT.SPECS

A -rated landscape context: Occurrence surrounded by a large area (>2000 ac/800 ha) of natural vegetation. None to a few small roads in the surrounding landscape.

B -rated landscape context: Landscape composed of at least 90% natural or semi-natural vegetation; or landscape has very little development or agriculture but has major components of non-native vegetation in at least one physiognomic layer or is composed primarily of young tree plantations.

C -rated landscape context: Landscape is a mosaic of agricultural or semi-developed areas and natural or semi-natural vegetation, the latter composing 25-90% of the landscape, or landscape is dominated by very young tree plantations (cut within last 20 years).

D -rated landscape context: Occurrence surrounded primarily by urban or agricultural landscape, with <25% landscape cover of natural or semi-natural vegetation.

Justification for A-rated criteria: Connectivity is intact and allows for natural migration of flora and fauna as well as completely buffered from perturbations outside of the occurrence.

Justification for C/D threshold: C-ranked occurrences have some limited buffering from adjacent system perturbations, they are connected (although minimally) with other natural systems in the surrounding landscape. With some effort, system function for C-ranked occurrences could be improved. D-ranked occurrences have no buffering, and are subject to altered hydrology and invasive species. D-ranked occurrences are missing fundamental components that prohibit restoration.

AUTHORSHIP: Renée Rondeau
DATE: July 20, 2000

LITERATURE CITED:

Andrews, R. R. and Righter, R. R. Colorado birds. 1992. Denver, Colorado: Denver Museum of Natural History.

SOUTHERN ROCKY MOUNTAINS ECOREGION
PONDEROSA PINE WOODLAND ECOLOGICAL SYSTEM –MATRIX

Pinus ponderosa / Cercocarpus montanus / Andropogon gerardii Wooded Herbaceous Vegetation
Pinus ponderosa / Bouteloua gracilis Woodland
Pinus ponderosa / Cercocarpus montanus Woodland
Pinus ponderosa / Arctostaphylos patula Woodland
Pinus ponderosa / Festuca arizonica Woodland
Pinus ponderosa / Festuca kingii Woodland
Pinus ponderosa / Muhlenbergia montana Woodland
Pinus ponderosa / Pseudoroegneria spicata Woodland
Pinus ponderosa / Quercus gambelii Woodland
Pinus ponderosa / Quercus X pauciloba Woodland
Pinus ponderosa / Ribes cereum Woodland

SCALE AND RANGE: MATRIX PATCH AND WIDESPREAD

Ponderosa pine woodlands are matrix-formers that occupies 10% of the Southern Rocky Mountains ecoregion and are found through throughout the area. This ecological system is primarily in the foothills and montane zones from approximately 6,000 to 9,000 feet on rolling plains or dry slopes with both north and south aspect. The northerly aspects may have a mixture of ponderosa pine and Douglas fir, while the southerly aspects tend to be dominated by ponderosa pine. A century of anthropogenic changes have altered the density and distribution of ponderosa pines. A healthy occurrence often consists of open and park-like stands dominated by *Pinus ponderosa.* Understory vegetation varies from shortgrass to tall shrubs, e.g., *Quercus gambelii* or grasses, e.g., *Festuca arizonica,* and *Bouteloua gracilis*.

Fire has played a very important role in shaping ponderosa pine woodlands. In the past, low intensity fires would burn through ponderosa pine stands every 8-15 years, removing competing understory vegetation and down material (Mehl 1992, Harrington and Sackett 1992). This resulted in irregular shaped stands of even-aged groups of trees varying in size, age and density (Mehl 1992).

Ponderosa pine is more fire resistant and less shade tolerant than Douglas-fir (Mehl 1992). Where periodic low intensity fires have been eliminated from the ecosystem more shade tolerant species such as Douglas-fir or white fir survive and ponderosa pine is seral.

Ponderosa pine has been heavily used since the mining days of the 1850's. It has been harvested for wood and provided forage for livestock. The combination of fire suppression, logging, and heavy livestock grazing has altered most ponderosa pine forests in the Southern Rocky Mountains ecoregion.

Mehl (1992) states the following: Where fire has been present, stands will be climax and contain groups of large, old trees with little understory vegetation or down woody material and few standing dead trees. The age difference of the groups of trees would be large. Where fire is less frequent there will also be smaller size trees in the understory giving the stand some structure with various canopy layers. Dead, down material will be present in varying amounts along with some standing dead trees. In both cases the large old trees will have irregular open, large branched crowns. The bark will be lighter in color, almost yellow, thick and some will like have basal fire scars.

Grace's warbler, Pygmy nuthatch, and flammulated owl are indicators of a healthy ponderosa pine woodland. All of these birds prefer mature trees in an open woodland setting (Winn 1998, Jones 1998, Levad 1998).

MINIMUM SIZE: 30,000 acres (see Anderson (1999) for determining minimum size for matrix communities)

SEPARATION DISTANCES: 1) substantial barriers to natural processes or species movement, including cultural vegetation (includes clearcuts/tree plantations) greater than ½ wide, major highways, or urban development; 2) a different ecological system wider than ½ mile wide; 3) a major break or change in the ecological land unit (e.g. topography, soils, geology).

Justification: Many of these communities occur naturally in a mosaic much of the time so minor breaks or small barriers are probably a very common part of the natural distribution and variability. If the breaks are larger, barriers may exist for some species.

RANK PROCEDURE: 1) condition, 2) landscape context, 3) size. Occurrence size criteria may not be as critical for patch communities as it is for matrix-forming communities (Anderson 1999). Factors such as the landscape context current condition, and historical continuity may contribute more to the diversity of an occurrence than does occurrence size, although the species-area relationship still holds up for patch type communities.

CONDITION SPECIFICATIONS:
A –rated condition: Compiled from Mehl (1992) and http://www.fs.fed.us/database/feis/. A mature stand of ponderosa pine consists of approximately 10 trees per acre with a minimum DBH of 18 inches and the minimum age of approx. 160 years. Usually this is a multi-aged stand with approximately two dead standing tees per acre with a minimum DBH of 10 inches. Downed trees are none to few. An old-growth ponderosa pine stand would consist of an overstory of trees that are predominately or entirely ponderosa pine. On the cooler more moist, north facing slopes it may be growing in association with Douglas-fir. Frequent low intensity fires are still part of this system. Roads or other development are mostly non-existant

B –rated condition: Little to no evidence of past logging disturbance over a major proportion of the occurrence and majority of stand is > 100 years old, may show evidence of selective logging that has altered the structure; non-native species may be present with low to moderate frequency in the understory, but have low percent cover. Fire frequency may be lower or more intense than expected. Roads or other development may be present but these occupy less than 3% of the occurrence.

C –rated condition: Stands regenerated naturally after logging or young to mature stands with significant history of selective logging disturbance that altered composition or structure; non-native species may be uncommon to frequent but do not dominate or co-dominate understory (<10-20% cover). If roads or other development are present they occupy less than 5% of the occurrence.

D –rated condition: Immature stand of ponderosa pine, often high density of trees, low shrub and herbaceous cover, and very low species diversity. Roads or other development occupy more than 5% of the occurrence.

Justification for A-rated criteria: Frequency of old-growth stands has been much reduced in this ecoregion, so old-growth carries a premium for condition. In addition, occurrences that have been unaltered by logging, fire suppression, and are primarily dominated by native species are priority stands for conservation of biodiversity. A-ranked occurrences provide suitable habitat for indicator species.

Justification for C/D threshold: C-ranked occurrences have potential for restoration over several decades. D-ranked occurrences have little or no potential for restoration because of extensive degradation.

SIZE SPECIFICATIONS:
A –rated size: Very large (>90,000 ac)
B –rated size: Large (50,000-80,000 ac)
C –rated size: Moderate (30,000-50,000 ac)
D –rated size: Small (<30,000 ac)

Justification for A-rated criteria: A-ranked occurrences are large enough to support excellent occurrences of ponderosa pine woodland birds, especially Flamulated owls, Pygmy nuthatch, and Grace's warbler. Occurrences of this size would likely contain sufficient internal variability to capture characteristic biophysical gradients and retain natural geomorphic disturbance. They are buffered from edge effects. Occurrences of this size will support fires and the above mentioned birds and allow for a mosaic of different fire and grazing regimes.

Justification for C/D threshold: C-ranked occurrences could support a minimum viable population of ponderosa pine woodland birds and a diverse insect fauna. While D-ranked occurrences are subject to loss of plant associations and their associated plants and animals.

LANDSCAPE CONTEXT SPECIFICATIONS

A –rated landscape context: Occurrence surrounded by at least 2000 acres of natural vegetation. None to a few small roads in the surrounding landscape.

B –rated landscape context: Landscape composed of at least 90% natural or semi-natural vegetation; or landscape has very little development or agriculture but has major components of non-native vegetation in at least one physiognomic layer or is composed primarily of young tree plantations.

C –rated landscape context: Landscape is a mosaic of agricultural or semi-developed areas and natural or semi-natural vegetation, the latter composing 25-90% of the landscape, or landscape is dominated by very young tree plantations (cut within last 20 years).

D –rated landscape context: Occurrence surrounded primarily by urban or agricultural landscape, with <25% landscape cover of natural or semi-natural vegetation.

Justification for A-rated criteria: Connectivity is intact and allows for natural migration of flora and fauna as well as completely buffered from perturbations outside of the occurrence.

Justification for C/D threshold: C-ranked occurrences have some limited buffering from adjacent system perturbations, they are connected (although minimally) with other natural systems in the surrounding landscape. With some effort, system function for C-ranked occurrences could be improved. D-ranked occurrences have no buffering, and are subject to altered hydrology and invasive species. D-ranked occurrences are missing fundamental components that prohibit restoration.

AUTHORSHIP: Renée Rondeau
DATE: October 23, 2000 (edited February 23, 2001)

LITERATURE CITED:

Anderson M. G. 1999. Viability and spatial assessment of ecological communities in the northern Appalachian ecoregion. University of New Hampshire.

Jones S. L. 1998. Pygmy nuthatch. Pages 360-361 in H. E. Kingery, ed., Colorado breeding bird atlas. Colorado Bird Atlas Partnership and Colorado Division of Wildlife, Denver, CO . 636.

Harrington M. G., and S. S. Sackett. 1992. Past and present fire influences on southwestern ponderosa pine old growth. Pages 44-50. In Kaufmann M. R., W. H. Moir, R. L. Bassett. Old-growth forests in the southwest and Rocky Mountain regions. Proceedings of a workshop, March 9-13, 1992, Portal, Arizona. USDA Forest Service, General Technical Report RM-213, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO. 201.).

Levad R. 1998. Grace's warbler. Pages 424-425 in H. E. Kingery, ed., Colorado breeding bird atlas. Colorado Bird Atlas Partnership and Colorado Division of Wildlife, Denver, CO .

Mehl, M. S. 1992. Old-growth descriptions for the major forest cover types in the Rocky Mountain region. In: Kaufmann M.R., Moir W.H., Bassett R.L., Technical Coordinators. Old-growth forests in the southwest and Rocky Mountain regions. Proceedings of a workshop; Mar 9-13, 1992; Portal, Arizona. Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO: USDA Forest Service, General Technical Report RM-213. 106-120.

Winn R. 1998. Flammulated owl. Pages 210-211 in H. E. Kingery, ed., Colorado breeding bird atlas. Colorado Bird Atlas Partnership and Colorado Division of Wildlife, Denver, CO . 636.

SOUTHERN ROCKY MOUNTAINS ECOREGION
PONDEROSA PINE SAVANNA ECOLOGICAL SYSTEM –MATRIX

Pinus ponderosa / Cercocarpus montanus / Andropogon gerardii Wooded Herbaceous Vegetation
Pinus ponderosa / Festuca arizonica Woodland
Pinus ponderosa / Bouteloua gracilis Woodland

SCALE AND RANGE: LARGE PATCH AND WIDESPREAD

Ponderosa pine savanna ecological system is a large patch system that occupies less than 1% of the Southern Rocky Mountains ecoregion and is found throughout the area. This ecological system is primarily in the foothills and montane zones from approximately 6,000 to 9,000 feet on rolling plains or dry slopes usually on a more southerly aspect. This system is best described as a savanna that has widely spaced (>150 years old) ponderosa pines. A century of anthropogenic changes have altered the density and distribution of ponderosa pines. A healthy occurrence often consists of open and park-like stands dominated by *Pinus ponderosa.* Understory vegetation varies from shortgrass to tall shrubs, e.g., *Quercus gambelii* or grasses, e.g., *Festuca arizonica,* and *Bouteloua gracilis*.

Fire has played a very important role in shaping ponderosa pine woodlands. In the past, low intensity fires would burn through ponderosa pine stands every 8-15 years, removing competing understory vegetation and down material (Mehl 1992, Harrington and Sackett 1992). This resulted in irregular shaped stands of even-aged groups of trees varying in size, age and density (Mehl 1992).

Ponderosa pine is more fire resistant and less shade tolerant than Douglas-fir (Mehl 1992). Where periodic low intensity fires have been eliminated from the ecosystem more shade tolerant species such as Douglas-fir or white fir survive and ponderosa pine is seral.

Ponderosa pine has been heavily used since the mining days of the 1850’s. It has been harvested for wood and provided forage for livestock. The combination of fire suppression, logging, and heavy livestock grazing has altered most ponderosa pine forests in the Southern Rocky Mountains ecoregion.

Mehl (1992) states the following: Where fire has been present, stands will be climax and contain groups of large, old trees with little understory vegetation or down woody material and few standing dead trees. The age difference of the groups of trees would be large. Where fire is less frequent there will also be smaller size trees in the understory giving the stand some structure with various canopy layers. Dead, down material will be present in varying amounts along with some standing dead trees. In both cases the large old trees will have irregular open, large branched crowns. The bark will be lighter in color, almost yellow, thick and some will like have basal fire scars.

Grace’s warbler, Pygmy nuthatch, and flammulated owl are indicators of a healthy ponderosa pine woodland. All of these birds prefer mature trees in an open woodland setting (Winn 1998, Jones 1998, Levad 1998).

MINIMUM SIZE: 30,000 acres (see Anderson (1999) for determining minimum size for matrix communities)

SEPARATION DISTANCES: 1) substantial barriers to natural processes or species movement, including cultural vegetation (includes clearcuts/tree plantations) greater than ½ wide, major highways, or urban development; 2) a different ecological system wider than ½ mile wide; 3) a major break or change in the ecological land unit (e.g. topography, soils, geology).

<u>Justification</u>: Many of these communities occur naturally in a mosaic much of the time so minor breaks or small barriers are probably a very common part of the natural distribution and variability. If the breaks are larger, barriers may exist for some species.

RANK PROCEDURE: 1) condition, 2) landscape context, 3) size. Occurrence size criteria may not be as critical for patch communities as it is for matrix-forming communities (Anderson 1999). Factors such as the landscape context current condition, and historical continuity may contribute more to the diversity of an occurrence than does occurrence size, although the species-area relationship still holds up for patch type communities.

CONDITION SPECIFICATIONS:

A –rated condition: Compiled from Mehl (1992) and http://www.fs.fed.us/database/feis/. A mature stand of ponderosa pine consists of approximately 10 trees per acre with a minimum DBH of 18 inches and the minimum age of approx. 160 years. Usually this is a multi-aged stand with approximately two dead standing tees per acre with a minimum DBH of 10 inches. Downed trees are none to few. An old-growth ponderosa pine stand would consist of an overstory of trees that are predominately or entirely ponderosa pine. On the cooler more moist, north facing slopes it may be growing in association with Douglas-fir. Frequent low intensity fires are still part of this system. Roads or other development are mostly non-existant

B –rated condition: Little to no evidence of past logging disturbance over a major proportion of the occurrence and majority of stand is > 100 years old, may show evidence of selective logging that has altered the structure; non-native species may be present with low to moderate frequency in the understory, but have low percent cover. Fire frequency may be lower or more intense than expected. Roads or other development may be present but these occupy less than 3% of the occurrence.

C –rated condition: Stands regenerated naturally after logging or young to mature stands with significant history of selective logging disturbance that altered composition or structure; non-native species may be uncommon to frequent but do not dominate or co-dominate understory (<10-20% cover). If roads or other development are present they occupy less than 5% of the occurrence.

D –rated condition: Immature stand of ponderosa pine, often high density of trees, low shrub and herbaceous cover, and very low species diversity. Roads or other development occupy more than 5% of the occurrence.

Justification for A-rated criteria: Frequency of old-growth stands has been much reduced in this ecoregion, so old-growth carries a premium for condition. In addition, occurrences that have been unaltered by logging, fire suppression, and are primarily dominated by native species are priority stands for conservation of biodiversity. A-ranked occurrences provide suitable habitat for indicator species.

Justification for C/D threshold: C-ranked occurrences have potential for restoration over several decades. D-ranked occurrences have little or no potential for restoration because of extensive degradation.

SIZE SPECIFICATIONS:
A –rated size: Very large (>90,000 ac)
B –rated size: Large (50,000-80,000 ac)
C –rated size: Moderate (30,000-50,000 ac)
D –rated size: Small (<30,000 ac)

Justification for A-rated criteria: A-ranked occurrences are large enough to support excellent occurrences of ponderosa pine woodland birds, especially Flamulated owls, Pygmy nuthatch, and Grace's warbler. Occurrences of this size would likely contain sufficient internal variability to capture characteristic biophysical gradients and retain natural geomorphic disturbance. They are buffered from edge effects. Occurrences of this size will support fires and the above mentioned birds and allow for a mosaic of different fire and grazing regimes.

Justification for C/D threshold: C-ranked occurrences could support a minimum viable population of ponderosa pine woodland birds and a diverse insect fauna. While D-ranked occurrences are subject to loss of plant associations and their associated plants and animals.

LANDSCAPE CONTEXT SPECIFICATIONS

A –rated landscape context: Occurrence surrounded by at least 2000 acres of natural vegetation. None to a few small roads in the surrounding landscape.

B –rated landscape context: Landscape composed of at least 90% natural or semi-natural vegetation; or landscape has very little development or agriculture but has major components of non-native vegetation in at least one physiognomic layer or is composed primarily of young tree plantations.

C –rated landscape context: Landscape is a mosaic of agricultural or semi-developed areas and natural or semi-natural vegetation, the latter composing 25-90% of the landscape, or landscape is dominated by very young tree plantations (cut within last 20 years).

D –rated landscape context: Occurrence surrounded primarily by urban or agricultural landscape, with <25% landscape cover of natural or semi-natural vegetation.

Justification for A-rated criteria: Connectivity is intact and allows for natural migration of flora and fauna as well as completely buffered from perturbations outside of the occurrence.

Justification for C/D threshold: C-ranked occurrences have some limited buffering from adjacent system perturbations, they are connected (although minimally) with other natural systems in the surrounding landscape. With some effort, system function for C-ranked occurrences could be improved. D-ranked occurrences have no buffering, and are subject to altered hydrology and invasive species. D-ranked occurrences are missing fundamental components that prohibit restoration.

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Harrington M. G., and S. S. Sackett. 1992. Past and present fire influences on southwestern ponderosa pine old growth. Pages 44-50. In Kaufmann M. R., W. H. Moir, R. L. Bassett. Old-growth forests in the southwest and Rocky Mountain regions. Proceedings of a workshop, March 9-13, 1992, Portal, Arizona. USDA Forest Service, General Technical Report RM-213, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO. 201.).

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Mehl, M. S. 1992. Old-growth descriptions for the major forest cover types in the Rocky Mountain region. In: Kaufmann M.R., Moir W.H., Bassett R.L., Technical Coordinators. Old-growth forests in the southwest and Rocky Mountain regions. Proceedings of a workshop; Mar 9-13, 1992; Portal, Arizona. Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO: USDA Forest Service, General Technical Report RM-213. 106-120.

Winn R. 1998. Flammulated owl. Pages 210-211 in H. E. Kingery, ed., Colorado breeding bird atlas. Colorado Bird Atlas Partnership and Colorado Division of Wildlife, Denver, CO . 636.

SOUTHERN ROCKY MOUNTAINS ECOREGION
PINYON-JUNIPER WOODLAND ECOLOGICAL SYSTEM --MATRIX

Pinus edulis - Juniperus scopulorum
Pinus edulis / Bouteloua curtipendula Woodland
Pinus edulis / Bouteloua gracilis Woodland
Pinus edulis / Cercocarpus montanus Woodland
Pinus edulis / Leymus ambiguus Woodland
Pinus edulis / Poa fendleriana Woodland
Pinus edulis / Pseudoroegneria spicata Woodland
Pinus edulis / Purshia tridentata Woodland
Pinus edulis / Quercus gambelii Woodland
Pinus edulis / Quercus x pauciloba Woodland
Pinus edulis / Rockland Woodland
Pinus edulis / Sparse Understory Forest
Pinus edulis / Stipa comata Woodland
Pinus edulis / Stipa scribneri Woodland

SCALE AND RANGE: MATRIX AND WIDESPREAD

Pinyon-juniper woodland ecological system is a matrix-former that occupies in approximately 11% of the Southern Rocky Mountains ecoregion, primarily in the southern half. Woodlands dominated by a mix of *Pinus edulis* and *Juniperus* spp. or pure or nearly pure stands of *Pinus edulis*, comprise the pinyon-juniper woodland ecological group. On the west slope of the Southern Rocky Mountains ecoregion *Juniperus osteosperma* or *J. scopulorum* are the dominant junipers, while on the east slope *J. monosperma* and *J. scopulorum* are the dominants. It occupies the lower and warmest elevations growing from 4,500 to 9,000 feet growing in a semiarid climate. It grows best just below the lower elevational range of ponderosa pine and above the grassland/shrublands of the foothills.

The stands exhibit considerable diversity in appearance and composition. Stands may consist of all ages or one age (Mehl 1992). Dominant trees are often 400 years old (Mehl 1992). Trees 800 to 1000 years old have been recorded (Mehl 1992). Some stands may have closed canopies with single or both tree species, with little or no understory, but many stands are open with widely scattered trees of one or both species with a wide variety of understory vegetation.

The p-j woodland is shade intolerant. It is the climax cover type remaining on the site until disturbed by fire. When disturbed by fire it will revert to grasses and eventually return to p-j woodalnd (Mehl 1992).

Although pinyon-juniper woodlands are a natural system the extent and quality has been severely altered since the early 1900's. Numerous studies have shown that pinyon-juniper, especially juniper have encroached on shrublands and grasslands (e.g., Blackburn and Tueller 1970, West 1999). Numerous processes influence pinyon-juniper woodlands, including climate, grazing, fires, tree harvest, and insect-pathogen outbreaks (West 1999; Eager 1999). Within a given region, the density of woodland, both historically and currently, is strongly related to topoedaphic gradients. The trees persisted throughout past centuries on steeper, rockier, and thus less burned sites (West 1999). Less steep sites, especially those with finer textured soils are where savannas, grasslands, and shrub steppes have occurred in the past. Pinyon-juniper stands on these gentler slopes may have been large, but more savanna-like with very open upper canopy and high grass production. Due to alteration of fires, grazing, etc. we now see various densities of younger trees occurring on sites that were once shrublands or grasslands (West 1999, Commons et al. 1999).

Mitchell and Roberts (1999) determined that the extent of pinyon-juniper woodlands in the Western United States occupies approx. 55.6 million acres. SRM has approximately 2.3 million acres.

MINIMUM SIZE: 30,000 acres (see Anderson 1999 for a good explanation for choosing size for matrix communities).

SEPARATION DISTANCES: 1) substantial barriers to natural processes or species movement, including cultural vegetation (includes clearcuts/tree plantations) greater than ½ wide, major highways, or urban development; 2) a different ecological system wider than ½ mile wide; 3) a major break or change in the ecological land unit (e.g. topography, soils, geology).

<u>Justification</u>: Many of these communities occur naturally in a mosaic much of the time so minor breaks or small barriers are part of the natural distribution and variability. If the breaks are larger, barriers may exist for some species.

RANK PROCEDURE: 1) condition, 2) size, 3) landscape context**.** Size is the most important ranking factor for matrix communities. Condition is of secondary importance and while landscape context is still important, it is slightly less so than the overall size and condition of an occurrence.

CONDITION SPECIFICATIONS:
The number of trees per hectare is a good indicator of landuse history of a *Pinyon-Juniper* woodland. Studies of fire scars on Juniper and Pinyon pines have shown that the tree density of Pinyon-Juniper woodlands was much lower prior to European settlement (West and Young 2000, Young and Evans 1981). Prior to 1800, stands had from 1 to 140 trees per acre. After about 1831, stands contained 100 to nearly 600 trees per acre (Blackburn and Tueller 1970). The density of trees varies depending upon site conditions. Sites with fewer trees (both historically and currently) had relatively deep soils and enough herbaceous undergrowth to support fire at regular intervals. Sites with a greater number of trees occurred on shallow, rocky soils, often on steeper slopes. Depth and rockiness of the soil along with percent slope directly effect the amount of herbaceous cover available to carry fire. Favorable deep and less-rocky soils support the fewest trees per ha, where the herbaceous cover is sufficient to carry fire at frequent intervals. Steep, rocky sites with shallow soils support less herbaceous cover and are often the location of the oldest surviving trees (Figure 1).

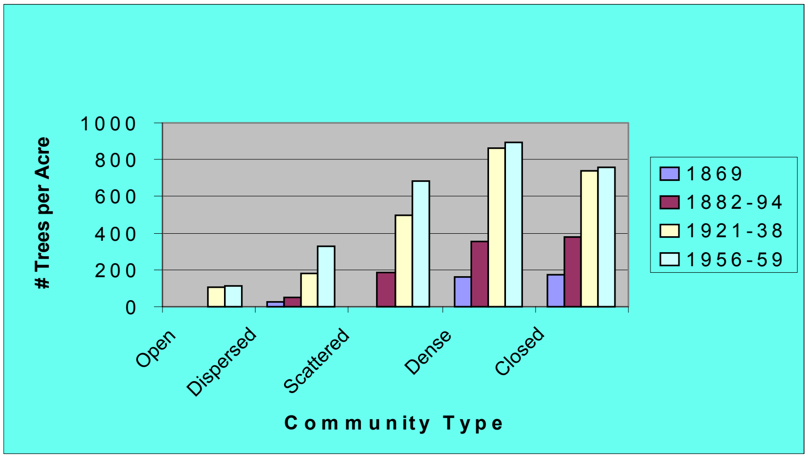

Figure 1. Pinyon-juniper woodland tree density pre-European settlement by community type. Community types were distributed on a gradient of decreasing soil depth and increasing soil rockiness. Open stands were farthest from the mountains and Closed communities were located adjacent to or on the foothills (based on Blackburn and Tueller 1970).

A -rated condition:
Tree density is <30 per ha on favorable sites, and up to 200 trees per ha on rocky, less favorable sites (Young and Evans 1981). Herbaceous cover between trees is heavy enough to carry regular fires. This is less important on steep, rocky sites. Non-native annual grasses are absent or incidental. Native perennial increaser species may be present <5% of the area. Microbiotic crusts are intact. Natural microrelief is undisturbed. Soil erosion is not accelerated by anthropogenic activities. No surficial disturbance is evident, the stand has never been "chained" and re-seeded. Some disturbance may be evident in small, isolated areas (e.g. mines or ranch activities and buildings; minor off-road vehicle use--<1%). There are few or no roads found within the occurrence. Fire has occurred within the stand within the last 10 years for deep soil sites. Accelerated soil erosion had not occurred, or if in the past, the herbaceous cover has increased sufficiently to check this problem.

B -rated condition:
Tree density is <40 ha on favorable sites, but not more than 600 trees per ha on rocky, less favorable sites. Community dominated by natives, herbaceous undergrowth is present but may be declining, native perennial increasers may be present and even dominant in spots, but not throughout the occurrence. Non-natives annuals may be present in disturbed areas only, and are not found throughout the occurrences (e.g. *Bromus tectorum*). Microbiotic crusts are intact in at least 80% of the occurrence. No surficial disturbance is evident, the stand has never been "chained" and re-seeded. If some disturbance is evident it is limited to less than 20% of the occurrence area (e.g. mines or ranch activities and buildings; off-road vehicle use--<5%). There are no to only a few roads found within the occurrence. Fire has occurred within the stand within the last 20-50 years for deep soil sites. Soil erosion may be accelerated in small patches, or lightly so throughout the occurrence. Soil erosion can be easily reversed by relatively simple, straightforward, and inexpensive changes in management.

C -rated condition:
Tree density is >40 trees per ha on favorable sites, >600 per ha on rocky, less favorable sites. Community dominated by native species; herbaceous undergrowth is becoming sparse. Non-native annuals can be abundant in small and large patches (e.g. *Bromus tectorum*). Herbaceous fuel load is not sufficient to carry fire. Microbiotic crusts are removed from more than 25% of the area, or are in various stages of degradation throughout the occurrence.
Surficial disturbances occur on more than 20% of the area (e.g. mines or ranch activities and buildings; off-road vehicle use). Less than 50% of the stand may have been "chained" and re-seeded. There are more than a few roads found within the occurrence. Fire has not occurred within the stand for 50-100 years. Soil erosion and gullying may be observed in patches (up to 30%) within the stand.

D -rated condition:
Tree density is very high (>800 ha) on both favorable and poor sites. Community is dominated by natives. The herbaceous undergrowth is nearly absent. Non-native annual are present and abundant (e.g. *Bromus tectorum*). Microbiotic crusts are >75% removed, occurring only in small pockets naturally protected from livestock and off-road vehicle use. Surficial disturbances

occur on more than 50% of the area (e.g. mines or ranch activities and buildings; off-road vehicle use). The stand may have been "chained", but not more than 50% of the occurrence. Many roads are found within the occurrence. Fire has not occurred within the stand for >100 years.
Soil erosion may be severe in places.

Justification for A-rated criteria: "Fair/Poor"rating threshold: this threshold is intended to separate "Fair" from "Poor" –rated occurrences. Fair occurrences would naturally improve in condition resulting from anthropogenic disturbances with a change in the management practices (prescribed burns, reduced grazing intensity), with significant recovery expected within 25 years.

Justification for C/D threshold: Poor occurrences will not likely improve and are prone to irreversible changes in composition. Significant emphasis is placed on the density of trees and the risk of loosing the entire stand from an intense crown fire and the subsequent severe erosion. In addition, the relative extent of introduced plant species and the loss of the microbiotic soil crust also speaks to the irreversible damage to the stand. Emphasis can also be placed in the degree of fragmentation from roads and the amount of accelerated soil erosion from sources other than those mentioned.

SIZE.SPECS
A -rated size: Very large (>90,000 ac)
B -rated size: Large (50,000-80,000 ac)
C -rated size: Moderate (30,000-50,000 ac)
D -rated size: Small (<30,000 ac)

Justification for A-rated criteria: A 90,000 acre stand is large enough to support a mosaic of stand conditions, ages, and disturbance patterns.

Justification for C/D threshold: A 30,000 acre stand is estimated to be as small as matrix communities can be and still support minimum viable populations of pine martens (Anderson 1999). Smaller than 30,000 acres is subject to edge effects and stand destroying events, e.g., fire, beetle kill.

Bird indicators include Black throated gray warbler, Bushtit, Brown towhee, Bewick's wren, Pinon Jay, Juniper titmouse, Poorwill, Black-chinned hummingbird, Gray flycatcher, Ash-throated flycatcher, Scrubjay. Large mammal indicator species are bighorn sheep, pronghorn antelope, and black bear.

LANDSCAPE CONTEXT SPECIFICATIONS:
A -rated landscape context: Occurrence surrounded by a large area (>2000 ac/800 ha) of natural vegetation. Few small roads in the surrounding landscape. Highly connected – surrounding landscape has been little altered, captures the characteristic ecological gradients (including adjacent large patch and surrounding matrix communities, e.g. sagebrush shrublands, ponderosa pine and other higher elevation conifer forests) and geomorphic processes, and the occurrences is completely surrounded by other high quality ecological systems.

B -rated landscape context: Landscape composed of at least 80% natural or semi-natural vegetation. Moderately connected— occurrence is surrounded by moderate-low quality sagebrush or other montane scrub. The pinyon-juniper may be invading the neighboring shrubland due to a lack of fire. Or the stand may be surrounded by an expansive semi-natural landscape that has been used extensively for grazing or military training currently or in the past.

C -rated landscape context: Landscape is a mosaic of agricultural or semi-developed areas and natural or semi-natural vegetation, the latter composing 25-80% of the landscape. Moderately fragmented and isolate.

D -rated landscape context: Occurrence surrounded primarily by urban or agricultural landscape, with <25% landscape cover of natural or semi-natural vegetation. Highly fragmented and isolated.

Justification for A rated criteria: Characteristic ecological gradients remain intact supporting interactions among component species. Natural disturbances (fire) can occur on a scale that permits maintenance of patches of the community in a variety of conditions.

Justification for C/D threshold: Landscape connectivity seriously impacted below about 35% cover of natural/semi-natural vegetation. Characteristic ecological gradients lacking or otherwise disrupted, with irretrievable impacts on habitat requirements for component species. Damage to microbiotic crust is essentially permanent.

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DATE: October 24, 2000

LITERATURE CITED:

Blackburn, W. H. and P. T. Tueller. 1970. Pinyon and Juniper Invasion in Black Sagebrush Communities in East-Central Nevada. Ecology 51(5):841-848

Commons M. L., R. K. Baydack and C. E. Braun. 1999. Sage grouse response to pinyon-juniper management. Pages 238-239 in S. B. Monsen and R. Stevens, eds., Proceedings: ecology and management of pinyon-juniper communities within the Interior West. U.S. Dept. Agric., Forest Service, Rocky Mountain Research Station, Proc. RMRS-P-9 Ogden, UT . 411 pp.

Eager, T. J. 1999. Factors affecting the health of pinyon pine trees (*Pinus edulis*) in the pinyon-juniper woodlands of western Colorado. Page 397 in S. B. Monsen and R. Stevens, eds., Proceedings: ecology and management of pinyon-juniper communities within the Interior West. U.S. Dept. Agric., Forest Service, Rocky Mountain Research Station, Proc. RMRS-P-9 Ogden, UT . 411.

Mehl, M. S. 1992. Old-growth descriptions for the major forest cover types in the Rocky Mountain region. *In:* Kaufmann MR, Moir WH, Bassett RL, Technical Coordinators. Old-growth forests in the southwest and Rocky Mountain regions. Proceedings of a workshop; Mar 9-13, 1992; Portal, Arizona. Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO: USDA Forest Service, General Technical Report RM-213. 106-120.

West, N. E. 1999. Distribution, composition, and classification of current Juniper-Pinyon woodlands and savannas across western North America. Pages 20-23 in S. B. Monsen and R. Stevens, eds., Proceedings: ecology and management of pinyon-juniper communities within the Interior West. U.S. Dept. Agric., Forest Service, Rocky Mountain Research Station, Proc. RMRS-P-9 Ogden, UT . 411.

West, N.E. and J.A. Young. 2000. Intermountain Valleys and Lower Mountain Slopes. *In:* North American Terrestrial Vegetation, 2nd Edition. Michael G. Barbour and William Dwight Billings, editors. Cambridge University Press, Cambridge, UK. 708 pp.

Young, J. A. and R. A. Evans. 1981. Demography and Fire History of a Western Juniper Stand. Journal of Range Management 34(6): 501-506.

SOUTHERN ROCKY MOUNTAINS ECOREGION
JUNIPER SAVANNA ECOLOGICAL SYSTEM –LARGE PATCH

Juniperus monosperma / Andropogon hallii Woodland
Juniperus monosperma / Bouteloua curtipendula Woodland
Juniperus monosperma / Bouteloua gracilis Woodland
Juniperus monosperma / Cercocarpus montanus - Ribes cereum Woodland
Juniperus monosperma / Krascheninnikovia lanata Woodland
Juniperus monosperma / Stipa neomexicana Woodland
Juniperus scopulorum / Artemisia tridentata Woodland
Juniperus scopulorum / Cercocarpus montanus Woodland
Juniperus scopulorum / Pseudoroegneria spicata Woodland
Juniperus scopulorum / Purshia tridentata Woodland
Juniperus osteosperma / Artemisia tridentata Woodland

Juniperus osteosperma / Leymus salinus ssp. *salmonis* Wooded Herbaceous Vegetation
Juniperus osteosperma / Stipa comata Wooded Herbaceous Vegetation
Juniperus osteosperma / Coleogyne ramosissima Woodland

SCALE AND RANGE: LARGE PATCH AND WIDESPREAD

Juniper savanna ecological system is a large patch system that occurs in approximately 2% of the Southern Rocky Mountains ecoregion, primarily in the Mew Mexico portion. It occupies the lower and warmest elevations growing from 4,500 to 6,000 feet in a semiarid climate. It grows best just below the lower elevational range of ponderosa pine and often intermingles with grasslands and shrublands. This system is best described as a savanna that has widely spaced mature (>150 years old) juniper trees and occasionally *Pinus edulis*. On the west slope of the Southern Rocky Mountains ecoregion *Juniperus osteosperma* or *J. scopulorum* are the dominant junipers, while on the east slope *J. monosperma* and *J. scopulorum* are the dominants.

Although juniper savannas are expected to occur naturally on the landscape the extent and quality has been severely altered since the early 1900's. Numerous studies have shown that juniper has encroached on shrublands and grasslands (e.g., Blackburn and Tueller 1970, West 1999). Numerous processes influence pinyon-juniper savannas including climate, grazing, fires, tree harvest, and insect-pathogen outbreaks (West 1999; Eager 1999). Within a given region, the density of tees, both historically and currently, is strongly related to topoedaphic gradients. Less steep sites, especially those with finer textured soils are where savannas, grasslands, and shrub steppes have occurred in the past. Juniper stands on these gentler slopes may have been large, but more savanna-like with very open upper canopy and high grass production. Due to alteration of fire intensity and frequency, grazing, and changes in climate we now see various densities of younger trees occurring on sites that were once shrublands or grasslands (West 1999, Commons et al. 1999).

It is unclear as to the number of acres we would expect to have in a juniper savanna system if fire suppression, livestock grazing, and climate change is considered. Therefore, finding occurrences of juniper savannas that are dominated by widely spaced mature trees where fires are still part of the system are set at a premium.

MINIMUM SIZE: 1000 acres

SEPARATION DISTANCES: 1) substantial barriers to natural processes or species movement, including cultural vegetation (includes clearcuts/tree plantations) greater than 1 wide, major highways, or urban development; 2) a different ecological system wider than 1 mile wide; 3) a major break or change in the ecological land unit (e.g. topography, soils, geology).

<u>Justification</u>: Many of these communities occur naturally in a mosaic much of the time so minor breaks or small barriers are part of the natural distribution and variability. If the breaks are larger, barriers may exist for some species.

RANK PROCEDURE: 1) condition, 2) size, 3) landscape context**.** Weighting is equal amongst these ranking factors.

CONDITION SPECIFICATIONS:
The number of trees per hectare is a good indicator of landuse history of a juniper savanna. Studies of fire scars on Juniper and Pinyon pines have shown that the tree density of Pinyon-Juniper woodlands was much lower prior to European settlement (West and Young 2000, Young and Evans 1981). Prior to 1800, stands had from 1 to 140 trees per acre. After about 1831, stands contained 100 to nearly 600 trees per acre (Blackburn and Tueller 1970). The density of trees varies depending upon site conditions. Sites with fewer trees (both historically and currently) had relatively deep soils and enough herbaceous undergrowth to support fire at regular intervals. Sites with a greater number of trees occurred on shallow, rocky soils, often on steeper slopes. Depth and rockiness of the soil along with percent slope directly effect the amount of herbaceous cover available to carry fire. Favorable deep and less-rocky soils support the fewest trees per ha, where the herbaceous cover is sufficient to carry fire at frequent intervals. Steep, rocky sites with shallow soils support less herbaceous cover and are often the location of the oldest surviving trees

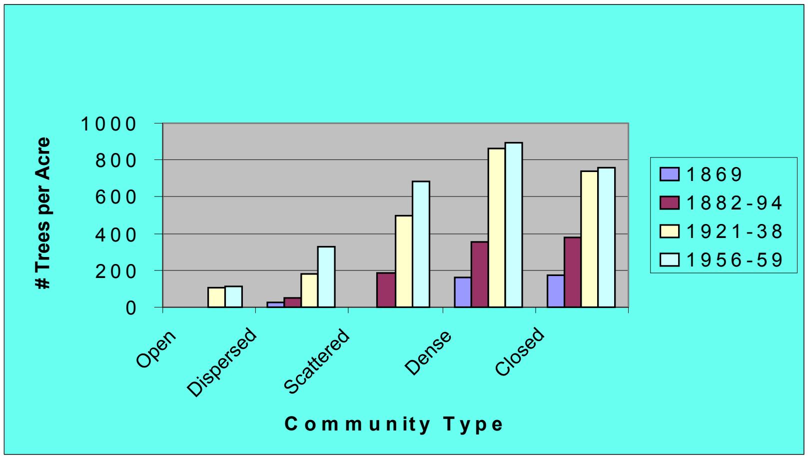

Figure 1. Pinyon-juniper woodland tree density pre-European settlement by community type. Community types were distributed on a gradient of decreasing soil depth and increasing soil rockiness. Open stands were farthest from the mountains and Closed communities were located adjacent to or on the foothills (based on Blackburn and Tueller 1970).

A -rated condition:
Tree density is <30 per ha on favorable sites, and up to 200 trees per ha on rocky, less favorable sites (Young and Evans 1981). Herbaceous cover between trees is heavy enough to carry regular fires. This is less important on steep, rocky sites. Non-native annual grasses are absent or incidental. Native perennial increaser species may be present <5% of the area. Microbiotic crusts are intact. Natural microrelief is undisturbed. Soil erosion is not accelerated by anthropogenic activities. No surficial disturbance is evident, the stand has never been "chained" and re-seeded. Some disturbance may be evident in small, isolated areas (e.g. mines or ranch activities and buildings; minor off-road vehicle use--<1%). There are few or no roads found within the occurrence. Fire has occurred within the stand within the last 10 years for deep soil sites. Accelerated soil erosion had not occurred, or if in the past, the herbaceous cover has increased sufficiently to check this problem.

B -rated condition: Tree density is <40 ha on favorable sites, but not more than 600 trees per ha on rocky, less favorable sites. Community dominated by natives, herbaceous undergrowth is present but may be declining, native perennial increasers may be present and even dominant in spots, but not throughout the occurrence. Non-natives annuals may be present in disturbed areas only, and are not found throughout the occurrences (e.g. *Bromus tectorum*). Microbiotic crusts are intact in at least 80% of the occurrence. No surficial disturbance is evident, the stand has never been "chained" and re-seeded. If some disturbance is evident it is limited to less than 20% of the occurrence area (e.g. mines or ranch activities and buildings; off-road vehicle use--<5%). There are no to only a few roads found within the occurrence. Fire has occurred within the stand within the last 20-50 years for deep soil sites. Soil erosion may be accelerated in small patches, or lightly so throughout the occurrence. Soil erosion can be easily reversed by relatively simple, straightforward, and inexpensive changes in management.

C -rated condition: Tree density is >40 trees per ha on favorable sites, >600 per ha on rocky, less favorable sites. Community dominated by native species; herbaceous undergrowth is becoming sparse. Non-native annuals can be abundant in small and large patches (e.g. *Bromus tectorum*). Herbaceous fuel load is not sufficient to carry fire. Microbiotic crusts are removed from more than 25% of the area, or are in various stages of degradation throughout the occurrence.
Surficial disturbances occur on more than 20% of the area (e.g. mines or ranch activities and buildings; off-road vehicle use). Less than 50% of the stand may have been "chained" and re-seeded. There are more than a few roads found within the occurrence. Fire has not occurred within the stand for 50-100 years. Soil erosion and gullying may be observed in patches (up to 30%) within the stand.

D -rated condition: Tree density is very high (>800 ha) on both favorable and poor sites. Community is dominated by natives. The herbaceous undergrowth is nearly absent. Non-native annual are present and abundant (e.g. *Bromus tectorum*). Microbiotic crusts are >75% removed, occurring only in small pockets naturally protected from livestock and off-road vehicle use. Surficial disturbances occur on more than 50% of the area (e.g. mines or ranch activities and buildings; off-road vehicle use). The stand may have been "chained", but not more than 50% of the occurrence. Many roads are found within the occurrence. Fire has not occurred within the stand for >100 years.Soil erosion may be severe in places.

<u>Justification for A-rated criteria</u>: Juniper savannas are dependent on fires and limited grazing. In order to have a healthy and intact vertebrate, invertebrate, and small mammal composition an occurrence must be dominated by native grasses with high species richness and widely spaced mature trees that would support a ground fire. A-ranked occurrences have processes, species composition, and the physical environment intact.

<u>Justification for C/D criteria</u>: Poor occurrences will not likely improve and are prone to irreversible changes in composition. Significant emphasis is placed on the density of trees and the risk of loosing the entire stand from an intense crown fire and the

subsequent severe erosion. In addition, the relative extent of introduced plant species and the loss of the microbiotic soil crust also speaks to the irreversible damage to the stand. Emphasis can also be placed in the degree of fragmentation from roads and the amount of accelerated soil erosion from sources other than those mentioned.

SIZE.SPECS
A – rated size: Very large (> 5000 acres)
B –rated size: Large (2000 to 5000 acres)
C –rated size: Moderate (1000 - 2000 ac)
D –rated size: Small (<1000 ac)

Justification for A-rated criteria: Large enough to support a mosaic of stand conditions, ages, and disturbance patterns.

Justification for C/D threshold: Smaller than 100 acres is subject to edge effects. No opportunity for mosaic disturbance patterns.

Bird indicators include Black throated gray warbler, Bushtit, Brown towhee, Bewick's wren, Pinon Jay, Juniper titmouse, Poorwill, Black-chinned hummingbird, Gray flycatcher, Ash-throated flycatcher, and Scrubjay.

LANDSCAPE CONTEXT:
A -rated landscape context: Occurrence surrounded by a large area (>2000 ac/800 ha) of natural vegetation. Few small roads in the surrounding landscape. Highly connected – surrounding landscape has been little altered, captures the characteristic ecological gradients (including adjacent large patch and surrounding matrix communities, e.g. sagebrush shrublands, ponderosa pine and other higher elevation conifer forests) and geomorphic processes, and the occurrences is completely surrounded by other high quality ecological systems.

B -rated landscape context: Landscape composed of at least 80% natural or semi-natural vegetation. Moderately connected—occurrence is surrounded by moderate-low quality sagebrush or other montane scrub. The pinyon-juniper may be invading the neighboring shrubland due to a lack of fire. Or the stand may be surrounded by an expansive semi-natural landscape that has been used extensively for grazing or military training currently or in the past.

C -rated landscape context: Landscape is a mosaic of agricultural or semi-developed areas and natural or semi-natural vegetation, the latter composing 25-80% of the landscape. Moderately fragmented and isolate.

D -rated landscape context: Occurrence surrounded primarily by urban or agricultural landscape, with <25% landscape cover of natural or semi-natural vegetation. Highly fragmented and isolated.

Justification for A rated criteria: Characteristic ecological gradients remain intact supporting interactions among component species. Natural disturbances (fire) can occur on a scale that permits maintenance of patches of the community in a variety of conditions.

Justification for C/D threshold: Landscape connectivity seriously impacted below about 35% cover of natural/semi-natural vegetation. Characteristic ecological gradients lacking or otherwise disrupted, with irretrievable impacts on habitat requirements for component species. Damage to microbiotic crust is essentially permanent.

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DATE: February 22, 2001

LITERATURE CITED:

Blackburn, W. H. and P. T. Tueller. 1970. Pinyon and Juniper Invasion in Black Sagebrush Communities in East-Central Nevada. Ecology 51(5):841-848

Commons M. L., R. K. Baydack and C. E. Braun. 1999. Sage grouse response to pinyon-juniper management. Pages 238-239 in S. B. Monsen and R. Stevens, eds., Proceedings: ecology and management of pinyon-juniper communities within the

Interior West. U.S. Dept. Agric., Forest Service, Rocky Mountain Research Station, Proc. RMRS-P-9 Ogden, UT . 411 pp.

Eager, T. J. 1999. Factors affecting the health of pinyon pine trees (*Pinus edulis*) in the pinyon-juniper woodlands of western Colorado. Page 397 in S. B. Monsen and R. Stevens, eds., Proceedings: ecology and management of pinyon-juniper communities within the Interior West. U.S. Dept. Agric., Forest Service, Rocky Mountain Research Station, Proc. RMRS-P-9 Ogden, UT . 411.

Mehl, M. S. 1992. Old-growth descriptions for the major forest cover types in the Rocky Mountain region. *In:* Kaufmann MR, Moir WH, Bassett RL, Technical Coordinators. Old-growth forests in the southwest and Rocky Mountain regions. Proceedings of a workshop; Mar 9-13, 1992; Portal, Arizona. Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO: USDA Forest Service, General Technical Report RM-213. 106-120.

West, N. E. 1999. Distribution, composition, and classification of current Juniper-Pinyon woodlands and savannas across western North America. Pages 20-23 in S. B. Monsen and R. Stevens, eds., Proceedings: ecology and management of pinyon-juniper communities within the Interior West. U.S. Dept. Agric., Forest Service, Rocky Mountain Research Station, Proc. RMRS-P-9 Ogden, UT . 411.

West, N.E. and J.A. Young. 2000. Intermountain Valleys and Lower Mountain Slopes. *In:* North American Terrestrial Vegetation, 2nd Edition. Michael G. Barbour and William Dwight Billings, editors. Cambridge University Press, Cambridge, UK. 708 pp.

Young, J. A. and R. A. Evans. 1981. Demography and Fire History of a Western Juniper Stand. Journal of Range Management 34(6): 501-506.

SOUTHERN ROCKY MOUNTAINS ECOREGION
LOWER MONTANE-FOOTHILLS SHRUBLAND --LARGE PATCH

Arctostaphylos patula / Ceanothus velutinus - Ceanothus prostratus Shrubland
Cercocarpus montanus / Bouteloua curtipendula Shrubland
Cercocarpus montanus / Elymus lanceolatus ssp. *lanceolatus* Shrubland
Cercocarpus montanus / Muhlenbergia montana Shrubland
Cercocarpus montanus / Pseudoroegneria spicata Shrubland
Cercocarpus montanus / Stipa comata Shrubland
Cercocarpus montanus / Stipa neomexicana Shrubland
Cercocarpus montanus / Stipa scribneri Shrubland
Cercocarpus montanus-Rhus trilobata / Andropogon gerardii Shrubland
Purshia tridentata / Artemisia frigida / Stipa comata Shrubland
Purshia tridentata / Muhlenbergia montana Shrubland
Purshia tridentata / Stipa comata Shrub Herbaceous Vegetation
Rhus trilobata Shrubland
Ribes cereum / Leymus ambiguus Shrubland
Symphoricarpos occidentalis Shrubland [Provisional]

SCALE AND RANGE: LARGE PATCH AND WIDESPREAD

Lower montane-foothills shrubland ecological system is a large patch system that is found in over 5% of the Southern Rocky Mountains ecoregion and well represented from the most northern latitudes to the most southern area of the ecoregion. This system is found between 5,000-9,000 feet in elevation and usually associated with rocky substrates. This system may have scattered trees but is a shrub dominated system with a variety of shrubs including *Cercocarpus montanus, Purshia tridentata, Rhus trilobata,* or *Ribes cereum.* The lower montane-foothills shrublands may occur as a mosaic of two or three plant associations often surrounded by grasslands or woodlands. Fires play an important role in this system as the dominant shrubs usually have a severe die back, although some plants will stump sprout (http://www.fs.fed.us/database/feis). Fire suppression has allowed an invasion of trees into some shrublands as well as an invasion of shrubs into grasslands. Additional threats to this system include fragmentation by roads and development, both provide an unnatural fire break as well as a conduit for weeds.

Viable populations of Green-tailed towhee and Scrub jay (especially oaks) indicate a healthy occurrence.

MINIMUM SIZE: 1000 acres.

SEPARATION DISTANCES: 1) substantial barriers to natural processes or species movement, including cultural vegetation greater than ¼ mile wide, major highways, or urban development, 2) different ecological system greater than ½ mile wide.

Justification: Large patch, lower montane-foothills shrubland system is susceptible to fragmentation by cultural vegetation or tree invasion. Primary criteria to be considered is the invasion of trees, non-native forbs, seed dispersal by dominant species and the dispersal behavior and requirements of shrubland fauna.

RANK PROCEDURE: 1) condition, 2) size, 3) landscape context. Weighting is equal amongst these ranking factors.

CONDITION SPECIFICATIONS:
A –rated condition: Native species dominant, non-native species may be present but in small amounts (< 1% total cover). Native species that increase with disturbance, e.g., *Yucca, Artemisia frigida,* and *Opuntia* spp*.,* have less than 3% relative cover. Invasive exotics with major potential to alter structure and composition are nearly absent (<1% cover), e.g., leafy spurge, knapweed, non-native thistle, *Bromus inermis*, *Poa pratensis, Bromus tectorum.* If trees are present, these are widely scattered and mature. Species richness is often high, and native grasses or sedges (non-increasers) are the dominant herbaceous cover. Fragmentation is limited to less than 1% of the occurrence and the fire and grazing regimes are largely intact.

B- rated condition: Native species dominant, non-native species are present but in small amounts (< 3% total cover). Native species that increase with disturbance, e.g., *Yucca, Artemisia frigida,* and *Opuntia* spp*.,* have less than 5% relative cover. Invasive exotics with major potential to alter structure and composition may be present, but with less than 3% cover. If trees are present, these are widely scattered and mature. Species richness is often high, and native grasses (non-increasers) are dominant. Fragmentation is limited to less than 5% of the occurrence and the fire and grazing regimes are relatively intact.

C-rated condition: Herbaceous cover is co-dominated by native and non-native species. Alteration of vegetation is extensive but potentially restorable over several decades. Vehicle use or livestock grazing disturbance, if present, is extensive and significant enough to have notable impact on species composition and soil compaction. Fragmentation is limited to less than 15% of the occurrence; invasive woody species are present but still controllable. The fire and grazing regimes may need immediate management in order for the occurrence to not deteriorate.

D –rated condition: Non-native species are dominant. Alteration of vegetation is extensive and restoration potential is low. Vehicle use or livestock grazing disturbance, if present, is extensive and significant enough to have notable impact on species composition and soil compaction. System remains fundamentally compromised despite restoration of some processes. Soil compaction and continued disturbance is extensive throughout the occurrence.

Justification for A-rated criteria: Lower montane-foothills shrublands may encounter periodic fires that may alter the seral stage of the system. A- ranked occurrences provide a diverse mosaic of shrubs, graminoids, and forbs that will respond positively to a fire event. In order to have a healthy and intact native fauna composition an occurrence must have an intact and diverse shrub and herbaceous canopy cover dominated by native species. A-ranked occurrences have processes, species composition, and the physical environment intact.

Justification for C/D threshold: C-ranked occurrences have potential for restoration over several decades. D-ranked occurrences have little or no potential for restoration because of extensive degradation.

SIZE SPECIFICATIONS:
A – rated size: Very large (> 5000 acres)
B –rated size: Large (2000 to 5000 acres)
C –rated size: Moderate (1000 - 2000 ac)
D –rated size: Small (<1000 ac)

Justification for A-rated criteria: A-ranked occurrences are large enough to support excellent occurrences of shrubland birds as well as a mosaic of several plant associations. Occurrences of this size would likely contain sufficient internal variability to capture characteristic biophysical gradients and retain natural geomorphic disturbance. They are buffered from edge effects. Occurrences of this size will most likely allow for a mosaic pattern in the event of a fire leaving some patches unburned, therefore providing several seral stages within an occurrence.

Justification for C/D threshold: C-ranked occurrences would support minimum viable populations of shrubland birds and other fauna. While D-ranked occurrences are subject to loss of plant associations and their associated plants and animals.

LANDSCAPE CONTEXT SPECIFICATIONS:
A-rated landscape context: Occurrence surrounded by at least 90% native and unaltered landscape with very little to no urban development or agriculture, and little to no industrial forestry. No unnatural barriers present. Connectivity of adjacent systems allows natural ecological processes, e.g., fire and species migrations to occur.

B-rated landscape context: Surrounding landscape composed of at least 75% natural or semi-natural vegetation, with little urban development within or adjacent to the occurrence. Adjacent systems surrounding occurrence retain much connectivity. Few non-natural barriers present.

C-rated landscape context: Adjacent systems surrounding occurrence are fragmented by alteration with limited connectivity. Surrounding landscape is a mosaic of agricultural or semi-developed areas with >50% natural or semi-natural vegetation. Some non-natural barriers are present. Significant disturbance, but easily restorable.

D-rated landscape context: Major human-caused alteration of surrounding landscape. Adjacent systems surrounding occurrence are mostly converted to agricultural or urban uses. Connectivity is severely hampered.

Justification for A-rated criteria: The lower montane-foothills shrubland and its adjacent landscape is intact. Connectivity to adjacent and nearby systems is intact. Non-native species are not a landscape threat. No obvious hindrances to fires exist, e.g., urban development. The occurrence is fully buffered by a natural landscape. Migration of shrubland species remains viable.

Justification for C/D threshold: C-ranked occurrences have some limited buffering from invasive species. D-ranked occurrences have no buffering, and are subject to altered fire regimes and invasive species causing a shift in species composition and altering the entire occurrence.

AUTHORSHIP: Renée Rondeau
Date: July 2, 2000

SOUTHERN ROCKY MOUNTAINS ECOREGION
GAMBEL'S OAK / SERVICEBERRY SHRUBLAND --LARGE PATCH

Amelanchier utahensis - Cercocarpus montanus Shrubland
Amelanchier utahensis / Carex geyeri Shrubland
Amelanchier utahensis / Pseudoroegneria spicata Shrubland
Quercus gambelii - Cercocarpus montanus / Carex geyeri Shrubland
Quercus gambelii / Amelanchier utahensis Shrubland
Quercus gambelii / Carex inops Shrubland
Quercus gambelii / Pachystima myrsinites Shrubland
Quercus gambelii / Robinia neomexicana / Symphoricarpos rotundifolius Shrubland
Quercus gambelii / Stipa comata Shrubland
Quercus gambelii / Symphoricarpos oreophilus Shrubland

SCALE AND RANGE: LARGE PATCH AND WIDESPREAD

Oak / serviceberry shrubland ecological system is a large patch system that occurs in approximately 3% of the Southern Rocky Mountains ecoregion, primarily on the lower elevations of the western slope. It is most commonly found along canyon walls, dry foothills, lower mountain slopes, and at the edge of the plains from approximately 5,000 to 9,500 feet in the Southern Rocky Mountains ecoregion. These shrublands are often situated above pinyon-juniper woodlands or sagebrush-grasslands, although at the interface of the plains these shrublands are often below the pinyon-juniper woodlands. *Quercus gambelii* grows on a wide variety of soil types ranging from calcareous, heavy, fine-grained loams but also on sandy loams, gravelly loams, clay loams, deep alluvial sand, and coarse gravel (Christensen 1955). *Amelanchier* grows best on coarse to medium well-drained soils (http://www.fs.fed.us/database/feis/). This ecological system may intergrade with the lower montane-foothills shrubland ecological system and share many of the same site characteristics. The effect of fire is an important distinguishing factor between the two systems. *Purshia tridentata* and *Cercocarpus montanus* usually have a severe die back following a fire, although some plants will stump sprout, while *Amelanchier* and *Quercus gambelii* are more resistant to fires. Both *Quercus* and *Amelanchier* generally sprout vigorously from stembases or from underground rhizomes following fire (http://www.fs.fed.us/database/feis/). Density and cover of oak and serviceberry often increase after fire (e.g., Harrington 1985).

Viable populations of Green-tailed towhee and Scrub jay (especially oaks) indicate a healthy occurrence.

MINIMUM SIZE: 1000 acres.

SEPARATION DISTANCES: 1) substantial barriers to natural processes or species movement, including cultural vegetation greater than ¼ mile wide, major highways, or urban development, 2) different ecological system greater than ½ mile wide.

Justification: Large patch, oak/serviceberry shrubland communities are susceptible to fragmentation by cultural vegetation or tree invasion. Primary criteria to be considered is the invasion of trees, non-native forbs, seed dispersal by dominant species and the dispersal behavior and requirements of shrubland fauna.

RANK PROCEDURE: 1) condition, 2) size, 3) landscape context. Weighting is equal amongst these ranking factors.

CONDITION SPECIFICATIONS:
A –rated condition: Native species dominant, non-native species may be present but in small amounts (< 5% total cover). Native species that increase with disturbance, e.g., *Yucca, Artemisia frigida,* and *Opuntia* spp*.,* have less than 3% relative cover. Invasive exotics with major potential to alter structure and composition are nearly absent (<1% cover), e.g., leafy spurge, non-native thistle, *Bromus inermis*, *Poa pratensis, Bromus tectorum.* If trees are present, these are widely scattered and mature. Species richness is often high, and native grasses or sedges (non-increasers) are the dominant herbaceous cover. Fragmentation is limited to less than 1% of the occurrence and the fire and grazing regimes are largely intact.

B- rated condition: Native species dominant, non-native species are present but in small amounts (< 10% total cover). Native species that increase with disturbance, e.g., *Yucca, Artemisia frigida,* and *Opuntia* spp*.,* have less than 5% relative cover. Invasive exotics with major potential to alter structure and composition may be present, but with less than 3% cover. If trees are present, these are widely scattered and mature. Species richness is often high, and native grasses (non-increasers) are dominant. Fragmentation is limited to less than 5% of the occurrence and the fire and grazing regimes are relatively intact.

C-rated condition: Herbaceous cover is co-dominated by native and non-native species. Alteration of vegetation is extensive but potentially restorable over several decades. Vehicle use or livestock grazing disturbance, if present, is extensive and significant enough to have notable impact on species composition and soil compaction. Fragmentation is limited to less than 15% of the occurrence; invasive woody species are present but still controllable. The fire and grazing regimes may need immediate management in order for the occurrence to not deteriorate.

D –rated condition: Non-native species are dominant. Alteration of vegetation is extensive and restoration potential is low. Vehicle use or livestock grazing disturbance, if present, is extensive and significant enough to have notable impact on species composition and soil compaction. System remains fundamentally compromised despite restoration of some processes. Soil compaction and continued disturbance is extensive throughout the occurrence.

Justification for A-rated criteria: Lower montane-foothills shrublands may encounter periodic fires that may alter the seral stage of the system. A- ranked occurrences provide a diverse mosaic of shrubs, graminoids, and forbs that will respond positively to a fire event. In order to have a healthy and intact native fauna composition an occurrence must have an intact and diverse shrub and herbaceous canopy cover dominated by native species. A-ranked occurrences have processes, species composition, and the physical environment intact.

Justification for C/D threshold: C-ranked occurrences have potential for restoration over several decades. D-ranked occurrences have little or no potential for restoration because of extensive degradation.

SIZE SPECIFICATIONS:
A – rated size: Very large (> 5000 acres)
B –rated size: Large (2000 to 5000 acres)
C –rated size: Moderate (1000 - 2000 ac)
D –rated size: Small (<1000 ac)

Justification for A-rated criteria: A-ranked occurrences are large enough to support excellent occurrences of shrubland birds as well as a mosaic of several plant associations. Occurrences of this size would likely contain sufficient internal variability to capture characteristic biophysical gradients and retain natural geomorphic disturbance. They are buffered from edge effects. Occurrences of this size will most likely allow for a mosaic pattern in the event of a fire leaving some patches unburned, therefore providing several seral stages within an occurrence.

Justification for C/D threshold: C-ranked occurrences would support minimum viable populations of shrubland birds and other fauna. While D-ranked occurrences are subject to loss of plant associations and their associated plants and animals.

LANDSCAPE CONTEXT SPECIFICATIONS:
A-rated landscape context: Occurrence surrounded by at least 90% native and unaltered landscape with very little to no urban development or agriculture, and little to no industrial forestry. No unnatural barriers present. Connectivity of adjacent systems allows natural ecological processes, e.g., fire and species migrations to occur.

B-rated landscape context: Surrounding landscape composed of at least 75% natural or semi-natural vegetation, with little urban development within or adjacent to the occurrence. Adjacent systems surrounding occurrence retain much connectivity. Few non-natural barriers present.

C-rated landscape context: Adjacent systems surrounding occurrence are fragmented by alteration with limited connectivity. Surrounding landscape is a mosaic of agricultural or semi-developed areas with >50% natural or semi-natural vegetation. Some non-natural barriers are present. Significant disturbance, but easily restorable.

D-rated landscape context: Major human-caused alteration of surrounding landscape. Adjacent systems surrounding occurrence are mostly converted to agricultural or urban uses. Connectivity is severely hampered.

Justification for A-rated criteria: The lower montane-foothills shrubland and its adjacent landscape is intact. Connectivity to adjacent and nearby systems is intact. Non-native species are not a landscape threat. No obvious hindrances to fires exist, e.g., urban development. The occurrence is fully buffered by a natural landscape. Migration of shrubland species remains viable.

Justification for C/D threshold: C-ranked occurrences have some limited buffering from invasive species. D-ranked occurrences have no buffering, and are subject to altered fire regimes and invasive species causing a shift in species composition and altering the entire occurrence.

AUTHORSHIP: Renée Rondeau
Date: January 10, 2001

LITERATURE CITED:

Christensen E. M. 1955. Ecological notes on the mountain brush in Utah. Utah Academy Proceedings 32: 107-111.

Harrington M. G. 1985. The effects of spring, summer, and fall burning on Gambel oak in a southeastern ponderosa pine stand. Forest Science 31(1): 156-163.

SOUTHERN ROCKY MOUNTAINS ECOREGION
WINTERFAT SHRUB STEPPE—LARGE PATCH

Krascheninnikovia lanata / Bouteloua gracilis Dwarf-shrub Herbaceous Vegetation
Krascheninnikovia lanata / Pascopyrum smithii - Bouteloua gracilis Dwarf-shrub Herbaceous Vegetation

Krascheninnikovia lanata / Oryzopsis hymenoides-(Stipa comata) Dwarf-shrub Herbaceous Vegetation
Chrysothamnus greenei / Bouteloua gracilis (Krascheninnikovia lanata) Herbaceous Vegetation

SCALE AND RANGE: LARGE PATCH AND WIDESPREAD (MATRIX IN SAN LUIS VALLEY)

The winterfat shrub steppe ecological system occupies approximately 2% of the Southern Rocky Mountain ecoregion, primarily situated in the San Luis Valley and the Gunnison Basin (Johnston 1997) areas. Small occurrences are also documented in the Colorado River basin and North Park. This system is comprised of dwarf shrubs and prior to anthropogenic changes the dominant shrub was *Krascheninnikovia lanata* (Johnston 1997). Today, *Chrysothamnus greenei* is the dominant shrub in the San Luis Valley although the wetter areas still have significant amounts of winterfat. Other shrubs that have increased from historic heavy livestock grazing include *Chrysothamnus parryi, C. viscidiflorus,* and *Gutierrezia sarothrae* (Johnston 1997). *Krascheninnikovia lanata*, *Stipa comata,* and *Oryzopsis hymenoides* are considered decreasers with grazing. *Bouteloua gracilis* is a common grass of this system. Winterfat shrub steppe occurs between 7,500-9,500 feet in elevation, on windswept mesas, valley floors, gentle slopes, or shoulders of ridges. A conspicuous gravel pavement is found on the surface (Tiedeman and Terwilliger 1978 as cited in Johnston 1997) and often persists throughout the profile (Johnston 1997). Pinyon-juniper woodlands and sagebrush shrublands commonly are adjacent to this system at the upper elevations.

The large-scale natural ecological processes maintaining this ecological system is fire and grazing. Anthropogenic changes that have altered this system include fire suppression and historic heavy livestock grazing.

MINIMUM SIZE: 1,000 acres (30,000 acres in the San Luis Valley).

SEPERATION DISTANCES: 1) substantial barriers to natural processes or species movement, including cultural vegetation or urban development greater than ¼ mile wide, 2) a different natural community from a different ecological system wider than one mile wide or continuous forest wider than ¼ mile, 3) a major break or change in the ecological land unit (e.g., topography, soils, geology).

Justification: Large patch communities are susceptible to fragmentation by cultural vegetation or forest/shrub invasion. Forests are likely to be more significant barriers than woodlands or non-forested wetlands for many species. Primary criteria to be considered is the invasion of woody vegetation, seed dispersal by dominant grasses and forbs, and the dispersal behavior and requirements of invertebrates and small mammals.

RANK PROCEDURE: 1) condition, 2) size, 3) landscape context. Occurrence size criteria may not be as critical for patch communities as it is for matrix-forming communities (Anderson 1999). Factors such as the landscape context current condition, and historical continuity may contribute more to the diversity of an occurrence than does occurrence size, although the species-area relationship still holds up for patch type communities. See additional notes under "Size".

CONDITION SPECIFICATIONS:
(Part of the following condition specifications follow the BLM, NRCS, and USGS "Interpreting indicators of rangeland health" (Shaver et al. 2000).

A –rated condition: *Krascheninnikovia lanata* is dominant at least in large patches. Native grasses are dominant, non-native species occupy less than 3% canopy cover. Invasive species with major potential to alter structure and composition are absent. Native species that increase with disturbance, e.g., *Koelaria micrantha,* and *Artemisia frigida* have less than 3% cover. If trees or rabbitbrush are present, these are widely scattered and mature. Species richness is often high and includes several native grasses as well as a diverse forb component. Soils have a distinct A-horizon. Water flow patterns show minimal evidence of past or current soil deposition or erosion. Terracettes absent or uncommon. Drainages are represented as natural stable channels; no signs of unnatural erosion. Fairly uniform distribution of litter is present. Surface soil is stabilized by organic matter decomposition products and/ or a biological crust. Soils are not overly compacted and are very stable (low erosion rate). Plant vigor is high. Fires are still part of this system.

B- rated condition: *Krascheninnikovia lanata* is dominant in large patches. Native grasses dominant, non-native species are present but in small amounts (< 5% total canopy cover). Invasive exotics with major potential to alter structure and composition occupy less than 1% of occurrence. Native species that increase with disturbance, e.g., *Koelaria micrantha,* and *Artemisia frigida* have less than 5% cover. If trees or rabbitbrush are present, these are scattered and mature. Species richness is often high, and native bunchgrasses are dominant. Soils may be slightly modified but still have a distinct A-horizon. Water flow patterns nearly matches what is expected for the site; erosion is minor with some instability and deposition. Slight active pedestalling; most pedestals are in flow paths and interspaces or on exposed slopes. Occasional terracettes present. Bare areas are of moderate size and sporadically connected. Occasional headcuts may be present. Litter may show some movement of smaller size classes in scattered concentrations around obstructions and in depressions. Soil surface resistance to erosion is significantly reduced in at least half of the plant canopy interspaces, or moderately reduced throughout the site. Soil surface loss or degradation is moderate in plant interspaces with some degradation beneath plant canopies. Soil structure is degraded and soil organic matter content is significantly reduced. Water infiltration is moderately reduced due to adverse changes in plant community composition and or distribution. Soil compaction moderately widespread and moderately restricts water movement and root penetration. ORV use, if present, occupies less than 1% of the occurrence. Livestock grazing is well managed with less than 3% of the occurrence showing signs of a C condition.

C-rated condition: *Krascheninnikovia lanata* is limited to small patches or scanty cover throughout occurrence. Non-native species are present and may dominate small patches, although native species still dominate the occurrence. Total canopy cover is at least 20% grasses. Native species that increase with livestock grazing may be co-dominant or dominant. Invasive exotics with major potential to alter structure and composition may be present although still manageable if attended to within the next few years; trees and shrubs may have seedlings, juveniles, or saplings present. Rill formation may be moderately active and well defined throughout most of the occurrence; gullies may be present with indications of active erosion. Some rocks and plants are pedestaled with occasional exposed roots. Bare ground is moderate to much higher than expected for the site with bare areas large and occasionally connected. Vegetation is intermittent on slopes. Headcuts are active but downcutting is not apparent. Litter movement is moderate and loosely concentrated near obstructions; moderate to small size classes of litter have been displaced. Soil surface resistance to erosion is significantly reduced in most interspaces and moderately reduced beneath plant canopies. Stabilizing agents present only in isolated patches. Soil surface loss or degradation may be severe throughout the site. Infiltration is greatly decreased due to adverse changes in plant community composition or distribution. Detrimental plant cover changes have occurred. Soil compaction may be widespread and greatly restricts water movement and root penetration. Dead plants or decadent plants may be common. Reproductive capability of native perennial plants is reduced. ORV use, if present, occupies less than 5% of the occurrence. Livestock grazing is well managed with less than 10% of the occurrence showing signs of a D condition.

D –rated condition: Non-native species are dominant, native species have less than 10% canopy cover and 20% relative cover. Alteration is extensive and restoration potential is low. Vehicle use or livestock grazing disturbance, if present, is extensive and significant enough to have notable impact on species composition, soil compaction and stability. System remains fundamentally compromised despite restoration of some processes. Rill formation may be severe and well defined throughout most of the occurrence. Water flow patterns may be extensive and numerous causing active erosion. Many rocks and plants are pedestaled; exposed plant roots are common. Bare ground is much higher than expected for the site (large and generally connected). Gullies may be common with indications of active erosion and downcutting. Nickpoints and headcuts are numerous and active. Litter movement may be extreme and concentrated around obstructions. Most size classes of litter have been displaced. Soil surface resistance to erosion may be extemely reduced throughout the site. Biological stabilization agents including organic matter and biological crusts virtually absent. Soil surface horizon may be absent. Infiltration may be severely decreased due to adverse changes in plant community composition and/or distribution. Soil compaction layer extensive; severely restricting water movement and root penetration. Plant vigor may be poor and dead or decadent plants are common. Litter largely absent relative to site potential.

<u>Justification for A-rated criteria</u>: Winterfat shrub steep may be dependent on periodic fires and limited grazing. In order to have a healthy and intact invertebrate and small mammal composition an occurrence must be dominated by native grasses with high species richness. A-ranked occurrences have processes, species composition, and the physical environment intact.

<u>Justification for C/D threshold:</u> C-ranked occurrences have potential for restoration over several decades. D-ranked occurrences have little or no potential for restoration because of extensive degradation.

SIZE SPECIFICATIONS:

For areas not in San Luis Valley:
A – rated size: Very large (> 5000 acres)
B –rated size: Large (2000 to 5000 acres)
C –rated size: Moderate (1000 - 2000 ac)
D –rated size: Small (<1000 ac)

For San Luis Valley:
A -rated size: Very large (>90,000 ac)
B -rated size: Large (50,000-80,000 ac)
C -rated size: Moderate (30,000-50,000 ac)
D -rated size: Small (<30,000 ac)

Justification for A-rated criteria: Winterfat shrub steppe is composed of a mosaic of plant communities. The San Luis valley occurrences appear to have a combination of large patch and matrix-forming attributes. For example large patches are usually more specific in their ecological tolerances than matrix, while matrix communities are more resilient and resistant to large scale disturbances than large patch communities (Anderson 1999). The winterfat shrub steppe fits large patch for its ecological tolerance and fits matrix for its ability to be resilient and resistant to large-scale disturbances, e.g., fire. Therefore, in the San Luis Valley an occurrence larger than or equal to 30,000 acres would likely contain sufficient internal variability to capture characteristic biophysical gradients and retain natural geomorphic disturbance as well as recover from major sand movement. They are also adequately buffered from edge effects. Outside of the San Luis Valley, this ecological system is usually represented as a large patch type and therefore a 1000 acre occurrence is deemed a viable size.

A-ranked occurrences are large enough to support viable populations of grassland birds as well as a mosaic of several plant associations. Occurrences of this size will allow for a mosaic of different fire and grazing regimes.

Justification for C/D threshold: C-ranked occurrences may still support a small number of grassland birds and a diverse insect fauna. While D-ranked occurrences are subject to loss of plant associations and their associated plants and animals. Edge effects are much more pronouned in D sized occurrences.

LANDSCAPE CONTEXT SPECIFICATIONS:
A-rated landscape context: Occurrence surrounded by a native and unaltered landscape with very little to no urban development or agriculture (>90% natural). No unnatural barriers present. Connectivity of adjacent systems allows natural ecological processes, e.g., fire to occur.

B-rated landscape context: Landscape composed of at least 75% natural or semi-natural vegetation, with any urban development not directly adjacent to the occurrence. Limited or minor human-caused alteration of landscape. Adjacent systems surrounding occurrence have moderate urban or agricultural alteration (60-90% natural) but retain much connectivity. Few non-natural barriers present.

C-rated landscape context: Surrounding landscape is a mosaic of agricultural or semi-developed areas with natural or semi-natural vegetation. Adjacent systems surrounding occurrence are fragmented by alteration (20 – 60% natural), with limited connectivity. Some non-natural barriers are present. Significant disturbance, but restorable.

D-rated landscape context: Major human-caused alteration of surrounding landscape. Adjacent systems surrounding occurrence are mostly converted to agricultural or urban uses. Connectivity is severely hampered.

Justification for A-rated criteria: The winterfat shrub steppe and its adjacent landscape is intact; connectivity to adjacent and nearby systems is intact; non-native species not a landscape threat; no obvious hindrances to use of prescribed fire, e.g., urban development. The occurrence is fully buffered by a natural landscape. Migration of grassland species remains viable.

Justification for C/D threshold: C-ranked occurrences have some limited buffering from invasive species. D-ranked occurrences have no buffering, and are subject to altered fire and grazing regimes causing a shift in species composition and altering the entire occurrence.

AUTHORSHIP: Renée Rondeau
Date: July 2, 2000

LITERATURE CITED:

Anderson M. G. 1999. Viability and spatial assessment of ecological communities in the northern Appalachian ecoregion. University of New Hampshire.

Johnston B. C. 1997. Ecological types of the Upper Gunnison Basin. Review draft. USDA, Forest Service, Gunnison, CO. 539 pp.

Shaver P., M. Pellant, D. A. Pyke and J. E. Herrick. 2000. Interpreting indicators of rangeland health, ver. 3.0.

Tiedeman J. A. and C. Jr. Terwilleger. 1978. Phyto-edaphic classification of the Piceance Basin. Colorado State University Range Sciece Department, Science Series No. 31, Fort Collins, Colo. 265 pp

SOUTHERN ROCKY MOUNTAINS ECOREGION
FOOTHILL GRASSLAND—LARGE PATCH

Andropogon gerardii - Schizachyrium scoparium Western Great Plains Herbaceous Vegetation
Andropogon gerardii - Sorghastrum nutans Western Great Plains Herbaceous Vegetation
Andropogon gerardii - Sporobolus heterolepis Western Great Plains Herbaceous Vegetation
Bouteloua gracilis - Bouteloua curtipendula Herbaceous Vegetation
Bouteloua gracilis - Bouteloua hirsuta Herbaceous Vegetation
Bouteloua gracilis - Buchloe dactyloides Herbaceous Vegetation
Bouteloua hirsuta - Bouteloua curtipendula Herbaceous Vegetation
Bouteloua hirsuta - Stipa neomexicana Herbaceous Vegetation
Muhlenbergia montana - Stipa comata Herbaceous Vegetation
Muhlenbergia montana Herbaceous Vegetation
Pascopyrum smithii - Bouteloua gracilis Herbaceous Vegetation
Poliomintha incana / Bouteloua gracilis Shrubland
Schizachyrium scoparium - Bouteloua curtipendula Western Great Plains Herbaceous Vegetation
Stipa comata - Bouteloua gracilis Colorado Front Range Herbaceous Vegetation
Stipa neomexicana Herbaceous Vegetation

SCALE AND RANGE: LARGE PATCH AND WIDESPREAD

Foothill grassland ecological system is a large patch system found primarily in the foothills of the Southern Rocky Mountains (SRM) ecoregion, usually between 5,000-7,000 feet in elevation. It is best characterized as a mid-grass to tallgrass prairie on gentle slopes, usually at the base of foothill slopes, e.g., the hogbacks of the Front Range. A combination of precipitation, temperature, and soils limit this system to the lower elevations within the Southern Rocky Mountains ecoregion, usually between 5,000-7,000 feet with approx. 16 inches of precip/year. This system often occurs, but is not limited, to the edge of the ecoregion and especially intergrades with the Central shortgrass prairie ecoregion. It is maintained by frequent fires and associated with specific soils, especially well-drained clay soils. Usually occurrences of this system have multiple plant associations that may be dominated by any of the following species: *Andropogon gerardii, Bouteloua gracilis, Muhlenbergia montana, Pascopyrum smithii, Schizachyrium scoparium, Stipa comata,* or *S. neomexicana*. Typical adjacent ecological systems include foothill shrublands, ponderosa pine savannas and woodlands, and pinyon-juniper savannas and woodlands as well as shortgrass prairie. The SRM tallgrass prairies are disjunct from the Great Plains tallgrass prairie with large expanses of mid-grass and shortgrass prairies in between.

Opler and Krizek (1984) considers the Colorado Front Range the fourth richest butterfly region in the United States. The reason for this richness has to do with many ecotones coming together of which the foothill grasslands system is an extremely important part. Examples of the skippers and butterflies that are SRM targets that need this system to survive are: Ottoe skipper (*Hesperia ottoe*), Cross-line skipper (*Polites origenes rhena*), Arogos skipper (*Atrytone arogos iowa*), Dusted skipper (*Atrytonopsis hianna turneri*), and Regal fritillary (*Speyeria idalia*). Viable populations of these skippers and butterflies are indicators of a healthy and functioning occurrence of a foothills grasslands system.

This system is one of the most severely altered systems in the Southern Rocky Mountains ecoregion. Alteration is due to fire suppression, housing and water developments, conversion to hay meadows, overgrazing, etc. Fire suppression has allowed for shrub and tree invasion into the grassland and alters the species composition as well (Mast et al. 1997, Mast et al. 1998). Housing and water developments severely fragment and usually destroy the habitat, while agricultural use has converted tall grass prairies into hay meadows dominated by exotic grasses, e.g., smooth brome (*Bromus inermis*). It is very unusual to find excellent occurrences of this system in the Southern Rocky Mountains ecoregion. Threats are very high for this system and therefore, a premium is set on protecting the existing occurrences. Restoration may be needed to obtain ecoregional goals.

MINIMUM SIZE: 1000 acres

SEPARATION DISTANCES: 1) substantial barriers to natural processes or species movement, including cultural vegetation greater than ¼ mile wide, major highways, or urban development, 2) a different natural community from a different ecological system wider than one mile wide or continuous forest wider than ¼ mile, 3) a major break or change in the ecological land unit (e.g., topography, soils, geology).

<u>Justification:</u> Large patch grassland communities are susceptible to fragmentation by cultural vegetation or tree/shrub invasion. Forests are likely to be more significant barriers than woodlands or non-forested wetlands for many grassland species. Primary criteria to be considered is the invasion of woody plants, seed dispersal by dominant grasses and forbs, and the dispersal behavior and requirements of invertebrates and small mammals.

RANK PROCEDURE: 1) condition, 2) landscape context, 3) size. Occurrence size criteria may not be as critical for patch communities as it is for matrix-forming communities (Anderson 1999). Factors such as the landscape context current condition, and historical continuity may contribute more to the diversity of an occurrence than does occurrence size, although the species-area relationship still holds up for patch type communities.

CONDITION SPECIFICATIONS:
A –rated condition: Native species dominate while non-native species if present, typically occupy a small area (< 5% total canopy cover). Invasive exotics with major potential to alter structure and composition are absent, e.g., *Bromus tectorum* and *Euphorbia esula*. Native species that increase with disturbance, e.g., *Koelaria micrantha, Guitierizzia sarothrae*, and *Artemisia frigida,* have less than 3% cover. If trees or shrubs are present, these are widely scattered and mature. Species richness is often high, and native grasses (non-increasers) are dominant. Fragmentation from roads and developments are less than 1% of the occurrence.

B- rated condition: Native species dominate while non-native species occupy less than 10% of the canopy cover. Invasive exotics with major potential to alter structure and composition may be present but in low abundance, e.g., *Bromus tectorum*. Native species that increase with disturbance, e.g., *Koelaria micrantha, Guiterizzia sarothrae*, and *Artemisia frigida,* have less than 10% cover. If trees or shrubs are present, these are widely scattered and mature. Species richness is often high, and native grasses (non-increasers) are common. Fragmentation from roads and developments are less than 5% of the occurrence.

C-rated condition: Vascular plant cover is co-dominated by native and non-native species, each typically >10% total cover, with native species > 20% relative cover. Native but "increaser" graminoids, may be co-dominant or dominant; invasive exotics with major potential to alter structure and composition may be prominent but still controllable. Trees and shrubs may have seedlings, juveniles, or saplings present. Alteration is extensive but potentially restorable over several decades. Fragmentation, vehicle use or livestock grazing disturbance, if present, is extensive and significant enough to have notable impact on species composition and soil compaction.

D –rated condition: Non-native species are dominant, native grassland species < 10% cover and 20% relative cover. Alteration is extensive and restoration potential is low. Vehicle use or livestock grazing disturbance, if present, is extensive and significant enough to have notable impact on species composition and soil compaction. System remains fundamentally compromised despite restoration of some processes. Soil compaction and disturbance are extensive throughout the occurrence.

<u>Justification for A-rated criteria</u>: Foothill grasslands are dependent on fires and limited grazing. In order to have a healthy and intact invertebrate and small mammal composition an occurrence must be dominated by native grasses with high species richness. A-ranked occurrences have processes, species composition, and the physical environment intact.

<u>Justification for C/D threshold:</u> C-ranked occurrences have potential for restoration over several decades. D-ranked occurrences have little or no potential for restoration because of extensive degradation.

SIZE SPECIFICATIONS:
A – rated size: Very large (> 5000 acres)
B –rated size: Large (2000 to 5000 acres)
C –rated size: Moderate (1000 - 2000 ac)
D –rated size: Small (<1000 ac)

Justification for A-rated criteria: A-ranked occurrences are large enough to support A-ranked occurrenes of disjunct butterflies and skippers, grassland birds as well as a mosaic of several plant associations. Occurrences of this size would likely contain sufficient internal variability to capture characteristic biophysical gradients and retain natural geomorphic disturbance. They are buffered from edge effects. Occurrences of this size will support fires and grazing animals and allow for a mosaic of different fire and grazing regimes.

Justification for C/D threshold: C-ranked occurrence size is the minimum size necessary to maintain a minimum viable population of the disjunct skippers, butterflies, and grassland birds. While D-ranked occurrences are subject to loss of plant associations and their associated plants and animals.

LANDSCAPE CONTEXT SPECIFICATIONS:
A-rated landscape context: Occurrence surrounded by a native and unaltered landscape with very little to no urban development or agriculture, and little to no industrial forestry (> 90% natural). No unnatural barriers present. Connectivity of adjacent systems allows natural ecological processes, e.g., fire to occur.

B-rated landscape context: Landscape composed of at least 75% natural or semi-natural vegetation, with any urban development not directly adjacent to the occurrence. Limited or minor human-caused alteration of landscape. Adjacent systems surrounding occurrence have moderate urban or agricultural alteration (60-90% natural) but retaining much connectivity. Few non-natural barriers present.

C-rated landscape context: Surrounding landscape is a mosaic of agricultural or semi-developed areas with natural or semi-natural vegetation. Adjacent systems surrounding occurrence are fragmented by alteration (20 – 60% natural), with limited connectivity. Some non-natural barriers are present. Significant disturbance, but easily restorable.

D-rated landscape context: Major human-caused alteration of surrounding landscape. Adjacent systems surrounding occurrence are mostly converted to agricultural or urban uses. Connectivity is severely hampered.

Justification for A-rated criteria: The foothills grassland and its adjacent landscape is intact; connectivity to adjacent and nearby systems is intact. Non-native species are not a landscape threat. Natural fire regime exists or can easily be recreated. The occurrence is fully buffered by a natural landscape. Migration of grassland species remains viable.

Justification for C/D threshold: C-ranked occurrences have some limited buffering from invasive species. D-ranked occurrences have no buffering, and are subject to altered fire and grazing regimes causing a shift in species composition and altering the entire occurrence.

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Date: June 27, 2000 (edited February 27, 2001)

LITERATURE CITED:
Anderson M. G. 1999. Viability and spatial assessment of ecological communities in the northern Appalachian ecoregion. Phd. Dissertation. University of New Hampshire.
Mast, J. N., T. T. Veblem, and M. E. Hodgson. 1997. Tree invasion within a pine/grassland ecotone: an approach with historic aerial photography and GIS modeling. Forest Ecology and Management 93:181-94.
Mast, J. N., T. T. Veblen, and Y. B. Linhart. 1998. Disturbance and climatic influences on age structure of ponderosa pine at the pine/grassland ecotone, Colorado Front Range. Journal of Biogeography 25:743-755.
Opler P. A. and G. O. Krizek. 1984. Butterflies east of the Great Plains: An illustrated Natural history. The John Hopkins University Press, Baltimore, MD. 294 pp.

SOUTHERN ROCKY MOUNTAINS ECOREGION
ACTIVE SAND DUNE AND SWALE COMPLEX ECOLOGICAL SYSTEM—LARGE PATCH

Oryzopsis hymenoides - Psoralidium lanceolatum Herbaceous Vegetation
Redfieldia flexuosa Herbaceous Vegetation
Scirpus pungens Herbaceous Vegetation
Carex simulata Herbaceous Vegetation
Salix exigua Shrubland
Unvegetated sand dunes

SCALE AND RANGE: LARGE PATCH AND LIMITED

The active sand dune and swale complex is a large patch ecological system that is limited to a few adjacent ecoregions and only found in the San Luis Valley within the Southern Rocky Mountains ecoregion. Large dunes comprise this dune system for which Great Sand Dunes National Park is named. These dunes cover about 27 km^2 (Fryberger et al. 1990) and lie at the base of the Sangre de Cristo Mountains from approximately 7,800 to 8,800 feet in elevation. The southwest winds and the east winds are nearly balanced, resulting in continued and upward growth of the dunes, and an imperceptible migration to the east. Here, the massive dunes form “star” formations reaching a height of over 700 feet (200 m) above the valley floor.

This system is comprised of multiple sparsely vegetated plant associations that often occur as a mosaic of two or three plant associations intermixed with unvegetated dunes. This system is best characterized as wind deposited sand dunes and swales that are sparsely vegetated with grasses and forbs. Vegetation mostly occurs in swales where the moisture content is high. The less stabilized vegetated dunes are dominated by *Redfieldia flexuosa-Psoralidium lanceolatum* while the more stabilized dunes are dominated by *Oryzopsis hymenoides.* Small isolated wetlands occur along the western edge of the active sand dune and swale complex and may be dominated by *Salix exigua, Scirpus pungens,* or *Carex simulata*.

The *Redfieldia flexuosa-Psoralidium lanceolatum* community is tightly correlated with the Great Sand Dunes tiger beetle (G1). While five other sand dune endemic beetles are also restricted to the Great Sand Dunes (Pineda et al. 1999).

Adjacent ecological systems include stabilized sand dune at the lower elevation and pinyon-juniper at the upper elevations.

MINIMUM SIZE: 10,000 acres.

SEPARATION DISTANCES: 1) substantial barriers to natural processes or species movement, including cultural vegetation or urban development greater than ½ mile wide 2) natural community from a different ecological system wider than one mile wide, or 3) major break in topography, soils, geology, etc.

Justification: Primary criteria to be considered are the reactions of endemic beetles and other sand dune insects to fragmentation, seed dispersal by dominant grasses and forbs, and the dispersal behavior and requirements of the Sand Dunes tiger beetle *(Cicindela theatina*). The separation distance for intervening natural or semi-natural communities assumes a distinct landscape difference that is not conducive to species migration.

RANK PROCEDURE: 1) condition, 2) size, 3) landscape context. Occurrence size criteria may not be as critical for patch communities as it is for matrix-forming communities (Anderson 1999). Factors such as the landscape context current condition, and historical continuity may contribute more to the diversity of an occurrence than does occurrence size, although the species-area relationship still holds up for patch type communities. See additional notes under “Size”.

CONDITION SPECIFICATIONS:
A –rated condition: A natural source of sand exists and is renewed and removed on a yearly basis. Groundwater and surface hydrology is intact. No or little evidence of alteration of the system due to groundwater pumping, creek damming, livestock grazing, mining, vehicle use, recreation, or other significant human activity. No or very few exotic species present with no potential for expansion. Swales that are dominated by *Redfieldia flexuosa, Oryzopsis hymenoides,* and *Psoralidium tenuifolium* (Great Sand Dunes) and are a good indication of functioning swales. Dynamic process of shifting dunes are in place.

B- rated condition: A natural source of sand exists and is renewed and removed on a yearly basis. Groundwater and surface hydrology is largely intact although this may be slightly altered by localized water development, livestock grazing, vehicle use, recreation, or other human activities. Alteration is easily restorable by ceasing such activities. Few exotic species with little potential for expansion if restoration occurs. Surface disturbance from ORV's, other recreation uses, or livestock grazing may be present but are restricted to less than 3% of the occurrence.

C-rated condition: Natural hydrologic regime altered by ground water pumping or stream diversions/damming. Vehicle use or grazing disturbance, if present, is extensive and significant enough to have notable impact on species composition and soil compaction. Exotic species may be present and impacting the native species composition. Significant resources re required to restor occurrence to a higher quality.

D –rated condition: Natural hydrologic regime or disturbance to site not restorable. System remains fundamentally compromised despite potential restoration of some processes. Exotic species may be dominant. Soil compaction and continued disturbance is extensive throughout the occurrence. A site where the hydrology has been severely altered and the impact from ORV's effects most or all of occurrence such that restoration is unlikely to occur.

Justification for A-rated criteria: Sand dune and swale complexes are dependent on the ability to have a mosaic of non-vegetated shifting sands and sparsely vegetated sand dunes or swales. These complexes may be dependent on both surface and groundwater. The surface water carries sand back to the source, while the groundwater maintains moist sand needed for the vegetation. A-ranked occurrences have processes, species composition, and the physical environment intact.

Justification for C/D threshold: C-ranked occurrences have potential for restoration over several decades. D-ranked occurrences have little or no potential for restoration because of extensive degradation.

SIZE SPECIFICATIONS:

A – rated size: Very large (30,000 acres)
B –rated size: Large (20,000 to 30,000 acres)
C –rated size: Moderate (10,000 to 20,000 ac)
D –rated size: Small (<10,000 ac)

Justification for A-rated criteria: Sand dune and swale complexes are composed of a mosaic of sparsely vegetated and non-vegetated sand dunes. The San Luis valley sand dune system appears to have a combination of large patch and matrix-forming attributes. For example large patches are usually more specific in their ecological tolerances than matrix, while matrix communities are more resilient and resistant to large scale disturbances than large patch communities (Anderson 1999). The sand dune complex fits large patch for its ecological tolerance and fits matrix for its ability to be resilient and resistant to large-scale disturbances, e.g., shifting dunes. A 30,000 acre occurrence in the San Luis Valley is predicted to be large enough to support A-ranked occurrences of the endemic insects. In addition it would likely contain sufficient internal variability to capture characteristic biophysical gradients and retain natural geomorphic disturbance as well as recover from major sand movement. This size also allows for areas to be adequately buffered from edge effects.

Justification for C/D threshold: C-ranked occurrences maintain a size that will allow for a complex structure with several plant associations and natural ecological processes to occur, and support a minimum viable population of the endemic insects. While D-ranked occurrences are too small to remain viable with natural or unnatural changes to the surrounding landscape and are easily subject to loss of plant associations and their associated plants and animals. Indicator animals include sand dunes tiger beetle (*Cicendela theatina*) and other endemic sand dune beetles (Pineda et al. 1999).

LANDSCAPE CONTEXT SPECIFICATIONS:

A-rated landscape context: Evidence of human-caused alteration of surface and groundwater hydrology within a 50 sq. mile radius is minimal. Groundwater pumping is limited to less than 10% of the area. Adjacent systems are unaltered by urban or agricultural uses (> 90% natural). Connectivity of adjacent systems allows natural ecological processes, e.g., flooding and wind dispersion to occur.

B-rated landscape context: Limited or minor human-caused alteration of hydrology, especially groundwater pumping. Groundwater pumping is limited to 20% of the area. Adjacent systems surrounding occurrence have moderate urban or agricultural alteration (60-90%) natural) but retaining much connectivity. Few non-natural barriers present.

C-rated landscape context: Local or moderate human-caused alteration of hydrology. Groundwater pumping is limited to 25% of the area. Adjacent systems surrounding occurrence are fragmented by alteration (20 – 60% natural), with limited connectivity. Some non-natural barriers are present. Significant, but restorable with significant resources.

D-rated landscape context: Major human-caused alteration of hydrology. Groundwater pumping is greater than 25% of the area. Adjacent systems surrounding occurrence are mostly converted to agricultural or urban uses. Connectivity is severely hampered.

Justification for A-rated criteria: The sand dune complex is especially sensitive to groundwater. Alteration of groundwater from as far away as 50? miles upstream of the sand dunes are believed to have an effect on the groundwater of the sand dunes. A-ranked occurrences exist in a natural hydrologic regime that is necessary to supply blowing sands as well as maintain existing vegetation. The sand dune complex is fully connected with natural intact vegetation and allowing for species migration and is fully buffered by a natural landscape.

Justification for C/D threshold: C-ranked occurrences have some limited buffering from invasive species and altered hydrology. While D-ranked occurrences have no buffering, and are subject to significantly altered hydrology and invasive species. Natural hydrologic processes are severely altered potentially causing a shift in species composition and altering the entire complex.

Definition: AUTHORSHIP: Renée Rondeau
Date: June 22, 2000 (edited February 24, 2001)

LITERATURE CITED:

Anderson, M. G. 1999. Viability and spatial assessment of ecological communities in the northern Appalachian ecoregion. Dissertation at University of New Hampshire.

Fryberger, S. G., L. F. Krystinik and C. J. Schenk. 1990. Modern and ancient eolian deposits: Petroleum exploration and production. Rocky Mountain Section, Society of Economic Paleontologists and Mineralogists, Denver, Colorado.

Pineada, P. M., R. J. Rondeau and A. Ochs. 1999. *A biological inventory and conservation recommendations for the Great Sand Dunes and San Luis Lakes, Colorado*. Colorado Natural Heritage Program, Colorado State University, Fort Collins, CO 86 pp. Report prepared for The Nature Conservancy, San Luis Valley Program.

SOUTHERN ROCKY MOUNTAINS ECOREGION
NORTH PARK ACTIVE SAND DUNE ECOLOGICAL SYSTEM—LARGE PATCH

Pascopyrum smithii Herbaceous Vegetation
Unvegetated sand dunes

SCALE AND RANGE: LARGE PATCH AND LIMITED

The North Park active sand dune ecological system is a large patch system limited to small areas both within Southern Rocky Mountains ecoregion and adjacent ecoregions. North Park differs from the other SRM ecoregion dune system (Great Sand Dunes) in size, climate, dominant species, and primary ecological process. Freeze-thaw and snow-melt processes form the sedimentary sturctures that distinguish the North Park dunes from the Great Sand Dunes in the San Luis Valley, Colorado.

The North Park dunes are the only major active area in a predominantly dormant dune field which cover approximately 25 square miles. The relatively high precipitation, short summers and cold climate combine to greatly reduce sand movement, even on the active dunes. Because the dunes are active, the area is in a fragile state of soil and vegetative development and is an example of an ecosystem which is extremely rare in Colorado.

Two primary dune fields comprise this system, both nearly equal in size of approx. 620 acres. The east dune fields have restricted visitation, while the west dune field is heavily recreated by ORV's.

The North Park dunes are sparsely vegetated with *Pascopyrum smithii* the dominant species.

MINIMUM SIZE: 100 acres.

SEPARATION DISTANCES: 1) substantial barriers to natural processes or species movement, including cultural vegetation or urban development greater than ½ mile wide 2) natural community from a different ecological system wider than one mile wide, or 3) major break in topography, soils, geology, etc.

Justification: Primary criteria to be considered are the reactions of invertebrates and seed dispersal of dominant grasses and forbs. The separation distance for intervening natural or semi-natural communities assumes a distinct landscape difference that is not conducive to species migration.

RANK PROCEDURE: 1) condition, 2) size, 3) landscape context. Occurrence size criteria may not be as critical for patch communities as it is for matrix-forming communities (Anderson 1999). Factors such as the landscape context current condition, and historical continuity may contribute more to the diversity of an occurrence than does occurrence size, although the species-area relationship still holds up for patch type communities. See additional notes under "Size".

CONDITION SPECIFICATIONS:
A –rated condition: There is a natural source of sand that is renewed and removed on a yearly basis. No or little evidence of alteration of the system due to livestock grazing, mining, vehicle use, recreation, etc. No or very few exotic species present with no potential for expansion. Swales that are dominated by *Pascopyrum smithii* are good indications of functioning swales. Dynamic process of shifting dunes are in place.

B- rated condition: There is a natural source of sand that is renewed and removed on a yearly basis although this may be slightly altered by localized development, livestock grazing, vehicle use, or recreation etc. Alteration is easily restorable by ceasing such activities. Few exotic species with little potential for expansion if restoration occurs. The site has the above characteristics, but surface disturbance over a small to moderate percentage of sand dunes has occurred due to ORV's, other recreation uses, or livestock grazing.

C-rated condition: Vehicle use or grazing disturbance, if present, is extensive and significant enough to have notable impact on species composition and soil compaction.

D –rated condition: Disturbance to site not restorable. System remains fundamentally compromised despite restoration of some processes. Exotic species may be dominant. Soil compaction and continued disturbance is extensive throughout the occurrence. A site where the hydrology has been severely altered and the impact from ORV's effects most or all of occurrence such that restoration is unlikely to occur.

Justification for A-rated criteria: Sand dune and swale complexes are dependent on the ability to have a mosaic of non-vegetated shifting sands and sparsely vegetated sand dunes or swales. A-ranked occurrences have processes, species composition, and the physical environment intact.

Justification for C/D threshold: C-ranked occurrences have potential for restoration over several decades. D-ranked occurrences have little or no potential for restoration because of extensive degradation.

SIZE SPECIFICATIONS:
A – rated size: Very large (> 600 acres)
B –rated size: Large (200 to 600 acres)
C –rated size: Moderate (100 - 200 ac)
D –rated size: Small (<100 ac)

Justification for A-rated criteria: Sand dune and swale complexes are composed of a mosaic of sparsely vegetated and non-vegetated sand dunes. It would likely contain sufficient internal variability to capture characteristic biophysical gradients and retain natural geomorphic disturbance as well as recover from major sand movement. They are also adequately buffered from edge effects.

Justification for C/D threshold: C-ranked occurrences maintain a size that will allow for a complex structure allowing for several plant associations to occur, natural ecological processes to occur, and a minimum viable population of the insects. While D-ranked occurrences are too small to remain viable with natural or unnatural changes to the surrounding landscape and are easily subject to loss of plant associations and their associated plants and animals.

LANDSCAPE CONTEXT SPECIFICATIONS:

A-rated landscape context: Adjacent systems are unaltered by urban or agricultural uses (> 90% natural). Connectivity of adjacent systems allows natural ecological processes, e.g., flooding and wind dispersion to occur.

B-rated landscape context: Adjacent systems surrounding occurrence have moderate urban or agricultural alteration (60-90%) natural) but retaining much connectivity. Few non-natural barriers present.

C-rated landscape context: Adjacent systems surrounding occurrence are fragmented by alteration (20 – 60% natural), with limited connectivity. Some non-natural barriers are present. Significant, but easily restorable.

D-rated landscape context: Adjacent systems surrounding occurrence are mostly converted to agricultural or urban uses. Connectivity is severely hampered.

Justification for A-rated criteria: The sand dune complex is fully connected with natural intact vegetation and allowing for species migration and is fully buffered by a natural landscape.

Justification for C/D threshold: C-ranked occurrences have some limited buffering from invasive species. While D-ranked occurrences have no buffering, and are subject to altered composition and invasive species.

Definition: AUTHORSHIP: Renée Rondeau
Date: February 26, 2001

LITERATURE CITED:

Anderson, M. G. 1999. Viability and spatial assessment of ecological communities in the northern Appalachian ecoregion. Dissertation at University of New Hampshire.

SOUTHERN ROCKY MOUNTAINS ECOREGION
STABALIZED SAND DUNE ECOLOGICAL SYSTEM—LARGE PATCH

Chrysothamnus nauseosus / Muhlenbergia pungens-Oryzopsis hymenoides Shrubland
Stipa comata - Oryzopsis hymenoides Herbaceous Vegetation
Sarcobatus vermiculatus Dune Shrub Herbaceous Vegetation
Pinus ponderosa / Oryzopsis hymenoides Sparse Vegetation

SCALE AND RANGE: LARGE PATCH AND ENDEMIC

The stabilized sand dune ecological system is a large patch system primarily associated with the Great Sand Dunes area in the San Luis Valley. This eolian depositional system covers about 800 km^{2}. The system is considered to extend from the Rio Grande northeastward to the Sangre de Cristo Mountains (Fryberger et al. 1990). This extensive vegetated sand sheet exists in a band between the alkaline greasewood flats-ephemeral wet meadow complex and the active sand dune and swale ecological system. At an elevational range of approximately 7,600 to 7,800 feet it is characterized by mostly flat bedded sand deposits with scattered groups of parabolic dunes, many of which have trailing "arms" of sand anchored by grassy or brush vegetation. Southwesterly prevailing winds deposit and shift the sands of this system. *Chrysothamnus nauseosus* is often the dominant shrub although *Sarcobatus vermiculatus* may be co-dominant. *Oryzopsis hymenoides*, *Stipa comata, Bouteloua gracilis* and *Muhlenbergia pungens* dominate the herbaceous layer.

Ecological processes that are important in the maintenance of this system are most likely a combination of grazing (antelope, elk, bison), fire, and wind. The natural/historic frequency and intensity of fires is unknown, although it is approx. 30 years for the adjacent pinyon-juniper woodland (Crane 1982). Fires reduce the cover and density of rabbitbrush and increase the density and cover of grasses (pers. observation). The historic amount and timing of grazing is also unknown. Over a portion of this system, bison have been replaced by cattle, although a large bison herd is maintained by The Nature Conservancy's Medano-Zapata Ranch.

High density, viable populations of Sage sparrow are good indicators of a healthy and functioning occurrence of the stabilized sand dune ecological system.

Threats to this system include groundwater withdrawal, especially large-scale projects that might impact the integrity of the dunes, recreation use especially off-road vehicles that might cause the dunes to become active, fire suppression and improper livestock grazing. Oil and gas exploration and development are also considered a threat to the intactness of this system.

MINIMUM SIZE: 10,000 acres.

SEPARATION DISTANCES: 1) substantial barriers to natural processes or species movement, including cultural vegetation greater than one mile wide, or urban development. 2) natural community from a different ecological system wider than one mile wide, or 3) major break in topography, soils, geology, or other relevant environmental factor.

<u>Justification:</u> Primary criteria to be considered in establishing separation distances are the reactions of endemic small mammals, e.g., plains pocket mouse (*Perognathus flavescens relictus*) and silky pocket mouse (*P. flavus sanluisi*), seed dispersal by dominant grasses and forbs, and the dispersal behavior and requirements of the Sand Dunes tiger beetle *(Cicindela theatina*). The separation distance for intervening natural or semi-natural communities assumes a distinct landscape difference that is not conducive to species migration and possibly acts as a fire barrier, e.g., wet meadows.

RANK PROCEDURE: 1) size, 2) condition, 3) landscape context. Size and condition receive equal weighting while landscape is of lesser importance.

CONDITION SPECIFICATIONS:
A –rated condition: A natural source of sand exists that is renewed or redistributed on a regular or yearly basis. No mining, limited vehicle use, recreation, or other human alterations that impact the system. Intact hydrology especially the groundwater system. No or very few exotic species present with no potential for expansion. Bison grazing is preferred to cattle grazing although cattle grazing that maintains *Oryzopsis hymenoides* and *Stipa comata* grasslands can still be ranked "A". Native grasses are dominant, non-native species occupy less than 3% canopy cover. Invasive species with major potential to alter structure and composition are absent.

B- rated condition: A natural source of sand exists that is renewed and removed on a yearly basis although this may be slightly altered by localized water development, livestock grazing, vehicle use, or recreation. Alteration is easily restorable by ceasing such activities. Few exotic species with little potential for expansion if restoration occurs. The site has the above characteristics, but surface disturbance over a small to moderate percentage of sand dunes has occurred due to ORV's, other recreation uses, or improper livestock grazing. Often the cover of *Chrysothamnus nauseosus* is higher, while the native bunch grass cover is lower due to 1) improper grazing and 2) suppression of fires. Native grasses dominant, non-native species are present but in small amounts (< 5% total canopy cover). Invasive exotics with major potential to alter structure and composition occupy less than 1% of occurrence.

C-rated condition: Vehicle use or grazing disturbance is extensive and significant enough to have notable impact on species composition and soil compaction. Hydrology is altered over a small portion or minimally across the occurrence. Exotic species may be scattered or patchily distributed, but can still be controlled with a significant amount of resources and effort. Vehicle use results in little to no vegetation cover on areas that are extensively used. If occurrence is poorly managed for livestock the density and cover of native bunch grasses is often patchy and scanty while *Chrysothamnus nauseous*is dominant. If management improves the occurrence is likely to improve within 10 years. Non-native species are present and may dominate small patches, although native species still dominate the occurrence.

D –rated condition: A site where the impact from ORV's or improper grazing effects most or all of occurrence such that restoration is unlikely to occur. Hydrology significantly impacted but may not show the full impacts. Disturbance to site not restorable in less than 25 years. System remains fundamentally compromised despite restoration of some processes. Exotic species may be dominant. Soil compaction and continued disturbance is extensive throughout the occurrence. Non-native species are dominant, native species have less than 20% relative cover.

Justification for A-rated criteria: Stabilized sand dune systems are dependent on the ability to have a mosaic of shrublands and grasslands. These complexes are also dependent on grazing, fires, and wind. A-ranked occurrences have ecological processes, species composition, and the physical environment intact.

Justification for C/D threshold: C-ranked occurrences have potential for restoration over several decades. D-ranked occurrences have little or no potential for restoration because of extensive and/or irreversible degradation.

SIZE SPECIFICATIONS:
A – rated size: Very large (> 30,000 acres)
B –rated size: Large (20,000 to 30,000 acres)
C –rated size: Moderate (10,000 to 20,000 ac)
D –rated size: Small (<10,000 ac)

Justification for A-rated criteria: Stabilized sand dune systems are composed of a mosaic of shrublands and grasslands. The San Luis valley sand sheet appears to have a combination of large patch and matrix-forming attributes. For example large patches are usually more specific in their ecological tolerances than matrix, while matrix communities are more resilient and resistant to large scale disturbances than large patch communities (Anderson 1999). The stabilized dune system fits large patch characteristics for its ecological tolerance and fits matrix for its ability to be resilient and resistant to large scale disturbances, e.g., fire. Therefore an occurrence larger than 10,000 ac would likely contain sufficient internal variability to capture characteristic biophysical gradients and retain natural geomorphic disturbance as well as to recover from a large fire. This size is also adequately buffered from edge effects.

Justification for C/D threshold: C-ranked occurrences have a size that will allow for a complex structure allowing for several plant associations to occur and natural ecological processes to occur. While D-ranked occurrences are too small to remain viable with natural or unnatural changes to the surrounding landscape and are easily subject to loss of plant associations and their associated plants and animals.

LANDSCAPE CONTEXT SPECIFICATIONS:
A-rated landscape context: Adjacent systems are unaltered by urban or agricultural uses (> 90% natural). No anthropogenic barriers present. Connectivity of adjacent systems allows natural ecological processes, e.g., fire and wind dispersion to occur.

B-rated landscape context: Limited or minor human-caused alteration of surrounding landscape. Adjacent systems surrounding occurrence have moderate urban or agricultural alteration (60-90%) natural) but retaining much connectivity. Few non-natural barriers present.

C-rated landscape context: Local or moderate human-caused alteration of landscape. Adjacent systems surrounding occurrence are fragmented by alteration (20 – 60% natural), with limited connectivity. Some non-natural barriers are present. Significant, but easily restorable.

D-rated landscape context: Major human-caused alteration of landscape. Adjacent systems surrounding occurrence are mostly converted to agricultural or urban uses. Connectivity is severely hampered.

Justification for A-rated criteria: The stabilized sand dune system exists in a natural landscape setting that is necessary to supply blowing sands as well as maintain existing vegetation. The system is fully connected with natural intact vegetation allowing for species migration and is fully buffered by a natural landscape.

Justification for C/D threshold: C-ranked occurrences have some limited buffering from invasive species. While D-ranked occurrences have no buffering, and are subject to altered hydrology and invasive species.

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Date: June 22, 2000 (edited February 24, 2001)

LITERATURE CITED:

Anderson, M. G. 1999. Viability and spatial assessment of ecological communities in the northern Appalachian ecoregion. Dissertation at University of New Hampshire.

Crane, M. F. 1982. Fire ecology of Rocky Mountain region forest habitat types. Final report. Contract with USFS Region 2 on file at Rocky Mountain Experiment Station. 268 pp.

Fryberger, S. G., L. F. Krystinik and C. J. Schenk. 1990. Modern and ancient eolian deposits: Petroleum exploration and production. Rocky Mountain Section, Society of Economic Paleontologists and Mineralogists, Denver, Colorado.

Pineada, P. M., R. J. Rondeau and A. Ochs. 1999. *A biological inventory and conservation recommendations for the Great Sand Dunes and San Luis Lakes, Colorado*. Colorado Natural Heritage Program, Colorado State University, Fort Collins, CO 86 pp. Report prepared for The Nature Conservancy, San Luis Valley Program.

SOUTHERN ROCKY MOUNTAINS ECOREGION
LOWER MONTANE RIPARIAN WOODLAND ECOLOGICAL SYSTEM

Acer negundo / Cornus sericea Forest
Acer negundo - Populus angustifolia / Cornus sericea Forest
Populus angustifolia - Populus deltoides - Salix amygdaloides Forest
Populus angustifolia / Alnus incana Forest
Populus angustifolia / Betula occidentalis Forest
Populus angustifolia / Cornus sericea Woodland
Populus angustifolia / Crataegus rivularis Woodland
Populus angustifolia / Prunus virginiana Woodland
Populus angustifolia / Rhus trilobata Forest
Populus angustifolia / Salix exigua Woodland
Populus angustifolia / Salix irrorata Woodland
Populus angustifolia / Salix ligulifolia (monticola, drummondiana, lucida) Woodland
Populus angustifolia / Salix drummondiana - Acer glabrum Woodland
Populus angustifolia / Salix - Shepherdia argentea Woodland
Populus angustifolia / Symphoricarpos
Populus angustifolia-Juniperus scopulorum Woodland
Populus angustifolia-Picea pungens / Alnus incana albus Woodland
Populus angustifolia Sand Dune Forest Woodland
Populus angustifolia-Pseudotsuga menziesii Woodland
Populus balsamifera var. *candicans* [current accepted names Weber= *P. balsamifera,* Kartez=*P. balsamifera* ssp. *balsamifera*]
Pseudotsuga menziesii / Betula occidentalis Woodland
Pseudotsuga menziesii / Cornus sericea Woodland
Juniperus scopulorum / Cornus sericea Woodland
Juniperus scopulorum Woodland [Provisional]

SCALE AND RANGE: LINEAR AND WIDESPREAD

Lower montane riparian woodland ecological system is a linear system confined to specific environments occurring on floodplains or terraces of rivers and streams. This ecological system is also found in other ecoregions from Idaho to New Mexico. Although the montane/subalpine riparian shrubland ecological system occupies less than 1% of the Southern Rocky Mountains ecoregion it is scattered throughout the region within a broad elevation range from approximately 6,000 to 9,000 feet. This system often occurs as a mosaic of multiple communities that are tree dominated with a diverse shrub component. The variety of plant associations connected to this system reflect elevation, stream gradient, floodplain width, and flooding events. The dominant trees may include *Acer negundo, Populus angustifolia, P. balsamifera, Pseudotsuaga menziesii, Picea pungens,* or *Juniperus scopulorum*. Dominant shrubs include *Acer glabrum, Alnus incana, Betula occidentalis, Cornus sericea, Crataegus rivularis, Prunus virginiana, Salix monticola, S. drummondiana, S. exigua, S. lucida, Shepherdia argentea,* or *Symphoricarpos* spp.. Generally the upland vegetation surrounding this riparian system range from grasslands to forests.

The primary abiotic ecological process necessary to maintain this ecological system is hydrology and more specifically surface flow. Annual and episodic flooding is extremely important for maintaining a diversity of age classes of *Populus angustifolia* as well as a mosaic of plant associations within any given floodplain. (cite Richter et al.). Alteration of the flooding regime due to water impoundment, diversions, etc. may produce changes to plant composition as well as community composition (Richter 1999?). In addition, upstream activities that effect water quality, e.g., mining, may be important to the vertebrates and invertebrate species that use this system.

MINIMUM SIZE: 1 mile by 100 feet.

SEPARATION DISTANCES: 1) substantial barriers to natural processes or species movement, including cultural vegetation or very degraded example of same community greater than ¼ mile long, major highways, urban development, large bodies of water, 2) different natural community (system) longer than than 1 mile along a river corridor, or ¼ mile in other situations, 3) major break in topography, soils, geology, etc., especially one resulting in a hydrologic break.

<u>Justification:</u> Primary criteria to be considered is the reaction to natural flooding. The separation distance for intervening natural or semi-natural communities assumes dynamic movements due to natural flooding regimes. Natural breaks include changes in the stream gradient and other features of the geomorphic setting (e.g. waterfalls). Unnatural breaks are bridges, roads, channelized sections, and heavily degraded reaches that alter the natural hydrologic flow, scour and deposition dynamics of the stream/river.

RANK PROCEDURE: 1) condition, 2) landscape context 3) size. Slightly higher weight should be given to landscape context and condition, as riparian woodlands in montane settings can be naturally very small.

CONDITION SPECIFICATIONS:
A –rated condition: Natural hydrologic regime intact, including an unaltered floodplain. No or little evidence of alteration due to drainage, flood control, irrigation canals, livestock grazing, digging, burning, mining, or vehicle use. No or very few exotic species present with no potential for expansion. Species composition is primarily of native species with a diverse physiognomic structure. Stream banks are not overly steepened, channel not overly widened, nor unvegetated by excessive grazing.

B- rated condition: Natural hydrologic regime intact or slightly altered by local drainage, flood control, irrigation canals, livestock grazing, digging, vehicle use, mining, or roads. Alteration is easily restorable by ceasing such activities. Few exotic species with little potential for expansion if restoration occurs. Although species composition is primarily of native species, the physiognomic structure is less diverse than above. Stream banks may show some local deleterious effects from excessive grazing or recreational use.

C-rated condition: Natural hydrologic regime altered by upstream dams, local drainage, diking, filling, digging, or dredging. Alteration is extensive but potentially restorable over several decades. Vehicle use or grazing disturbance, if present, is extensive and significant enough to have notable impact on species compostion and soil compaction, causing excessive erosion. Exotic species (e.g., *Taraxacum officianalis, Poa pratensis, Agrostis stolonifiera*) may be widespread but potentially manageable with restoration of most natural processes. Stream banks have been severely altered by excessive grazing or other human caused reasons, e.g, channeling, road construction, etc.

D –rated condition: Natural hydrologic regime or disturbance to site not restorable. System remains fundamentally compromised despite restoration of some processes. Invasive exotic species, e.g, *Tamarix*, may be dominant over significant portions of area, with little potential for control.

<u>Justification for A-rated criteria</u>: Riparian woodlands are dependent on specific hydrologic regimes, soils, and ability to move both up and down the stream as well as side to side within the floodplain. A-ranked occurrences have natural flooding processes, species compostion, and physical environment intact.

<u>Justification for C/D threshold:</u> C-ranked occurrences have potential for restoration over several decades. D-ranked occurrences have little or no potential for restoration because of extensive degradation.

SIZE SPECIFICATIONS:
A – rated size: Very large (> 5 linear miles)
B –rated size: Large (3 to 5 linear miles)
C –rated size: Moderate (1 to 3 linear miles)
D –rated size: Small (< 1 linear mile)

Justification for A-rated criteria: Riparian woodlands are often composed of a mosaic of different plant associations, often including small patches of shrublands and herbaceous vegetation. Occurrences of this size have a wide range of plant associations within the complex that show a wide range of variation in hydrology, soil texture, and geomorphology, e.g., point bars. Occurrences of this size would likely contain sufficient internal variability to capture characteristic biophysical gradients and retain natural geomorphic and hydrologic disturbance. They are buffered from edge effects and small hydrology alterations.

Justification for C/D threshold: C-ranked occurrences are large enough to sustain some natural or human caused perturbations. While D-ranked occurrences are too small to remain viable with changes to the hydrology. They are also extremely susceptible to invasions by non-natives making them subject to loss of plant associations and their associated plants and animals.

LANDSCAPE CONTEXT SPECIFICATIONS:
A-rated landscape context: No evidence of human-caused alteration of hydrology, especially upstream of occurrence and within the watershed. Uplands surrounding occurrence and within the watershed are largely unaltered by urban or agricultural uses (> 90% natural), and have few to no recent (< 20 years) clearcuts (<25% of landscape). No unnatural barriers present. Connectivity to habitats allows natural processes and species migration to occur.

B-rated landscape context: Little evidence of human-caused alteration of hydrology, especially upstream of occurrence and within the watershed. Uplands surrounding occurrence and within the watershed are largely unaltered by urban or agricultural uses (60 to 90% natural), but retaining much connectivity, or uplands are heavily managed forest landscape with clearcuts, mining, or numerous roads. Few barriers present. Some natural processes such as flooding, may be slightly compromised. No regional dam upstream.

C-rated landscape context: Uplands surrounding occurrence or upstream watershed are fragmented by urban or agricultural alteration (20 to 60% natural), with limited connectivity. Some barriers are present, and natural processes few. Local or moderate human-caused alteration of hydrology may be present, for example small dams, irrigation ditches, etc.

D-rated landscape context: Major human-caused alteration of hydrology. Uplands surrounding occurrence mostly converted to agricultural or urban uses. Riparian occurrence may be reduced to narrow strip with much edge effect. Connectivity and natural processes are nonexistent. Large dams and numerous diversions are within watershed.

Justification for A-rated criteria: These are occurrences with nearly intact watersheds and natural flooding processes in place. Riparian areas are fully connected with uplands, and fully buffer upland influences.

Justification for C/D threshold: C-ranked occurrences provide some limited buffering from upland influences. D-ranked occurrences provide no buffering, and are subject to siltation, pollutions, invasive species, etc. Large dams disrupt the natural flooding process as well as regulating the annual flows.

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SOUTHERN ROCKY MOUNTAINS ECOREGION
FOOTHILLS RIPARIAN WOODLAND AND SHRUBLAND ECOLOGICAL SYSTEM

Alnus incana -Salix irrorata Shrubland
Crataegus rivularis Shrubland
Forestiera pubescens Shrubland
Populus deltoides - (Salix amygdaloides) / Salix exigua Woodland
Populus deltoides / Symphoricarpos occidentalis Woodland
Populus deltoides ssp. *wislizeni / Rhus trilobata* Woodland
Populus fremontii / Salix exigua Forest
Prunus virginiana Shrubland
Rhus trilobata - Salix exigua Shrubland
Salix amygdaloides Woodland
Salix exigua / Barren Shrubland
Salix exigua / Mesic Graminoids Shrubland

Salix exigua Shrubland [Provisional]
Salix irrorata Shrubland

SCALE AND RANGE: LINEAR AND WIDESPREAD

Foothills riparian woodland and shrubland ecological system is a linear system confined to specific environments occurring on floodplains or terraces of rivers and streams. This system occupies less than 0.5% of the Southern Rocky Mountains ecoregion and is primarily found at the lowest elevations between 5,000 and 7,000 feet. This system is dependent on a natural hydrologic regime, especially annual to episodic flooding. Riparian areas of the Southern Rocky Mountains are extremely diverse and often several linear ecological systems may be within close proximity to each other, e.g., wet meadows, montane riparian woodlands and foothills riparian woodland and shrubland ecological systems may be closely associated. Primary driving factors elevation, stream gradient, and floodplain width. Foothills riparian woodland and shrubland system is usually found on low to moderate gradient streams with narrow to broad floodplains. Dominant species of this system include *Alnus incana, Crataegus rivularis, Forestiera pubescens, Populus deltoides, P. fremontii, Prunus virginina, Rhus trilobata, Salix amygdaloides, S. exigua,* and *S. irrorata.* The surrounding upland systems range from grasslands, shrublands to woodlands.

Primary threats to this system include cessation of flooding, water diversions, clearing of riparian vegetation, excessive livestock grazing, and channelization.

MINIMUM SIZE: 0.5 mile by 30 feet.

SEPARATION DISTANCES: 1) substantial barriers to natural processes or species movement, including cultural vegetation or very degraded example of same community greater than ¼ mile long, major highways, urban development, large bodies of water, 2) different natural riparian system longer than 1 mile, 3) major break in topography, soils, geology, etc., especially one resulting in a hydrologic break. Natural breaks include changes in the stream gradient and other features of the geomorphic setting (e.g. waterfalls). Unnatural breaks are bridges, roads, channelized sections, and heavily degraded reaches that alter the natural hydrologic flow, scour and deposition dynamics of the stream/river.

<u>Justification:</u> Primary criteria to be considered is the reaction to natural flooding. The separation distance for intervening natural or semi-natural communities assumes dynamic movements due to natural flooding regimes.

RANK PROCEDURE: 1) condition, 2) landscape context 3) size. Condition and landscape context get slightly higher weighting than size, as these riparian shrublands and woodlands can naturally be quite small.

CONDITION SPECIFICATIONS:
A –rated condition: Natural hydrologic regime intact, including an unaltered floodplain. No or little evidence of alteration due to drainage, flood control, irrigation canals, livestock grazing, digging, burming, vehicle use, etc. If non-native species present than less than 3% canopy cover; in addition there is a small chance for expansion. Species composition is primarily of native species with a diverse physiognomic structure. Stream banks are not overly steepened nor unvegetated by excessive grazing or other human caused actions.

B- rated condition: Natural hydrologic regime intact or slightly altered by local drainage, flood control, irrigation canals, livestock grazing, digging, vehicle use, roads, etc. Alteration is easily restorable by ceasing such activities. Few exotic species with little potential for expansion if restoration occurs. Although species composition is primarily of native species, the physiognomic structure is less diverse than above. Stream banks may show some local deleterious effects from excessive grazing or other human caused action.

C-rated condition: Natural hydrologic regime altered by upstream dams, local drainage, diking, filling, digging, or dredging. Alteration is extensive but potentially restorable over several decades. Vehicle use or grazing disturbance, if present, is extensive and significant enough to have notable impact on species composition and soil compaction, causing excessive erosion. Exotic species (e.g., *Taraxacum officianalis, Poa pratensis, Agrostis stolonifiera, Bromus inermis*) may be widespread but potentially manageable with restoration of most natural processes. Stream banks may be severely altered by excessive grazing or other human caused reasons, e.g, channeling, road construction, etc.

D –rated condition: Natural hydrologic regime or disturbance to site not restorable. System remains fundamentally compromised despite restoration of some processes. Invasive exotic species, e.g, *Tamarix*, may be dominant over significant portions of area, with little potential for control.

Justification for A-rated criteria: Riparian woodlands and shrublands are dependent on specific hydrologic regimes, soils, and ability to move both up and down the stream as well as side to side within the floodplain. A-ranked occurrences have natural flooding processes, species composition, and physical environment intact.

Justification for C/D threshold: C-ranked occurrences have potential for restoration over several decades. D-ranked occurrences have little or no potential for restoration because of extensive degradation.

SIZE SPECIFICATIONS:
A – rated size: Very large (> 1.5 linear miles)
B –rated size: Large (1 to 1.5 linear miles)
C –rated size: Moderate (.5 to 1 linear miles)
D –rated size: Small (< .5 linear mile)

Justification for A-rated criteria: Foothills riparian woodland and shrublands are often composed of a mosaic of different plant associations, often including small patches of herbaceous vegetation. Occurrences of this size have a wide range of plant associations within the complex that show a wide range of variation in hydrology, soil texture, and geomorphology, e.g., point bars. Occurrences of this size would likely contain sufficient internal variability to capture characteristic biophysical gradients and retain natural geomorphic and hydrologic disturbance. They are buffered from edge effects and small hydrology alterations.

Justification for C/D threshold: C-ranked occurrences are large enough to sustain some natural or human caused perturbations. While D-ranked occurrences are too small to remain viable with changes to the hydrology. They are also extremely susceptible to invasions by non-natives making them subject to loss of plant associations and their associated plants and animals.

LANDSCAPE CONTEXT SPECIFICATIONS:
A-rated landscape context: No evidence of human-caused alteration of hydrology, especially upstream of occurrence and within the watershed. Water quality is excellent and supports expected aquatic invertebrates. Uplands surrounding occurrence and within the watershed are largely unaltered by urban or agricultural uses (>90% natural), and have few to no recent (<20 years) clearcuts (<25% of landscape). No unnatural barriers present. Connectivity to habitats allows natural processes and species migration to occur.

B-rated landscape context: Little evidence of human-caused alteration of hydrology, especially upstream of occurrence and within the watershed. Uplands surrounding occurrence and within the watershed are largely unaltered by urban or agricultural uses (60 to 90% natural), but retaining much connectivity, or uplands are not heavily managed forest landscape with clearcuts, or numerous roads. Few barriers present. Some natural processes such as flooding, may be slightly compromised. No regional dam upstream.

C-rated landscape context: Uplands surrounding occurrence or upstream watershed are fragmented by urban or agricultural alteration (20 to 60% natural), with limited connectivity. Some barriers are present, and natural processes few. Local or moderate human-caused alteration of hydrology may be present, for example small dams, irrigation ditches, and mines.

D-rated landscape context: Major human-caused alteration of hydrology. Uplands surrounding occurrence mostly converted to agricultural or urban uses. Riparian occurrence may be reduced to narrow strip with much edge effect. Connectivity and natural processes are nonexistent. Large dams and numerous diversions are within watershed. Mining may be extensive.

Justification for A-rated criteria: These are occurrences with nearly intact watersheds and natural flooding processes in place. Riparian areas are fully connected with uplands, and fully buffered from upland influences.

Justification for C/D threshold: C-ranked occurrences have some limited buffering from upland influences. D-ranked occurrences have little or no buffering, and are subject to significant impacts such as siltation, pollution, and invasive species. Large dams disrupt the natural flooding process as well as regulating the annual flows.

AUTHORSHIP: Renée Rondeau

Date: July 19, 2000 (edited February 27, 2001)

SOUTHERN ROCKY MOUNTAINS ECOREGION
GREASEWOOD FLATS-EPHEMERAL WETLAND COMPLEX

Chrysothamnus nauseosus / Sporobolus airoides Shrubland
Distichlis spicata Herbaceous Vegetation
Distichlis spicata -Scirpus nevadensis Herbaceous Vegetation
Eleocharis palustris Herbaceous Vegetation
Puccinellia nuttalliana Herbaceous Vegetation
Salicornia rubra Herbaceous Vegetation
Sarcobatus vermiculatus / *Bouteloua gracilis* Shrubland
Sarcobatus vermiculatus / *Distichlis spicata* Shrubland
Sarcobatus vermiculatus / *Juncus balticus* Sparse Vegetation
Sarcobatus vermiculatus / Sporobolus airoides Sparse Vegetation
Sarcobatus vermiculatus Dune Shrubland
Sarcobatus vermiculatus Shrubland
Sporobolus airoides - Distichlis spicata Herbaceous Vegetation
Sporobolus airoides Herbaceous Vegetation

SCALE AND RANGE: LARGE PATCH AND LIMITED

Greasewood flats-ephemeral wet meadow complex are large patch systems confined to specific environments defined by hydrologic regime, soil salinity and texture. By definition, this system occurs as a mosaic of multiple communities. Surrounded by grasslands, stabilized sand dunes or wet meadow systems. Within the Southern Rocky Mountains ecoregion, this system is limited to the San Luis Valley.

MINIMUM SIZE: 10,00 acres.

SEPERATION DISTANCES: 1) substantial barriers to natural processes or species movement, including cultural vegetation greater than ¼ mile wide, major highways, canals, or irrigation ditches, urban development, or large bodies of water, 2) a natural community from a different ecological group wider than ¼ mile.

Justification: Primary criteria to be considered are the hydrologic system, soil texture and salinity, and surrounding landscape. The separation distance for intervening natural or semi-natural communities assumes a different hydrologic regime, soil texture and salinity.

RANK PROCEDURE: 1) condition, 2) size, 3) landscape context. Equal weighting should be given to all ranking factors.

CONDITION SPECIFICATIONS:
A –rated condition: Natural hydrologic regime intact. No or little evidence of alteration due to drainage, flood control, irrigation canals, livestock grazing, digging, burming, vehicle use, etc. No or very few exotic species present with no potential for expansion. Native species that increase under anthropogenic influences are not abnormally predominant. Note: One should be careful when evaluating hydrology, because the hydrologic regime for this system can potentially be affected by off-site factors many miles away.

B- rated condition: Natural hydrologic regime intact or slightly altered (within 60-140% of historic means for timing and magnitude) by local drainage, flood control, irrigation canals, livestock grazing, digging, vehicle use, etc. Alteration is easily restorable by ceasing such activities. Few exotic species with little potential for expansion if restoration occurs. Native species that increase under anthropogenic influences may form dense stands over <10% of the occurrence, but do not appear to be expanding.

C-rated condition: Natural hydrologic regime altered by local drainage, diking, filling, digging, or dredging. Alteration is extensive but potentially restorable over several decades. Vehicle use or grazing disturbance, if present, is extensive and significant enough to have notable impact on species composition. Exotic species (especially *Cardaria* spp.) may be widespread but potentially manageable with restoration of most natural processes. Native increasers may dominate the occurrence.

D –rated condition: Natural hydrologic regime or disturbance to site not restorable. System remains fundamentally compromised despite restoration of some processes. Invasive exotic species, especially *Cardaria* spp., may be dominant over significant portions of area, with little potential for control.

<u>Justification for A-rated criteria</u>: Greasewood flats-ephemeral wet meadow complexes are dependent of specific hydrologic regimes, soils, and salinity. A natural hydrologic regime and limited anthropogenic influences insures that A-ranked occurrences have natural processes, species composition, and physical environment intact.

<u>Justification for C/D threshold:</u> C-ranked occurrences have potential for restoration over several decades. D-ranked occurrences have little or no potential for restoration because of extensive degradation.

SIZE SPECIFICATIONS:
A – rated size: Very large (30,000 acres)
B –rated size: Large (20,000 to 30,000 acres)
C –rated size: Moderate (10,000 to 20,000 ac)
D –rated size: Small (<10,000 ac)

<u>Justification for A-rated criteria</u>: Greasewood-ephemeral wet meadow complexes are composed of mosaics of different associations included in this group. Occurrences of this size have a wide range of plant associations within the complex that show a wide range of variation in hydrology, salinity, and soil texture. They are large enough that most of the occurrence is buffered from edge effects and small hydrology alterations.

<u>Justification for C/D threshold</u>: C-ranked occurrences are large enough to sustain some natural or human caused perturbations as well as provide an area large enough to contain a mosaic of plant associations. While D-ranked occurrences are too small to remain viable with changes to the hydrology, and contain insufficient area to maintain a diversity of plant associations. They are also extremely susceptible to invasions by non-natives making them subject to loss of greasewood-ephemeral wet meadow plant associations and their associated plants and animals.

LANDSCAPE CONTEXT SPECIFICATIONS:
A-rated landscape context: No evidence of human-caused alteration of hydrology. No invasive *Cardaria* present on adjacent lands. Wet meadows and grasslands within 1 mile of the occurrence are unaltered by urban or agricultural uses (> 90% natural). No barriers to water or species movement are present, either within an occurrence or between nearby occurrences.. Connectivity of vegetation allows natural ecological processes (e.g., flooding and species migration) to occur. Timing and depth of high and low groundwater has been little affected by groundwater pumping, and remains from 90-110% of historic patterns.

B-rated landscape context: Limited or minor human-caused alteration of hydrology, especially groundwater pumping and canals (mean timing and magnitude are within 60%-140% of the estimated historic means). No or very little, and easily controlled, invasive *Cardaria* present on adjacent wet meadows. Grasslands and wet meadows within ½ mile of the occurrence with moderate urban or agricultural alteration (60-90%) natural) but retaining much connectivity among patches of natural and semi-natural vegetation. Few barriers present to movement of material and species across the landscape. Timing and depth of high and low groundwater has been little affected by groundwater pumping, and remains from 75-90% of historic patterns.

C-rated landscape context: Local or moderate human-caused alteration of hydrology. Invasive *Cardaria* may be abundant on adjacent wet meadows surrounding occurrence, altering species composition. Adjacent wet meadows and grasslands surrounding occurrence are fragmented by alteration (20 – 60% natural), with limited connectivity among remaining patches of natural and semi-natural vegetation. Some barriers are present that restrict movement of materials and organisms across system boundaries. C-ranked landscapes are restorable over years or decades. Timing and depth of high and low groundwater has been affected by groundwater pumping, and remains from below 75% of historic patterns.

D-rated landscape context: Major human-caused alteration of hydrology. Adjacent wet meadows and grasslands surrounding occurrence are mostly converted to agricultural or urban uses. Connectivity is severely hampered. Groundwater pumping is greater than 20% of the area. D-ranked landscapes are missing fundamental system components that render restoration unfeasible.

Justification for A-rated criteria: These are occurrences with nearly intact hydrologic regime at the landscape scale, and they are fully connected with natural intact uplands. Both of the features assure that the historic structure, composition, and function of the system is maintained. The natural landscape surrounding the occurrence fully buffers the occurrence from anthropogenic influences.

Justification for C/D threshold: C-ranked occurrences have some limited buffering from invasive species and changes to upland landscapes. Restoration is conceivable. While D-ranked occurrences have no buffering, and are subject to altered hydrology and invasive species. Natural hydrologic processes are severely altered causing a shift in species composition and altering the entire complex. Restoration is probably not possible.

AUTHORSHIP: Renée Rondeau and John Sanderson
Date: June 21, 2000

SOUTHERN ROCKY MOUNTAINS ECOREGION
MONTANE WET MEADOW—SMALL PATCH

Calamagrostis canadensis Herbaceous Vegetation
Carex aquatilis - Carex utriculata Herbaceous Vegetation
Carex aquatilis Herbaceous Vegetation
Carex lanuginosa Herbaceous Vegetation
Carex lasiocarpa Herbaceous Vegetation
Carex limosa Herbaceous Vegetation
Carex praegracilis Herbaceous Vegetation
Carex utriculata Herbaceous Vegetation
Carex saxatilis Herbaceous Vegetation
Carex simulata Herbaceous Vegetation
Eleocharis palustris Herbaceous Vegetation
Eleocharis rostellata Herbaceous vegetation
Juncus balticus Herbaceous Vegetation
Spartina gracilis Herbaceous Vegetation
Triglochin maritimum Herbaceous Vegetation

SCALE AND RANGE: SMALL PATCH AND WIDESPREAD

Montane wet meadow ecological system is a small patch system in the western U.S. montane ecoregions. Within the Southern Rocky Mountains ecoregion, this system is widely distributed both in elevation and latitude and confined to specific environments defined primarily by hydrology. Water levels in this system are often at or near the ground surface for much (or all) of the growing season, but also may fluctuate considerable through the year. Surface inundation may occur, but it typically does not last for long. Physical disturbance during inundation (e.g., during flood events) may be significant for the structure and composition of these systems. Wet meadows occur on mineral soils that have typical hydric soil characteristics, including relatively high organic content and redoximorphic features. This system usually occurs as a mosaic of several plant associations. The surrounding landscape often contains other wetland systems, e.g., riparian shrublands, or a variety of upland systems from grasslands to forest. Although this system usually occurs in small patches, the large intermountain valleys (San Luis Valley, South Park, and North Park) have some large examples of montane wet meadows.

MINIMUM SIZE: 1 acre

SEPERATION DISTANCES: 1) substantial barriers to natural processes or species movement, including cultural vegetation greater than ¼ mile wide, major highways, urban development, or large bodies of water, 2) natural community from a different ecological system wider than ½ mile wide, 3) major break in topography, soils, geology, etc., especially one resulting in a hydrologic break.

Justification: Primary criteria to be considered are the hydrologic system and the surrounding landscape. The separation distance for intervening natural or semi-natural communities assumes a different hydrologic regime that would inhibit movement of wetland associated species. They are often isolated hydrologically from other wetlands, and easily impacted by surrounding land use.

RANK PROCEDURE: 1) condition, 2) landscape context, 3) size. Condition and landscape context are the primary ranking factors, with size secondary because even small examples of this system can have high biological significance.

CONDITION SPECIFICATIONS:
A –rated condition: Natural hydrologic regime intact. No or little evidence of wetland alteration due to increased or decreased drainage, clearing, livestock grazing, or anthropogenic nutrient inputs. No or very few exotic species present with no potential for expansion. Native species that increase with disturbance or changes in hydrology/nutrients (e.g., nitrogen and phosphorus) are absent or low in abundance.

B- rated condition: Natural hydrologic regime nearly intact. Alteration from local drainage, clearing, livestock grazing, or nutrient inputs is easily restorable by ceasing such activities. Few exotic species with little potential for expansion if restoration occurs. Native species that increase with disturbance or changes in hydrology/nutrients are absent, low in abundance, or restricted to high-nutrient microsites that represent less than 5% of the total wetland area.

C-rated condition: Natural hydrologic regime altered by local drainage. Alteration from local drainage, clearing, or livestock grazing is extensive, but potentially restorable over several decades. Exotic species may be widespread but potentially manageable with restoration of most natural processes. Native species that increase with disturbance or changes in hydrology/nutrients may be prominent.

D –rated condition: Natural hydrologic regime or disturbance regimes not restorable. System remains fundamentally compromised despite restoration of some processes. Exotic species may be dominant. Native species that increase with disturbance or changes in hydrology/nutrients are prominent to dominant.

<u>Justification for A-rated criteria</u>: Montane wet meadows in the Southern Rocky Mountains depend on seasonally to permanently saturated soils, and occasional flooding disturbance, so alteration of the hydrologic regime invariably compromises the natural communities. Other anthropogenic influences (grazing, nutrient inputs) can significantly alter community composition by shifting competitive interactions. Non-native species (e.g., *Poa pratensis*), when in sufficient number, can displace native species. A-ranked occurrences have hydrologic processes intact, which supports native species composition, nutrient status of the wetland, and other natural conditions of the wetland.

<u>Justification for C/D threshold:</u> C-ranked occurrences have potential for restoration over several decades. D-ranked occurrences have little or no potential for restoration because of extensive degradation.

SIZE SPECIFICATIONS:
A – rated size: Very large (> 75 acres)
B –rated size: Large (20 to 75 acres)
C –rated size: Moderate (1 to 20 ac)
D –rated size: Small (< 1 ac)

<u>Justification for A-rated criteria</u>: Wet meadows are usually composed of mosaics of different plant associations included within this system. Occurrences of this size would maximize the diversity of species and plant associations. They would also likely contain sufficient internal variability to capture the full range of characteristic biophysical gradients, retain natural geomorphic features, and allow for natural disturbances (e.g., flood). The core of occurrences of this size is buffered from edge effects and small hydrology alterations along their periphery.

<u>Justification for C/D threshold</u>: C-ranked occurrences are large enough to sustain some natural or human caused perturbations. While D-ranked occurrences are too small to remain viable with changes to the hydrology. They are also extremely susceptible to invasions by non-natives making them subject to loss of wet meadow plant associations and their associated plants and animals.

LANDSCAPE CONTEXT SPECIFICATIONS:
A-rated landscape context: Uplands within 1 mile of the occurrence are largely unaltered (>90%natural) by urban or agricultural uses such as clearcuts, crop cultivation, land development, or heavy livestock grazing. There are no unnatural

barriers present between adjacent lands and the occurrence, allowing free flow of organisms and materials across the wetland/upland boundary. Connectivity of habitats allows natural processes and species migration to occur.

B-rated landscape context: Uplands with ¼ mile of the occurrence with moderate urban or agricultural alteration (60 to 90% natural), but with no major barriers to water or species movement within the occurrence. There are few unnatural barriers present between this occurrence and nearby occurrences that would inhibit species movement among occurrences. Some natural processes such as flooding and fire may have altered frequencies or intensities.

C-rated landscape context: Uplands surrounding occurrence are fragmented by urban or agricultural alteration (20 to 60% natural), with limited connectivity between this occurrence and the next nearest occurrence. Some barriers are present, and natural processes few. Activities (development, clearcuts, heavy grazing, etc.) in surrounding uplands alters the hydrologic regime. Restoration of the hydrologic regime and species composition resembling the historic composition is feasible.

D-rated landscape context: Uplands surrounding occurrence are mostly converted to agricultural or urban uses. Connectivity and natural processes are almost nonexistent. Restoration is not feasible within reason.

Justification for A-rated criteria: These are occurrences with nearly intact watersheds and processes. Wetlands are fully connected with other occurrences of this system, and with natural intact uplands. The wetlands are fully buffered from unnatural upland influences. Having these structures and processes in place means adjacent landscapes fully support the natural functioning of the occurrence.

Justification for C/D threshold: C-ranked occurrences have some limited buffering from upland influences, they are connected (although minimally) with other natural systems in the surrounding landscape, and the hydrologic regime and nutrient status have not been completely altered by upland influences. For C-ranked occurrences, restoring drainage patterns and compatible management activities in surrounding landscapes could improve the rank.   D-ranked occurrences have no buffering, and are subject to altered hydrology and invasive species. Natural hydrologic processes are severely altered causing a shift in species composition and altering the entire complex. For D-ranked occurrences, there is no possibility of changing the structure or the management on adjacent lands.

AUTHORSHIP: Renée Rondeau and John Sanderson
Date: June 27, 2000 (edited February 24, 2001)

SOUTHERN ROCKY MOUNTAINS ECOREGION
FRESHWATER MARSH—SMALL PATCH

Eleocharis palustris Herbaceous Vegetation
Eleocharis rostellata Herbaceous Vegetation
Glyceria borealis Herbaceous Vegetation
Myriophyllum sibiricum Herbaceous Vegetation
Nuphar lutea ssp. *polysepala* Herbaceous Vegetation
Polygonum amphibium Herbaceous Vegetation [Provisional]
Potamogeton foliosus Herbaceous Vegetation
Potamogeton natans Herbaceous Vegetation
Ranunculus aquatilis - Callitriche palustris Herbaceous Vegetation
Scirpus americanus - Eleocharis spp. Herbaceous Vegetation
Scirpus maritimus Herbaceous Vegetation
Scirpus pungens Herbaceous Vegetation
Scirpus tabernaemontani - Scirpus acutus Herbaceous Vegetation
Sparganium angustifolium Herbaceous Vegetation
Sparganium eurycarpum Herbaceous Vegetation
Typha angustifolia-Typha latifolia Herbaceous Vegetation

SCALE AND RANGE: SMALL PATCH AND WIDESPREAD

Freshwater marsh ecological system is a small patch system confined to specific environments defined primarily by hydrology. Marshes are frequently or continually inundated, with water depths up to 2 m. Water levels may be stable, or may fluctuate 1 m or more over the course of the growing season. Natural marshes may occur in depressions in the landscape (ponds, kettle ponds), as fringes around lakes, and along slow-flowing streams and rivers (such riparian marshes, are also referred to as sloughs). Marshes have distinctive soils that are typically mineral soils but can also accumulate organic material. Soils have characteristics that result from long periods of anaerobic conditions (e.g., gleyed soils, high organic content, redoximorphic features). Marshes are characterized by herbaceous vegetation adapted to saturated soil conditions. Vegetation is typically emergent (rising out of the water) such as *Typha* spp. and *Scirpus* spp., or submergent/floating such as *Potamogeton* spp. and *Lemna* spp. Most freshwater marshes are usually composed of mosaics of several plant associations and may be dominated by *Eleocharis* spp., *Glyceria borealis, Myriophyllum sibiricum, Nuphar lutea, Polygonum amphibium, Potamogeton* spp., *Ranunculus aquatilis, Scirpus* spp., *Sparganium* spp. or *Typha*. Within the Southern Rocky Mountains ecoregion this system is widely scattered. It can occur at nearly any elevation and is usually limited to small areas. This system is also found in many other ecoregions.

Primary threats to this system include changes in water quality and quantity, diversions, mining, logging, and invasive species.

MINIMUM SIZE: 2 acres

SEPARATION DISTANCES: 1) substantial barriers to natural processes or species movement, including cultural vegetation greater than ¼ mile wide, major highways, urban development, or large bodies of water, 2) natural community from a different ecological system wider than ½ mile wide, 3) major break in topography, soils, geology, etc., especially one resulting in a hydrologic break.

Justification: Primary criteria to be considered are the hydrologic system and the surrounding landscape. The separation distance for intervening natural or semi-natural communities assumes a different hydrologic regime that would inhibit movement of organisms or materials among occurrences. They are often isolated hydrologically from other wetlands, and easily impacted by surrounding land use.

RANK PROCEDURE: 1) condition, 2) landscape context, 3) size. Condition and landscape context are the primary ranking factors, with size secondary because even small examples of this system can have high value.

CONDITION SPECIFICATIONS:
A –rated condition: Natural hydrologic regime intact. No or little evidence of marsh or wetland complex alteration due to increased or decreased drainage, clearing, livestock grazing, anthropogenic nutrient input, mining, or other human impacts. No or very few exotic species present with no potential for expansion. Native species that increase with disturbance to changes in hydrology or nutrients are absent or low in abundance.

B- rated condition: Natural hydrologic regime nearly intact. Alteration from local drainage, clearing, mining, or livestock grazing is easily restorable by ceasing such activities. Few exotic species with little potential for expansion if restoration occurs. Native species that increase with disturbance to changes in hydrology or nutrients are absent, low in abundance, or restricted to high-nutrient microsites.

C-rated condition: Natural hydrologic regime altered by local drainage. Alteration from local drainage, clearing, mining, or livestock grazing, is extensive, but potentially restorable over several decades. Exotic species may be widespread but potentially manageable with restoration of most natural processes. Native species that increase with disturbance to changes in hydrology or nutrients may be very prominent.

D –rated condition: Natural hydrologic regime or disturbance to site not restorable without significant resources. System remains fundamentally compromised despite restoration of some processes. Exotic species may be dominant. Native species that increase with disturbance to changes in hydrology or nutrients are prominent to dominant.

Justification for A-rated criteria: Freshwater marshes in the Southern Rocky Mountains ecoregion depend on perennial water regime, permanently saturated soils, and occasional flooding disturbance. A-ranked occurrences have these processes intact, with no history of alteration to the hydrology or surface structure, thus fully supporting the historic structure, composition, and function of the occurrence.

Justification for C/D threshold: C-ranked occurrences have potential for restoration over several decades. D-ranked occurrences have little or no potential for restoration because of extensive degradation.

SIZE SPECIFICATIONS:
A – rated size: Very large (> 50 acres)
B –rated size: Large (20 to 50 acres)
C –rated size: Moderate (2 to 20 ac)
D –rated size: Small (< 2 ac)

Justification for A-rated criteria: Marshes are usually composed of mosaics of different plant associations included within this system. Occurrences of this size would likely contain maximum diversity of species and plant associations. Very large occurrences would also contain sufficient internal variability to capture characteristic biophysical gradients, retain natural geomorphic surfaces, and allow for natural disturbance regimes such as flooding and drawdown. The core of an A-ranked occurrence is buffered from edge effects and small hydrology alterations along its edges.

Justification for C/D threshold: C-ranked occurrences are large enough to contain moderate diversity, and to sustain some natural or human caused perturbations. D-ranked occurrences are noticeably lacking in diversity, and are too small to remain viable with changes to the hydrology. They are also extremely susceptible to invasions by non-natives making them subject to loss of wet meadow plant associations and their associated plants and animals. These small occurrences are alos not able to withstand extreme nutrient discharges or sediment loads from upstream or the uplands

LANDSCAPE CONTEXT SPECIFICATIONS:
A-rated landscape context: Uplands within one mile of the occurrence are largely unaltered by urban or agricultural uses (>90% natural), and include few to no recent clearcuts, roads, mines, developments, or excessively grazed pastures. No hydrological alterations are in place that pump groundwater or divert surface flows away from the marsh. There are no unnatural barriers present either within or surrounding the occurrence that would inhibit movement of organisms and materials across systems boundaries. Connectivity of habitats allows natural processes and species migration to occur.

B-rated landscape context: Uplands within ¼ mile of occurrence with moderate urban or agricultural alteration (60 to 90% natural), but retaining much connectivity, or uplands are heavily managed. Few unnatural barriers present between wetlands and uplands. Some hydrological alteration may occur within the local watershed, but is at some distance (>1 mile) from the marsh and has only minor influence on the natural water levels in the marsh. Other natural processes such as flooding, drawdown, and fire have been altered but not significantly so from their historic frequency and intensity.

C-rated landscape context: Uplands surrounding occurrence are fragmented by urban or agricultural alteration (20 to 60% natural), with limited connectivity among patches of natural or semi-natural vegetation. Some barriers are present, and natural processes have been eliminated or have had their frequency and intensity greatly altered. Restoration is feasible.

D-rated landscape context: Uplands surrounding occurrence are mostly converted to agricultural or urban uses. Connectivity and natural processes are almost nonexistent. Restoration is not feasible within reason.

Justification for A-rated criteria: These are occurrences with nearly intact watersheds and processes so that a natural hydrologic regime supports historic system structure, composition, and function. Wetlands are fully connected with natural intact uplands, and their core is fully buffered from upland influences.

Justification for C/D threshold: C-ranked occurrences have some limited buffering from upland influences. D-ranked occurrences have no buffering, and are subject to altered hydrology and invasive species. Natural hydrologic processes are severely altered causing a shift in species composition and altering the entire complex.

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APPENDIX 25

AQUATIC SYSTEMS INTEGRITY

Ecological Drainage Unit (EDU) Site Name/Code	System	System Description	Length (km)	Quality	Total # sites where found	Best Example
Arkansas/Canadian						
BLACK MOUNTAIN						
	1212	alpine, range includes low or moderate gradient, headwater and creek, sedimentary	13.12	fair	2	NO
	1212	alpine, range includes low or moderate gradient, headwater and creek, sedimentary	5.91	good	2	YES
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	5.05	good	6	NO
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	5.71	fair	2	NO
COTTONWOOD PASS						
	1211	alpine, range includes low or moderate gradient, headwater and creek, granitic or volcanic	92.59	fair	7	NO
	1211	alpine, range includes low or moderate gradient, headwater and creek, granitic or volcanic	84.83	good	7	NO
	1211	alpine, range includes low or moderate gradient, headwater and creek, granitic or volcanic	55.03	very good	7	YES
	1211	alpine, range includes low or moderate gradient, headwater and creek, granitic or volcanic	33.84	poor	7	NO
	1211	alpine, range includes low or moderate gradient, headwater and creek, granitic or volcanic	27.96	very poor	7	NO
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	35.00	fair	2	NO
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	30.31	good	2	NO
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	23.33	poor	2	NO
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	10.02	very poor	2	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
COYOTE CREEK						
	1213	alpine, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	99.32	very poor	4	NO
	1213	alpine, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	47.18	poor	4	NO
	1213	alpine, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	2.50	fair	4	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	42.94	very poor	7	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	25.11	fair	7	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	23.85	poor	7	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	12.58	good	7	NO
	3213	montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	12.71	very poor	4	NO
	3213	montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	1.69	poor	4	NO
CRYSTAL LAKE CREEK						
	1211	alpine, range includes low or moderate gradient, headwater and creek, granitic or volcanic	3.53	very good	7	YES
CULEBRA RANGE						
	2222	alpine to montane, range includes low or moderate gradient, small river, sedimentary	33.16	good	9	NO
	2222	alpine to montane, range includes low or moderate gradient, small river, sedimentary	31.75	very good	9	YES
	2222	alpine to montane, range includes low or moderate gradient, small river, sedimentary	25.71	fair	9	NO
	3213	montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	0.75	good	4	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
DARK CANYON						
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	21.53	very poor	6	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	18.52	poor	6	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	17.99	fair	6	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	4.23	very good	6	YES
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	72.70	poor	2	NO
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	26.20	very good	2	YES
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	23.88	fair	2	NO
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	21.11	good	2	NO
ELK RIDGE						
	1211	alpine, range includes low or moderate gradient, headwater and creek, granitic or volcanic	8.51	fair	7	NO
	1213	alpine, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	6.52	fair	4	NO
FOSSIL RIDGE						
	1211	alpine, range includes low or moderate gradient, headwater and creek, granitic or volcanic	0.31	good	7	NO
GARDEN PARK						
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	47.34	good	4	YES
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	17.09	fair	4	NO
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	1.18	poor	4	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	2111	alpine to montane, steep or very steep gradient, headwater and creek, granitic or volcanic	34.25	fair	5	NO
	2111	alpine to montane, steep or very steep gradient, headwater and creek, granitic or volcanic	29.48	good	5	NO
	2111	alpine to montane, steep or very steep gradient, headwater and creek, granitic or volcanic	11.09	poor	5	NO
	2111	alpine to montane, steep or very steep gradient, headwater and creek, granitic or volcanic	9.10	very poor	5	NO
	2222	alpine to montane, range includes low or moderate gradient, small river, sedimentary	67.29	good	9	NO
	2222	alpine to montane, range includes low or moderate gradient, small river, sedimentary	41.11	fair	9	NO
	2222	alpine to montane, range includes low or moderate gradient, small river, sedimentary	6.67	poor	9	NO
	2222	alpine to montane, range includes low or moderate gradient, small river, sedimentary	5.51	very poor	9	NO
GREENHORN MOUNTAIN						
	2111	alpine to montane, steep or very steep gradient, headwater and creek, granitic or volcanic	193.61	good	5	NO
	2111	alpine to montane, steep or very steep gradient, headwater and creek, granitic or volcanic	172.53	fair	5	NO
	2111	alpine to montane, steep or very steep gradient, headwater and creek, granitic or volcanic	83.08	poor	5	NO
	2111	alpine to montane, steep or very steep gradient, headwater and creek, granitic or volcanic	34.31	very poor	5	NO
	2111	alpine to montane, steep or very steep gradient, headwater and creek, granitic or volcanic	20.23	very good	5	YES
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	85.97	good	3	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	35.77	very good	3	YES
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	27.34	fair	3	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	2222	alpine to montane, range includes low or moderate gradient, small river, sedimentary	9.15	fair	9	NO
	2222	alpine to montane, range includes low or moderate gradient, small river, sedimentary	3.37	good	9	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	38.51	good	7	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	16.55	very good	7	YES
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	3.33	fair	7	NO
	4212	foothill to montane, range includes low or moderate gradient, headwater and creek, sedimentary	0.51	very poor	2	NO
	4222	foothill to montane, range includes low or moderate gradient, small river, sedimentary	14.24	very good	2	YES
HUERFANO GRASSLANDS						
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	2.99	very good	3	YES
	2222	alpine to montane, range includes low or moderate gradient, small river, sedimentary	4.46	fair	9	NO
	2222	alpine to montane, range includes low or moderate gradient, small river, sedimentary	1.35	good	9	NO
	4222	foothill to montane, range includes low or moderate gradient, small river, sedimentary	1.30	very good	2	YES
LA VETA PASS LINK						
	2222	alpine to montane, range includes low or moderate gradient, small river, sedimentary	18.86	good	9	NO
	2222	alpine to montane, range includes low or moderate gradient, small river, sedimentary	10.54	fair	9	NO
	2222	alpine to montane, range includes low or moderate gradient, small river, sedimentary	4.76	very good	9	YES
MIDDLE ARKANSAS RIVER						
	1112	alpine, steep or very steep gradient, headwater and creek, sedimentary	12.59	poor	2	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	1112	alpine, steep or very steep gradient, headwater and creek, sedimentary	2.29	fair	2	NO
	2111	alpine to montane, steep or very steep gradient, headwater and creek, granitic or volcanic	31.43	good	5	NO
	2111	alpine to montane, steep or very steep gradient, headwater and creek, granitic or volcanic	3.58	fair	5	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	29.36	good	6	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	14.48	fair	6	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	6.26	very poor	6	NO
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	18.25	good	2	NO
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	8.77	very good	2	YES
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	1.98	fair	2	NO
	2222	alpine to montane, range includes low or moderate gradient, small river, sedimentary	73.15	fair	9	NO
	2222	alpine to montane, range includes low or moderate gradient, small river, sedimentary	66.15	good	9	NO
	2222	alpine to montane, range includes low or moderate gradient, small river, sedimentary	17.38	poor	9	NO
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	159.74	good	1	NO
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	136.27	fair	1	NO
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	15.37	very good	1	YES
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	12.87	poor	1	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	4231	foothill to montane, range includes low or moderate gradient, large river, granitic or volcanic	74.74	fair	1	NO
	4231	foothill to montane, range includes low or moderate gradient, large river, granitic or volcanic	48.10	good	1	NO
	4231	foothill to montane, range includes low or moderate gradient, large river, granitic or volcanic	22.48	poor	1	NO
	4231	foothill to montane, range includes low or moderate gradient, large river, granitic or volcanic	3.57	very good	1	YES
	4231	foothill to montane, range includes low or moderate gradient, large river, granitic or volcanic	0.33	very poor	1	NO
MOSQUITO RANGE						
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	1.74	good	4	YES
	1213	alpine, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	11.08	fair	4	NO
	1213	alpine, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	6.40	very poor	4	NO
	1213	alpine, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	5.65	good	4	YES
	1213	alpine, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	1.38	poor	4	NO
MOUNT MASSIVE						
	1211	alpine, range includes low or moderate gradient, headwater and creek, granitic or volcanic	3.09	very good	7	YES
PIKES PEAK						
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	45.24	fair	4	NO
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	29.24	poor	4	NO
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	19.12	good	4	YES
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	14.99	very poor	4	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	2111	alpine to montane, steep or very steep gradient, headwater and creek, granitic or volcanic	70.69	fair	5	NO
	2111	alpine to montane, steep or very steep gradient, headwater and creek, granitic or volcanic	44.84	poor	5	NO
	2111	alpine to montane, steep or very steep gradient, headwater and creek, granitic or volcanic	37.02	very poor	5	NO
	2111	alpine to montane, steep or very steep gradient, headwater and creek, granitic or volcanic	14.00	good	5	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	63.19	fair	6	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	50.00	poor	6	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	26.96	very poor	6	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	21.83	good	6	NO
	2222	alpine to montane, range includes low or moderate gradient, small river, sedimentary	5.06	fair	9	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	10.18	good	7	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	2.47	fair	7	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	1.40	very poor	7	NO
	4213	foothill to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	37.56	good	1	YES
	4213	foothill to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	25.90	fair	1	NO
	4213	foothill to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	17.75	poor	1	NO
	4213	foothill to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	8.91	very poor	1	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	4223	foothill to montane, range includes low or moderate gradient, small river, alluvial or glacial basin	0.31	good	1	YES
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	4.59	very poor	1	YES
ROMLEY						
	1211	alpine, range includes low or moderate gradient, headwater and creek, granitic or volcanic	6.00	fair	7	NO
	1211	alpine, range includes low or moderate gradient, headwater and creek, granitic or volcanic	4.44	very poor	7	NO
SANGRE DE CRISTO MTNS						
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	0.58	good	4	YES
	1112	alpine, steep or very steep gradient, headwater and creek, sedimentary	93.31	good	2	NO
	1112	alpine, steep or very steep gradient, headwater and creek, sedimentary	33.95	fair	2	NO
	1112	alpine, steep or very steep gradient, headwater and creek, sedimentary	24.76	very good	2	YES
	1112	alpine, steep or very steep gradient, headwater and creek, sedimentary	4.07	very poor	2	NO
	1112	alpine, steep or very steep gradient, headwater and creek, sedimentary	2.10	poor	2	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	132.65	fair	3	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	126.08	good	3	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	28.21	very good	3	YES
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	26.25	poor	3	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	5.71	very poor	3	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	2222	alpine to montane, range includes low or moderate gradient, small river, sedimentary	85.15	good	9	NO
	2222	alpine to montane, range includes low or moderate gradient, small river, sedimentary	42.83	fair	9	NO
	2222	alpine to montane, range includes low or moderate gradient, small river, sedimentary	36.09	very good	9	YES
	2222	alpine to montane, range includes low or moderate gradient, small river, sedimentary	8.76	poor	9	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	8.96	fair	7	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	0.17	good	7	NO
	3213	montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	0.97	good	4	NO
	3213	montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	0.63	very good	4	YES
SAPELLO/MORA VALLEYS						
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	11.39	good	7	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	7.98	very poor	7	NO
SOUTH ARKANSAS RIVER						
	1211	alpine, range includes low or moderate gradient, headwater and creek, granitic or volcanic	0.06	good	7	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	27.29	fair	6	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	7.87	poor	6	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	2.98	very good	6	YES
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	2.15	good	6	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
SOUTH PARK						
	1212	alpine, range includes low or moderate gradient, headwater and creek, sedimentary	39.72	good	2	YES
	1212	alpine, range includes low or moderate gradient, headwater and creek, sedimentary	2.07	fair	2	NO
SOUTHERN SANGRE DE CRISTO MOUNTAINS						
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	55.82	good	7	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	22.59	very good	7	YES
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	0.26	fair	7	NO
ST CHARLES RIVER						
	2111	alpine to montane, steep or very steep gradient, headwater and creek, granitic or volcanic	5.12	fair	5	NO
	2111	alpine to montane, steep or very steep gradient, headwater and creek, granitic or volcanic	3.46	poor	5	NO
	4212	foothill to montane, range includes low or moderate gradient, headwater and creek, sedimentary	0.43	fair	2	NO
	4212	foothill to montane, range includes low or moderate gradient, headwater and creek, sedimentary	0.16	good	2	YES
TRICKLE MOUNTAIN						
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	2.24	very good	6	YES
VERMEJO PARK/UPPER PURGATOIRE						
	1213	alpine, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	6.57	very poor	4	NO
	1213	alpine, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	1.32	good	4	YES
	2222	alpine to montane, range includes low or moderate gradient, small river, sedimentary	1265.18	good	9	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	2222	alpine to montane, range includes low or moderate gradient, small river, sedimentary	634.34	fair	9	NO
	2222	alpine to montane, range includes low or moderate gradient, small river, sedimentary	149.38	very good	9	YES
	2222	alpine to montane, range includes low or moderate gradient, small river, sedimentary	92.95	very poor	9	NO
	2222	alpine to montane, range includes low or moderate gradient, small river, sedimentary	80.78	poor	9	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	6.82	good	7	NO
	3213	montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	24.89	very poor	4	NO
	3213	montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	18.42	fair	4	NO
	3213	montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	7.13	good	4	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	5.19	fair	1	YES
	3222	montane, range includes low or moderate gradient, small river, sedimentary	4.65	very poor	1	NO
Colorado - San Juan						
ANIMAS RIVER						
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	15.48	good	10	NO
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	11.55	very good	10	YES
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	5.80	fair	10	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	32.34	good	5	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	22.96	very poor	5	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	11.24	very good	5	YES
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	6.98	fair	5	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	4.26	poor	5	NO
	3221	montane, range includes low or moderate gradient, small river, granitic or volcanic	51.26	very poor	4	NO
	3221	montane, range includes low or moderate gradient, small river, granitic or volcanic	20.83	poor	4	NO
	3221	montane, range includes low or moderate gradient, small river, granitic or volcanic	17.92	fair	4	NO
	3221	montane, range includes low or moderate gradient, small river, granitic or volcanic	14.86	good	4	NO
	3221	montane, range includes low or moderate gradient, small river, granitic or volcanic	2.17	very good	4	YES
	3222	montane, range includes low or moderate gradient, small river, sedimentary	77.00	good	2	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	73.96	very good	2	YES
	3222	montane, range includes low or moderate gradient, small river, sedimentary	23.16	fair	2	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	9.84	poor	2	NO
ARCHULETA CREEK						
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	24.56	good	2	YES
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	4.73	fair	9	NO
CANYON LARGO						
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	5.72	poor	9	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
CHACON CANYON						
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	41.13	fair	9	NO
CUMBRES PASS LINK						
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	16.70	good	10	NO
DEATH VALLEY CREEK						
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	9.16	very good	9	YES
ENDLICH MESA BASIN						
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	1.43	very good	10	YES
FLORIDA CREEK						
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	15.25	fair	10	NO
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	11.67	poor	10	NO
HUNTER						
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	0.81	very good	10	YES
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	14.56	very good	9	YES
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	11.53	good	9	NO
LION CREEK						
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	0.26	good	5	NO
MARTEN LINK A						
	3222	montane, range includes low or moderate gradient, small river, sedimentary	0.00	good	2	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
MONTEZUMA CREEK						
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	8.60	fair	9	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	8.48	good	9	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	6.33	very poor	9	NO
	3221	montane, range includes low or moderate gradient, small river, granitic or volcanic	5.98	fair	4	NO
	3221	montane, range includes low or moderate gradient, small river, granitic or volcanic	2.62	good	4	NO
PAGOSA SPRINGS						
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	33.32	good	10	NO
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	5.62	fair	10	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	195.93	fair	9	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	82.44	good	9	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	51.33	poor	9	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	42.35	very poor	9	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	15.61	very good	9	YES
	3221	montane, range includes low or moderate gradient, small river, granitic or volcanic	56.91	fair	4	NO
	3221	montane, range includes low or moderate gradient, small river, granitic or volcanic	21.91	poor	4	NO
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	49.93	fair	1	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	9.24	poor	1	NO
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	3.20	very good	1	YES
PIEDRA RIVER						
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	22.60	very good	10	YES
RIO CHAMA						
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	1.54	good	9	NO
SAN JUAN RIVER						
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	3.11	good	2	YES
	3221	montane, range includes low or moderate gradient, small river, granitic or volcanic	2.93	good	4	NO
SAN MIGUEL RIVER						
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	12.51	very poor	5	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	11.02	fair	5	NO
SOUTH SAN JUAN						
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	182.82	good	10	NO
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	142.21	very good	10	YES
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	24.88	fair	10	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	27.74	good	9	NO
SQUAW CREEK						
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	34.50	very good	10	YES

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	3.11	very good	5	YES
UNCOMPAGHRE / RED CLOUD						
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	18.64	very poor	5	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	12.97	good	5	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	7.24	fair	5	NO
WOLF CREEK						
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	23.62	good	10	NO
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	5.51	fair	10	NO
Pecos Basin						
SOUTHERN SANGRE DE CRISTO MOUNTAINS						
	1112	alpine, steep or very steep gradient, headwater and creek, sedimentary	67.63	very good	1	YES
	1112	alpine, steep or very steep gradient, headwater and creek, sedimentary	10.65	good	1	NO
	2112	alpine to montane, steep or very steep gradient, headwater and creek, sedimentary	44.27	very good	1	YES
	2112	alpine to montane, steep or very steep gradient, headwater and creek, sedimentary	42.99	good	1	NO
	2112	alpine to montane, steep or very steep gradient, headwater and creek, sedimentary	11.13	very poor	1	NO
	2112	alpine to montane, steep or very steep gradient, headwater and creek, sedimentary	10.70	fair	1	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	19.81	good	1	YES
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	16.28	fair	1	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	3.40	very poor	1	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	49.27	fair	1	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	37.58	very good	1	YES
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	34.13	good	1	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	14.17	very poor	1	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	34.04	fair	1	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	2.96	very good	1	YES
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	2.87	good	1	NO
	3213	montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	0.50	good	1	YES
Platte Basin						
BERTHOUD PASS						
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	48.26	fair	19	NO
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	17.99	very poor	19	NO
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	15.78	poor	19	NO
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	11.38	good	19	NO
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	1.41	very good	19	YES

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
BOX ELDER CREEK						
	4212	foothill to montane, range includes low or moderate gradient, headwater and creek, sedimentary	186.28	fair	5	NO
	4212	foothill to montane, range includes low or moderate gradient, headwater and creek, sedimentary	62.68	good	5	NO
	4212	foothill to montane, range includes low or moderate gradient, headwater and creek, sedimentary	32.51	poor	5	NO
	4212	foothill to montane, range includes low or moderate gradient, headwater and creek, sedimentary	19.46	very good	5	YES
	4212	foothill to montane, range includes low or moderate gradient, headwater and creek, sedimentary	8.04	very poor	5	NO
BUTTERFLY HAVEN						
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	6.55	poor	19	NO
CHEESMAN						
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	9.77	very good	11	YES
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	9.47	good	11	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	53.35	very poor	9	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	5.99	fair	9	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	5.90	poor	9	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	5.16	good	9	YES
	3221	montane, range includes low or moderate gradient, small river, granitic or volcanic	41.09	fair	2	NO
	3221	montane, range includes low or moderate gradient, small river, granitic or volcanic	37.00	good	2	NO
	3221	montane, range includes low or moderate gradient, small river, granitic or volcanic	16.55	poor	2	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	3221	montane, range includes low or moderate gradient, small river, granitic or volcanic	15.63	very poor	2	NO
	3221	montane, range includes low or moderate gradient, small river, granitic or volcanic	6.32	very good	2	YES
	4233	foothill to montane, range includes low or moderate gradient, large river, alluvial or glacial basin	5.76	fair	1	YES
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	187.34	fair	19	NO
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	108.22	good	19	NO
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	90.87	poor	19	NO
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	57.08	very poor	19	NO
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	56.75	very good	19	YES
CORRAL CREEK						
	3112	montane, steep or very steep gradient, headwater and creek, sedimentary	50.96	fair	1	NO
	3112	montane, steep or very steep gradient, headwater and creek, sedimentary	18.49	good	1	YES
	3112	montane, steep or very steep gradient, headwater and creek, sedimentary	7.75	very poor	1	NO
	3112	montane, steep or very steep gradient, headwater and creek, sedimentary	3.35	poor	1	NO
DRY LARAMIE RIVER						
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	5.48	good	13	NO
	4231	foothill to montane, range includes low or moderate gradient, large river, granitic or volcanic	20.17	good	2	NO
	4231	foothill to montane, range includes low or moderate gradient, large river, granitic or volcanic	2.63	very good	2	YES

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
ESTES PARK						
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	0.04	very good	11	YES
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	246.99	very good	19	YES
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	187.52	fair	19	NO
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	179.05	good	19	NO
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	90.46	poor	19	NO
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	55.47	very poor	19	NO
FORBES/SHEEP MOUNTAIN						
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	16.60	very good	14	YES
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	14.61	good	14	NO
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	9.13	fair	13	NO
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	8.01	poor	13	NO
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	1.88	very poor	13	NO
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	0.75	good	13	NO
GOLDEN GATE CANYON						
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	46.04	fair	19	NO
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	35.50	very poor	19	NO
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	28.93	poor	19	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	6.20	good	19	NO
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	1.18	very good	19	YES
GRAYS/TORREY						
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	0.58	fair	4	NO
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	0.39	very poor	4	NO
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	39.91	good	19	NO
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	16.11	very good	19	YES
GUANELLA						
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	45.92	good	19	NO
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	25.28	very poor	19	NO
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	24.92	fair	19	NO
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	20.66	very good	19	YES
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	6.31	poor	19	NO
HARDEN CREEK						
	2112	alpine to montane, steep or very steep gradient, headwater and creek, sedimentary	1.59	fair	6	NO
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	2.25	fair	14	NO
HERMIT PARK						
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	4.94	fair	19	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
HORSESHOE CREEK						
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	8.03	fair	13	NO
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	5.85	good	13	NO
	4212	foothill to montane, range includes low or moderate gradient, headwater and creek, sedimentary	70.78	fair	5	NO
	4212	foothill to montane, range includes low or moderate gradient, headwater and creek, sedimentary	47.79	good	5	NO
	4212	foothill to montane, range includes low or moderate gradient, headwater and creek, sedimentary	23.62	very good	5	YES
	4212	foothill to montane, range includes low or moderate gradient, headwater and creek, sedimentary	8.21	poor	5	NO
	4212	foothill to montane, range includes low or moderate gradient, headwater and creek, sedimentary	1.36	very poor	5	NO
	4231	foothill to montane, range includes low or moderate gradient, large river, granitic or volcanic	1.69	good	2	NO
HUSTON PARK						
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	41.60	good	11	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	35.54	fair	11	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	7.48	very good	11	YES
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	2.43	poor	11	NO
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	85.89	fair	13	NO
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	23.80	good	13	NO
IRON CREEK						
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	12.62	poor	14	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
KENOSHA						
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	28.89	good	11	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	16.46	fair	11	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	15.66	poor	11	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	9.40	very good	11	YES
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	53.10	good	19	NO
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	44.50	fair	19	NO
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	28.84	very good	19	YES
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	26.65	very poor	19	NO
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	23.18	poor	19	NO
LA BONTE CREEK						
	4212	foothill to montane, range includes low or moderate gradient, headwater and creek, sedimentary	24.81	poor	5	NO
	4212	foothill to montane, range includes low or moderate gradient, headwater and creek, sedimentary	15.33	fair	5	NO
LARAMIE FOOTHILLS						
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	295.59	fair	19	NO
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	164.14	good	19	NO
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	137.80	poor	19	NO
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	42.05	very poor	19	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	21.33	very good	19	YES
LARAMIE RIVER						
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	14.57	fair	4	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	33.36	fair	8	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	0.85	good	8	YES
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	41.31	fair	13	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	2.44	fair	9	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	26.79	fair	3	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	7.66	good	3	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	2.82	very good	3	YES
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	48.43	fair	19	NO
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	2.47	good	19	NO
LONG GULCH						
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	5.14	good	11	NO
LOWER POUDRE						
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	148.12	fair	19	NO
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	78.41	poor	19	NO
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	74.59	good	19	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	0.64	very good	19	YES
LYNX LINK B						
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	9.11	fair	11	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	2.30	good	11	NO
LYNX LINKS 3						
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	0.13	good	11	NO
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	2.91	good	19	NO
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	0.42	fair	19	NO
MILL CREEK						
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	13.82	good	14	NO
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	9.35	very poor	14	NO
MOSQUITO RANGE						
	1112	alpine, steep or very steep gradient, headwater and creek, sedimentary	52.52	good	2	NO
	1112	alpine, steep or very steep gradient, headwater and creek, sedimentary	31.81	fair	2	NO
	1112	alpine, steep or very steep gradient, headwater and creek, sedimentary	12.24	poor	2	NO
	1112	alpine, steep or very steep gradient, headwater and creek, sedimentary	6.07	very poor	2	NO
	1112	alpine, steep or very steep gradient, headwater and creek, sedimentary	3.54	very good	2	YES
	1213	alpine, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	0.57	fair	1	YES

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	2.18	fair	8	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	0.32	good	8	YES
MOUNT FALCON NORTH						
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	39.25	very poor	19	NO
MOUNT ZIRKEL						
	2111	alpine to montane, steep or very steep gradient, headwater and creek, granitic or volcanic	3.09	very good	1	YES
	2111	alpine to montane, steep or very steep gradient, headwater and creek, granitic or volcanic	0.24	fair	1	NO
	2112	alpine to montane, steep or very steep gradient, headwater and creek, sedimentary	31.52	fair	6	NO
	2112	alpine to montane, steep or very steep gradient, headwater and creek, sedimentary	5.05	poor	6	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	55.06	very good	11	YES
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	46.50	fair	11	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	43.02	good	11	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	5.21	poor	11	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	4.34	very poor	11	NO
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	144.20	very good	14	YES
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	67.85	good	14	NO
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	47.28	fair	14	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	3111	montane, steep or very steep gradient, headwater and creek, granitic or volcanic	0.36	good	1	YES
MULE CREEK						
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	6.02	good	13	NO
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	3.50	fair	13	NO
NORTH BOULDER CREEK						
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	27.10	poor	19	NO
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	24.35	fair	19	NO
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	18.46	good	19	NO
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	13.15	very poor	19	NO
NORTH CAMERON PASS						
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	12.27	fair	4	NO
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	2.96	good	4	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	26.54	fair	8	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	2.37	poor	8	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	1.32	good	8	YES
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	118.97	good	14	NO
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	81.61	very good	14	YES
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	37.30	fair	14	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	26.54	poor	14	NO
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	5.37	very poor	14	NO
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	37.44	good	13	NO
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	33.65	very good	13	YES
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	6.61	fair	13	NO
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	144.12	good	19	NO
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	113.11	fair	19	NO
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	42.83	very good	19	YES
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	11.09	poor	19	NO
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	6.51	very poor	19	NO
NORTH LARAMIE RIVER						
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	169.01	fair	13	NO
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	131.43	good	13	NO
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	11.76	poor	13	NO
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	9.78	very good	13	YES
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	0.46	very poor	13	NO
	4212	foothill to montane, range includes low or moderate gradient, headwater and creek, sedimentary	5.42	good	5	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
NORTH PARK						
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	79.87	fair	8	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	14.97	poor	8	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	6.90	good	8	YES
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	102.60	fair	14	NO
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	77.70	good	14	NO
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	2.47	very good	14	YES
	2222	alpine to montane, range includes low or moderate gradient, small river, sedimentary	191.90	fair	1	NO
	2222	alpine to montane, range includes low or moderate gradient, small river, sedimentary	97.00	good	1	YES
	2222	alpine to montane, range includes low or moderate gradient, small river, sedimentary	22.02	poor	1	NO
	2222	alpine to montane, range includes low or moderate gradient, small river, sedimentary	4.87	very poor	1	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	150.07	fair	9	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	34.13	good	9	YES
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	4.59	poor	9	NO
NORTH PARK SAND DUNES						
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	1.46	fair	8	NO
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	23.21	good	14	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	6.18	fair	14	NO
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	3.97	very good	14	YES
NORTH PLATTE RIVER						
	4212	foothill to montane, range includes low or moderate gradient, headwater and creek, sedimentary	4.18	good	5	NO
NORTH ST VRAIN						
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	108.03	good	19	NO
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	74.34	fair	19	NO
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	39.42	very poor	19	NO
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	36.67	poor	19	NO
PASS CREEK						
	2112	alpine to montane, steep or very steep gradient, headwater and creek, sedimentary	40.97	fair	6	NO
	2112	alpine to montane, steep or very steep gradient, headwater and creek, sedimentary	36.42	good	6	YES
	2112	alpine to montane, steep or very steep gradient, headwater and creek, sedimentary	4.04	poor	6	NO
PENNOCK MOUNTAIN						
	2112	alpine to montane, steep or very steep gradient, headwater and creek, sedimentary	29.88	fair	6	NO
	2112	alpine to montane, steep or very steep gradient, headwater and creek, sedimentary	17.30	good	6	YES
	2112	alpine to montane, steep or very steep gradient, headwater and creek, sedimentary	8.46	poor	6	NO
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	22.74	fair	14	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	55.61	good	13	NO
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	24.26	very good	13	YES
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	6.54	fair	13	NO
PIKES PEAK						
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	107.54	very poor	9	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	9.83	poor	9	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	1.02	fair	9	NO
	3221	montane, range includes low or moderate gradient, small river, granitic or volcanic	4.31	very poor	2	NO
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	4.25	very poor	19	NO
PLATTE RIVER						
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	30.97	fair	11	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	20.73	good	11	NO
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	2.05	fair	14	NO
	3231	montane, range includes low or moderate gradient, large river, granitic or volcanic	78.16	fair	3	NO
	3231	montane, range includes low or moderate gradient, large river, granitic or volcanic	37.02	good	3	YES
	3231	montane, range includes low or moderate gradient, large river, granitic or volcanic	10.79	very poor	3	NO
	3231	montane, range includes low or moderate gradient, large river, granitic or volcanic	8.78	poor	3	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
RED BUTTES						
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	4.94	good	9	YES
ROCK MOUNTAIN						
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	30.00	good	14	NO
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	13.42	fair	14	NO
ROGERS UNIT						
	1211	alpine, range includes low or moderate gradient, headwater and creek, granitic or volcanic	14.87	good	2	YES
	3222	montane, range includes low or moderate gradient, small river, sedimentary	2.02	good	3	NO
SHELL CREEK						
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	0.32	good	9	YES
SNOWY RANGE						
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	27.97	fair	14	NO
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	11.03	poor	14	NO
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	4.62	very good	14	YES
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	3.95	very poor	14	NO
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	3.05	good	14	NO
SOUTH CAMERON PASS						
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	68.40	fair	8	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	12.71	good	8	YES

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	28.77	poor	14	NO
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	27.21	fair	14	NO
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	18.94	good	14	NO
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	5.69	very poor	14	NO
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	26.46	very good	19	YES
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	17.23	fair	19	NO
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	7.19	very poor	19	NO
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	7.02	poor	19	NO
	22211	alpine to montane, range includes low or moderate gradient, small river, granitic or volcanic, headwater lakes	1.23	good	19	NO
SOUTH COTTONWOOD CREEK						
	3231	montane, range includes low or moderate gradient, large river, granitic or volcanic	6.03	good	3	YES
SOUTH FORK BEAR CREEK						
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	24.72	good	13	NO
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	24.27	fair	13	NO
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	0.15	poor	13	NO
SOUTH PARK						
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	33.27	fair	4	NO
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	27.85	good	4	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	3.09	very good	4	YES
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	2.99	poor	4	NO
	1112	alpine, steep or very steep gradient, headwater and creek, sedimentary	40.37	good	2	NO
	1112	alpine, steep or very steep gradient, headwater and creek, sedimentary	37.24	poor	2	NO
	1112	alpine, steep or very steep gradient, headwater and creek, sedimentary	35.91	fair	2	NO
	1112	alpine, steep or very steep gradient, headwater and creek, sedimentary	3.57	very good	2	YES
	1112	alpine, steep or very steep gradient, headwater and creek, sedimentary	2.47	very poor	2	NO
	1211	alpine, range includes low or moderate gradient, headwater and creek, granitic or volcanic	50.09	fair	2	NO
	1211	alpine, range includes low or moderate gradient, headwater and creek, granitic or volcanic	27.31	very poor	2	NO
	1211	alpine, range includes low or moderate gradient, headwater and creek, granitic or volcanic	19.75	poor	2	NO
	1212	alpine, range includes low or moderate gradient, headwater and creek, sedimentary	101.43	fair	1	NO
	1212	alpine, range includes low or moderate gradient, headwater and creek, sedimentary	24.47	poor	1	NO
	1212	alpine, range includes low or moderate gradient, headwater and creek, sedimentary	8.76	very poor	1	NO
	1212	alpine, range includes low or moderate gradient, headwater and creek, sedimentary	3.40	good	1	YES
	2112	alpine to montane, steep or very steep gradient, headwater and creek, sedimentary	44.76	poor	6	NO
	2112	alpine to montane, steep or very steep gradient, headwater and creek, sedimentary	30.91	very poor	6	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	11.68	very poor	11	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	11.04	poor	11	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	6.89	fair	11	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	105.22	fair	8	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	82.03	poor	8	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	11.85	very poor	8	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	8.73	good	8	YES
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	18.64	poor	9	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	16.59	fair	9	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	1.42	very poor	9	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	18.53	fair	3	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	11.56	poor	3	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	9.45	very poor	3	NO
SQUIRREL CREEK						
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	6.87	poor	11	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	6.58	fair	11	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	4.83	very poor	11	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	10.71	fair	14	NO
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	9.26	poor	14	NO
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	0.36	good	14	NO
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	34.52	very poor	13	NO
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	22.83	poor	13	NO
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	13.57	fair	13	NO
	3231	montane, range includes low or moderate gradient, large river, granitic or volcanic	4.13	very poor	3	NO
TROUBLESOME HEADWATERS						
	2112	alpine to montane, steep or very steep gradient, headwater and creek, sedimentary	21.15	fair	6	NO
	2112	alpine to montane, steep or very steep gradient, headwater and creek, sedimentary	8.24	good	6	YES
	2112	alpine to montane, steep or very steep gradient, headwater and creek, sedimentary	6.26	poor	6	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	62.84	good	8	YES
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	40.30	fair	8	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	16.03	very poor	8	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	8.22	poor	8	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	2.33	good	9	YES

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
TURTLE ROCK						
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	128.86	very poor	13	NO
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	23.77	poor	13	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	1.47	very poor	9	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	1.36	poor	9	NO
WALLROCK CREEK						
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	0.28	good	13	NO
	3213	montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	3.96	good	1	NO
	3213	montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	0.60	very good	1	YES
Upper Colorado						
ANIMAS RIVER						
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	6.31	good	13	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	1.72	good	16	NO
BALDY CHATO						
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	4.36	fair	14	NO
BALDY CINCO						
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	4.13	very good	14	YES
BEATON CREEK EAST						
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	6.47	fair	11	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
BEAVER CREEK - LONE CONE						
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	38.16	fair	13	NO
	4112	foothill to montane, steep or very steep gradient, headwater and creek, sedimentary	2.95	fair	8	NO
BERTHOUD PASS						
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	23.95	very poor	16	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	9.64	good	19	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	4.04	very good	19	YES
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	0.66	very poor	19	NO
BIG DOMINGUEZ RIVER						
	3111	montane, steep or very steep gradient, headwater and creek, granitic or volcanic	82.62	good	5	NO
	3111	montane, steep or very steep gradient, headwater and creek, granitic or volcanic	62.50	very good	5	YES
BRUSH CREEK AT CANNIBAL POINT						
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	14.18	very good	14	YES
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	7.54	fair	14	NO
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	3.38	good	14	NO
BURNING MOUNTAIN						
	4233	foothill to montane, range includes low or moderate gradient, large river, alluvial or glacial basin	0.77	fair	9	NO
BUTLER CREEK						
	3222	montane, range includes low or moderate gradient, small river, sedimentary	10.65	good	16	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	3222	montane, range includes low or moderate gradient, small river, sedimentary	6.26	fair	16	NO
CASTLE PEAK						
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	23.18	good	16	NO
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	18.30	fair	16	NO
	2112	alpine to montane, steep or very steep gradient, headwater and creek, sedimentary	165.23	good	7	NO
	2112	alpine to montane, steep or very steep gradient, headwater and creek, sedimentary	39.81	fair	7	NO
	3112	montane, steep or very steep gradient, headwater and creek, sedimentary	60.73	good	8	NO
	3112	montane, steep or very steep gradient, headwater and creek, sedimentary	23.35	fair	8	NO
	3112	montane, steep or very steep gradient, headwater and creek, sedimentary	11.81	very good	8	YES
	3112	montane, steep or very steep gradient, headwater and creek, sedimentary	9.20	poor	8	NO
	3132	montane, steep or very steep gradient, large river, sedimentary	149.41	fair	4	NO
	3132	montane, steep or very steep gradient, large river, sedimentary	141.34	good	4	NO
	3132	montane, steep or very steep gradient, large river, sedimentary	4.75	very good	4	YES
	3132	montane, steep or very steep gradient, large river, sedimentary	2.47	poor	4	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	32.49	good	16	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	19.59	fair	16	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	1.40	poor	16	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	4.88	fair	11	NO
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	1.91	poor	11	NO
	12111	alpine, range includes low or moderate gradient, headwater and creek, granitic or volcanic, headwater lakes	60.42	good	3	NO
	12111	alpine, range includes low or moderate gradient, headwater and creek, granitic or volcanic, headwater lakes	4.37	fair	3	NO
	12111	alpine, range includes low or moderate gradient, headwater and creek, granitic or volcanic, headwater lakes	3.44	very good	3	YES
CATTLE CREEK						
	3112	montane, steep or very steep gradient, headwater and creek, sedimentary	5.46	very good	8	YES
CIMARRON RIVER						
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	15.70	fair	14	NO
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	3.68	good	14	NO
COLONA MOUNTAIN						
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	3.19	fair	11	NO
CONUNDRUM						
	2111	alpine to montane, steep or very steep gradient, headwater and creek, granitic or volcanic	4.59	good	6	NO
	2112	alpine to montane, steep or very steep gradient, headwater and creek, sedimentary	29.58	very good	7	YES
	2112	alpine to montane, steep or very steep gradient, headwater and creek, sedimentary	18.43	good	7	NO
	2112	alpine to montane, steep or very steep gradient, headwater and creek, sedimentary	6.60	very poor	7	NO
	2112	alpine to montane, steep or very steep gradient, headwater and creek, sedimentary	0.71	poor	7	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	11.03	poor	19	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	10.33	very poor	19	NO
COTTONWOOD CRK S SAN JUANS						
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	37.61	good	13	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	30.15	fair	13	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	8.35	very good	13	YES
	3222	montane, range includes low or moderate gradient, small river, sedimentary	58.84	fair	16	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	55.04	good	16	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	1.31	very poor	16	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	1.30	very good	16	YES
	4112	foothill to montane, steep or very steep gradient, headwater and creek, sedimentary	0.63	good	8	NO
COTTONWOOD PASS						
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	12.16	very good	16	YES
	1211	alpine, range includes low or moderate gradient, headwater and creek, granitic or volcanic	261.68	good	5	NO
	1211	alpine, range includes low or moderate gradient, headwater and creek, granitic or volcanic	129.28	very good	5	YES
	1211	alpine, range includes low or moderate gradient, headwater and creek, granitic or volcanic	87.28	fair	5	NO
	2112	alpine to montane, steep or very steep gradient, headwater and creek, sedimentary	65.86	good	7	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	2112	alpine to montane, steep or very steep gradient, headwater and creek, sedimentary	30.28	very good	7	YES
	2112	alpine to montane, steep or very steep gradient, headwater and creek, sedimentary	2.23	fair	7	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	49.68	good	19	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	24.97	fair	19	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	16.10	very good	19	YES
	3221	montane, range includes low or moderate gradient, small river, granitic or volcanic	60.68	good	2	NO
	3221	montane, range includes low or moderate gradient, small river, granitic or volcanic	19.01	very good	2	YES
	3221	montane, range includes low or moderate gradient, small river, granitic or volcanic	15.16	fair	2	NO
CRESTED BUTTE						
	2111	alpine to montane, steep or very steep gradient, headwater and creek, granitic or volcanic	138.18	good	6	NO
	2111	alpine to montane, steep or very steep gradient, headwater and creek, granitic or volcanic	66.10	fair	6	NO
	2111	alpine to montane, steep or very steep gradient, headwater and creek, granitic or volcanic	54.57	very good	6	YES
	2111	alpine to montane, steep or very steep gradient, headwater and creek, granitic or volcanic	17.34	poor	6	NO
	2111	alpine to montane, steep or very steep gradient, headwater and creek, granitic or volcanic	12.43	very poor	6	NO
	2112	alpine to montane, steep or very steep gradient, headwater and creek, sedimentary	33.37	good	7	NO
	2112	alpine to montane, steep or very steep gradient, headwater and creek, sedimentary	5.83	fair	7	NO
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	6.27	very good	5	YES

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	2.69	good	5	NO
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	157.12	good	14	NO
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	98.33	very good	14	YES
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	44.04	fair	14	NO
	3231	montane, range includes low or moderate gradient, large river, granitic or volcanic	45.21	fair	4	NO
	3231	montane, range includes low or moderate gradient, large river, granitic or volcanic	21.36	poor	4	NO
	3231	montane, range includes low or moderate gradient, large river, granitic or volcanic	0.89	good	4	NO
CROSS AND FALL CREEKS						
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	43.59	very good	19	YES
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	25.39	good	19	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	15.75	very poor	19	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	2.57	poor	19	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	0.31	fair	21	NO
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	12.39	good	11	NO
CROWN						
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	15.74	poor	19	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	11.35	fair	19	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	10.12	good	19	NO
	3112	montane, steep or very steep gradient, headwater and creek, sedimentary	20.26	fair	8	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	25.08	poor	21	NO
	4232	foothill to montane, range includes low or moderate gradient, large river, sedimentary	9.24	poor	3	NO
	4232	foothill to montane, range includes low or moderate gradient, large river, sedimentary	8.08	fair	3	NO
	4232	foothill to montane, range includes low or moderate gradient, large river, sedimentary	0.53	very poor	3	NO
DAWSON DRAW CANYON EAST						
	4112	foothill to montane, steep or very steep gradient, headwater and creek, sedimentary	11.68	fair	8	NO
DEBEQUE CANYON						
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	19.12	good	5	NO
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	6.34	fair	5	NO
	4223	foothill to montane, range includes low or moderate gradient, small river, alluvial or glacial basin	2.55	good	2	YES
	4233	foothill to montane, range includes low or moderate gradient, large river, alluvial or glacial basin	1.28	good	9	NO
DEBEQUE SOUTH						
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	104.09	fair	5	NO
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	91.69	good	5	NO
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	49.00	poor	5	NO
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	6.19	very poor	5	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	3.12	very good	5	YES
	3112	montane, steep or very steep gradient, headwater and creek, sedimentary	7.43	fair	8	NO
	3112	montane, steep or very steep gradient, headwater and creek, sedimentary	3.33	good	8	NO
	4212	foothill to montane, range includes low or moderate gradient, headwater and creek, sedimentary	26.37	good	6	NO
	4212	foothill to montane, range includes low or moderate gradient, headwater and creek, sedimentary	15.89	very good	6	YES
	4212	foothill to montane, range includes low or moderate gradient, headwater and creek, sedimentary	10.44	fair	6	NO
	4223	foothill to montane, range includes low or moderate gradient, small river, alluvial or glacial basin	21.38	poor	2	NO
	4223	foothill to montane, range includes low or moderate gradient, small river, alluvial or glacial basin	19.90	fair	2	NO
	4223	foothill to montane, range includes low or moderate gradient, small river, alluvial or glacial basin	4.22	good	2	YES
	4233	foothill to montane, range includes low or moderate gradient, large river, alluvial or glacial basin	37.21	good	9	NO
	4233	foothill to montane, range includes low or moderate gradient, large river, alluvial or glacial basin	2.18	fair	9	NO
EAGLE RIVER AT GYPSUM						
	3112	montane, steep or very steep gradient, headwater and creek, sedimentary	5.02	poor	8	NO
	3112	montane, steep or very steep gradient, headwater and creek, sedimentary	1.92	fair	8	NO
	3132	montane, steep or very steep gradient, large river, sedimentary	2.98	very poor	4	NO
	3132	montane, steep or very steep gradient, large river, sedimentary	1.78	poor	4	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	53.43	fair	21	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	34.35	good	21	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	14.04	poor	21	NO
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	59.10	poor	11	NO
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	38.86	very poor	11	NO
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	19.79	fair	11	NO
	4233	foothill to montane, range includes low or moderate gradient, large river, alluvial or glacial basin	10.45	poor	9	NO
	4233	foothill to montane, range includes low or moderate gradient, large river, alluvial or glacial basin	3.41	very poor	9	NO
EAST DIVIDE CREEK						
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	4.44	fair	21	NO
EAST RIFLE CREEK						
	3222	montane, range includes low or moderate gradient, small river, sedimentary	10.97	good	16	NO
ELK RIDGE						
	1213	alpine, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	2.20	good	3	NO
	1213	alpine, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	0.39	fair	3	NO
	1213	alpine, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	0.04	very good	3	YES
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	15.90	fair	19	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	11.95	good	19	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	3.19	very good	19	YES

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
ESCALANTE RIVER						
	3111	montane, steep or very steep gradient, headwater and creek, granitic or volcanic	136.08	good	5	NO
	3111	montane, steep or very steep gradient, headwater and creek, granitic or volcanic	65.87	fair	5	NO
	3111	montane, steep or very steep gradient, headwater and creek, granitic or volcanic	61.30	very good	5	YES
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	2.61	fair	21	NO
	4212	foothill to montane, range includes low or moderate gradient, headwater and creek, sedimentary	48.53	very good	6	YES
ESTES PARK						
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	8.67	very good	19	YES
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	1.72	good	19	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	1.22	poor	19	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	0.58	fair	19	NO
FALL CREEK						
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	5.26	very good	14	YES
FLAT TOPS						
	2111	alpine to montane, steep or very steep gradient, headwater and creek, granitic or volcanic	0.28	good	6	NO
	2112	alpine to montane, steep or very steep gradient, headwater and creek, sedimentary	16.13	good	7	NO
	2112	alpine to montane, steep or very steep gradient, headwater and creek, sedimentary	12.30	fair	7	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	6.07	very good	21	YES

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	5.98	good	21	NO
	12111	alpine, range includes low or moderate gradient, headwater and creek, granitic or volcanic, headwater lakes	50.07	very good	3	YES
	12111	alpine, range includes low or moderate gradient, headwater and creek, granitic or volcanic, headwater lakes	0.92	good	3	NO
FOSSIL RIDGE						
	1211	alpine, range includes low or moderate gradient, headwater and creek, granitic or volcanic	11.35	fair	5	NO
	1211	alpine, range includes low or moderate gradient, headwater and creek, granitic or volcanic	10.12	very good	5	YES
	1211	alpine, range includes low or moderate gradient, headwater and creek, granitic or volcanic	3.99	good	5	NO
FRYINGPAN RIVER						
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	5.06	very good	19	YES
GLENWOOD CANYON						
	3112	montane, steep or very steep gradient, headwater and creek, sedimentary	2.59	poor	8	NO
	3132	montane, steep or very steep gradient, large river, sedimentary	24.64	fair	4	NO
	3132	montane, steep or very steep gradient, large river, sedimentary	20.95	poor	4	NO
	3132	montane, steep or very steep gradient, large river, sedimentary	2.20	good	4	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	121.62	fair	21	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	108.91	good	21	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	32.27	poor	21	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	2.47	very poor	21	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	4232	foothill to montane, range includes low or moderate gradient, large river, sedimentary	12.75	poor	3	NO
	4232	foothill to montane, range includes low or moderate gradient, large river, sedimentary	4.25	good	3	YES
	4233	foothill to montane, range includes low or moderate gradient, large river, alluvial or glacial basin	34.89	poor	9	NO
	4233	foothill to montane, range includes low or moderate gradient, large river, alluvial or glacial basin	10.72	very poor	9	NO
	4233	foothill to montane, range includes low or moderate gradient, large river, alluvial or glacial basin	9.22	fair	9	NO
	4233	foothill to montane, range includes low or moderate gradient, large river, alluvial or glacial basin	3.50	good	9	NO
	12111	alpine, range includes low or moderate gradient, headwater and creek, granitic or volcanic, headwater lakes	31.49	good	3	NO
	12111	alpine, range includes low or moderate gradient, headwater and creek, granitic or volcanic, headwater lakes	24.43	fair	3	NO
	12111	alpine, range includes low or moderate gradient, headwater and creek, granitic or volcanic, headwater lakes	11.35	very good	3	YES
GORE RANGE						
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	198.49	good	16	NO
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	172.65	very good	16	YES
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	73.45	very poor	16	NO
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	46.93	fair	16	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	5.09	very good	19	YES
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	2.60	good	19	NO
	3112	montane, steep or very steep gradient, headwater and creek, sedimentary	31.77	fair	8	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	3112	montane, steep or very steep gradient, headwater and creek, sedimentary	29.04	good	8	NO
	3112	montane, steep or very steep gradient, headwater and creek, sedimentary	6.96	very good	8	YES
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	50.22	fair	11	NO
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	14.00	good	11	NO
GRAYS/TORREY						
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	77.11	very poor	16	NO
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	69.22	fair	16	NO
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	34.55	poor	16	NO
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	30.75	good	16	NO
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	4.44	very good	16	YES
	1213	alpine, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	26.76	poor	3	NO
	1213	alpine, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	19.55	very poor	3	NO
	1213	alpine, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	11.24	fair	3	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	4.58	fair	19	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	3.94	good	19	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	0.42	poor	19	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
GREEN MOUNTAIN						
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	25.80	good	14	NO
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	14.51	fair	14	NO
GRIZZLY PEAK						
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	1.55	very good	13	YES
GUNNISON BASIN						
	1211	alpine, range includes low or moderate gradient, headwater and creek, granitic or volcanic	33.26	good	5	NO
	1211	alpine, range includes low or moderate gradient, headwater and creek, granitic or volcanic	25.07	fair	5	NO
	1211	alpine, range includes low or moderate gradient, headwater and creek, granitic or volcanic	22.06	very good	5	YES
	1211	alpine, range includes low or moderate gradient, headwater and creek, granitic or volcanic	13.87	poor	5	NO
	1211	alpine, range includes low or moderate gradient, headwater and creek, granitic or volcanic	1.96	very poor	5	NO
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	348.20	fair	14	NO
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	244.41	good	14	NO
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	116.78	poor	14	NO
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	61.82	very good	14	YES
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	12.90	very poor	14	NO
	3221	montane, range includes low or moderate gradient, small river, granitic or volcanic	101.61	fair	2	NO
	3221	montane, range includes low or moderate gradient, small river, granitic or volcanic	79.05	poor	2	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	3221	montane, range includes low or moderate gradient, small river, granitic or volcanic	10.72	good	2	NO
	3221	montane, range includes low or moderate gradient, small river, granitic or volcanic	8.61	very poor	2	NO
	3231	montane, range includes low or moderate gradient, large river, granitic or volcanic	33.12	poor	4	NO
	3231	montane, range includes low or moderate gradient, large river, granitic or volcanic	32.42	very poor	4	NO
	3231	montane, range includes low or moderate gradient, large river, granitic or volcanic	0.09	fair	4	NO
HARDSCRABBLE						
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	10.81	good	21	NO
LA GARITA						
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	0.58	good	19	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	0.21	very good	19	YES
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	13.35	very good	14	YES
LAWHEAD GULCH						
	3231	montane, range includes low or moderate gradient, large river, granitic or volcanic	2.45	fair	4	NO
	4212	foothill to montane, range includes low or moderate gradient, headwater and creek, sedimentary	10.95	poor	6	NO
	4212	foothill to montane, range includes low or moderate gradient, headwater and creek, sedimentary	10.11	good	6	NO
	4212	foothill to montane, range includes low or moderate gradient, headwater and creek, sedimentary	5.73	fair	6	NO
LITTLE COAL CREEK						
	2111	alpine to montane, steep or very steep gradient, headwater and creek, granitic or volcanic	16.01	very good	6	YES

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	2111	alpine to montane, steep or very steep gradient, headwater and creek, granitic or volcanic	5.32	good	6	NO
	2111	alpine to montane, steep or very steep gradient, headwater and creek, granitic or volcanic	2.78	fair	6	NO
LIZARD HEAD						
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	8.73	fair	16	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	41.28	fair	13	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	19.99	good	13	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	12.99	very good	13	YES
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	9.19	poor	13	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	0.34	fair	16	NO
LOWER DOLORES RIVER						
	3222	montane, range includes low or moderate gradient, small river, sedimentary	60.73	fair	16	NO
	4112	foothill to montane, steep or very steep gradient, headwater and creek, sedimentary	5.19	fair	8	NO
LYNX LINKS 3						
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	12.86	good	19	NO
MARTEN LINK A						
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	1.59	fair	13	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	0.73	very poor	13	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	36.82	good	16	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	3222	montane, range includes low or moderate gradient, small river, sedimentary	11.98	fair	16	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	10.95	very poor	16	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	3.42	very good	16	YES
MCCLURE PASS						
	2111	alpine to montane, steep or very steep gradient, headwater and creek, granitic or volcanic	58.41	very good	6	YES
	2111	alpine to montane, steep or very steep gradient, headwater and creek, granitic or volcanic	25.61	good	6	NO
	2111	alpine to montane, steep or very steep gradient, headwater and creek, granitic or volcanic	3.12	fair	6	NO
	2111	alpine to montane, steep or very steep gradient, headwater and creek, granitic or volcanic	1.82	poor	6	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	151.92	good	21	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	59.95	fair	21	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	39.97	very poor	21	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	32.20	very good	21	YES
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	26.48	poor	21	NO
	4212	foothill to montane, range includes low or moderate gradient, headwater and creek, sedimentary	8.52	good	6	NO
	4232	foothill to montane, range includes low or moderate gradient, large river, sedimentary	10.11	poor	3	NO
	4232	foothill to montane, range includes low or moderate gradient, large river, sedimentary	7.07	fair	3	NO
	4232	foothill to montane, range includes low or moderate gradient, large river, sedimentary	3.98	good	3	YES

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	4232	foothill to montane, range includes low or moderate gradient, large river, sedimentary	2.37	very poor	3	NO
MIDDLE FORK POWDERHORN CREEK						
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	8.38	very good	14	YES
MORRISON CREEK						
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	13.20	fair	16	NO
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	5.97	good	16	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	0.75	fair	13	NO
MOSQUITO RANGE						
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	6.73	fair	16	NO
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	6.40	poor	16	NO
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	5.98	good	16	NO
	1213	alpine, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	11.21	fair	3	NO
	1213	alpine, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	1.39	poor	3	NO
MOUNT CALLAHAN						
	4212	foothill to montane, range includes low or moderate gradient, headwater and creek, sedimentary	1.60	poor	6	NO
	4233	foothill to montane, range includes low or moderate gradient, large river, alluvial or glacial basin	11.19	fair	9	NO
	4233	foothill to montane, range includes low or moderate gradient, large river, alluvial or glacial basin	7.09	poor	9	NO
	4233	foothill to montane, range includes low or moderate gradient, large river, alluvial or glacial basin	3.84	good	9	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	4233	foothill to montane, range includes low or moderate gradient, large river, alluvial or glacial basin	0.69	very poor	9	NO
MOUNT ZIRKEL						
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	1.20	very good	16	YES
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	0.96	fair	16	NO
	2111	alpine to montane, steep or very steep gradient, headwater and creek, granitic or volcanic	1.09	fair	6	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	14.79	fair	13	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	4.96	good	13	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	1.26	poor	13	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	2.88	fair	21	NO
MUDDY CREEK						
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	1.89	fair	16	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	20.11	fair	13	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	7.47	good	13	NO
	3132	montane, steep or very steep gradient, large river, sedimentary	7.32	poor	4	NO
	3132	montane, steep or very steep gradient, large river, sedimentary	3.44	fair	4	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	25.58	fair	21	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	64.77	fair	16	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	3222	montane, range includes low or moderate gradient, small river, sedimentary	31.13	poor	16	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	5.62	very poor	16	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	2.69	good	16	NO
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	25.22	fair	11	NO
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	3.06	good	11	NO
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	2.94	very poor	11	NO
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	2.29	poor	11	NO
NATURITA CREEK						
	4112	foothill to montane, steep or very steep gradient, headwater and creek, sedimentary	54.01	fair	8	NO
OURAY						
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	20.06	good	16	NO
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	19.50	poor	16	NO
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	10.81	fair	16	NO
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	2.55	very poor	16	NO
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	7.73	very good	14	YES
DISAPPOINTMENT VALLEY						
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	11.77	good	21	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	3.04	very good	21	YES

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	3222	montane, range includes low or moderate gradient, small river, sedimentary	1.09	good	16	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	0.61	fair	16	NO
	4112	foothill to montane, steep or very steep gradient, headwater and creek, sedimentary	131.78	good	8	NO
	4112	foothill to montane, steep or very steep gradient, headwater and creek, sedimentary	36.49	fair	8	NO
	4112	foothill to montane, steep or very steep gradient, headwater and creek, sedimentary	2.79	very good	8	YES
PLEASANT VALLEY CREEK						
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	12.00	poor	16	NO
PRYOR CREEK						
	3111	montane, steep or very steep gradient, headwater and creek, granitic or volcanic	15.47	fair	5	NO
	3111	montane, steep or very steep gradient, headwater and creek, granitic or volcanic	11.39	good	5	NO
	3111	montane, steep or very steep gradient, headwater and creek, granitic or volcanic	1.61	poor	5	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	12.13	good	21	NO
RED & WHITE MTN						
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	4.98	very good	16	YES
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	13.19	very good	19	YES
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	10.08	fair	19	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	8.77	good	19	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	7.11	poor	19	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	5.08	very poor	19	NO
	3112	montane, steep or very steep gradient, headwater and creek, sedimentary	5.85	fair	8	NO
	3112	montane, steep or very steep gradient, headwater and creek, sedimentary	4.11	good	8	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	31.40	good	16	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	22.32	very good	16	YES
	3222	montane, range includes low or moderate gradient, small river, sedimentary	6.27	fair	16	NO
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	37.22	very poor	11	NO
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	32.13	poor	11	NO
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	30.95	good	11	NO
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	27.76	fair	11	NO
RIFLE HOGBACK						
	3222	montane, range includes low or moderate gradient, small river, sedimentary	9.52	poor	16	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	1.03	fair	16	NO
	4233	foothill to montane, range includes low or moderate gradient, large river, alluvial or glacial basin	5.30	poor	9	NO
	4233	foothill to montane, range includes low or moderate gradient, large river, alluvial or glacial basin	4.68	very poor	9	NO
RIFLE REACH/COLORADO RIVER						
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	25.56	poor	5	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	11.70	poor	21	NO
	4212	foothill to montane, range includes low or moderate gradient, headwater and creek, sedimentary	29.34	poor	6	NO
	4212	foothill to montane, range includes low or moderate gradient, headwater and creek, sedimentary	8.82	fair	6	NO
	4212	foothill to montane, range includes low or moderate gradient, headwater and creek, sedimentary	2.13	very poor	6	NO
	4233	foothill to montane, range includes low or moderate gradient, large river, alluvial or glacial basin	103.84	very poor	9	NO
	4233	foothill to montane, range includes low or moderate gradient, large river, alluvial or glacial basin	55.49	poor	9	NO
	4233	foothill to montane, range includes low or moderate gradient, large river, alluvial or glacial basin	29.96	good	9	NO
	4233	foothill to montane, range includes low or moderate gradient, large river, alluvial or glacial basin	24.83	fair	9	NO
ROAN CLIFFS						
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	7.02	very poor	5	NO
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	3.45	poor	5	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	4.34	fair	16	NO
	4233	foothill to montane, range includes low or moderate gradient, large river, alluvial or glacial basin	32.07	very poor	9	NO
	4233	foothill to montane, range includes low or moderate gradient, large river, alluvial or glacial basin	16.89	poor	9	NO
	4233	foothill to montane, range includes low or moderate gradient, large river, alluvial or glacial basin	10.11	good	9	NO
	4233	foothill to montane, range includes low or moderate gradient, large river, alluvial or glacial basin	4.53	very good	9	YES
	4233	foothill to montane, range includes low or moderate gradient, large river, alluvial or glacial basin	1.23	fair	9	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
ROCKY FORK CREEK						
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	7.62	fair	19	NO
ROUBIDEAU						
	3111	montane, steep or very steep gradient, headwater and creek, granitic or volcanic	128.82	good	5	NO
	3111	montane, steep or very steep gradient, headwater and creek, granitic or volcanic	37.54	fair	5	NO
	3111	montane, steep or very steep gradient, headwater and creek, granitic or volcanic	18.10	poor	5	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	19.66	good	21	NO
SAN MIGUEL RIVER						
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	37.75	very poor	16	NO
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	36.39	fair	16	NO
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	18.56	poor	16	NO
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	16.64	good	16	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	46.75	fair	13	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	28.59	good	13	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	11.83	poor	13	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	4.65	very good	13	YES
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	121.16	good	21	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	119.57	fair	21	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	46.14	very poor	21	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	18.96	poor	21	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	2.49	very good	21	YES
	3222	montane, range includes low or moderate gradient, small river, sedimentary	130.99	fair	16	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	31.49	very poor	16	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	29.41	good	16	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	27.51	poor	16	NO
	4112	foothill to montane, steep or very steep gradient, headwater and creek, sedimentary	24.60	very poor	8	NO
	4112	foothill to montane, steep or very steep gradient, headwater and creek, sedimentary	7.97	fair	8	NO
	4112	foothill to montane, steep or very steep gradient, headwater and creek, sedimentary	7.84	poor	8	NO
SNOWMASS CREEK						
	2112	alpine to montane, steep or very steep gradient, headwater and creek, sedimentary	21.02	very good	7	YES
	2112	alpine to montane, steep or very steep gradient, headwater and creek, sedimentary	2.36	good	7	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	6.87	very good	21	YES
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	0.21	good	21	NO
SOUTH ARKANSAS RIVER						
	1211	alpine, range includes low or moderate gradient, headwater and creek, granitic or volcanic	21.42	good	5	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	1211	alpine, range includes low or moderate gradient, headwater and creek, granitic or volcanic	12.18	very good	5	YES
	1211	alpine, range includes low or moderate gradient, headwater and creek, granitic or volcanic	0.11	fair	5	NO
SOUTH CAMERON PASS						
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	146.56	very good	19	YES
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	103.61	fair	19	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	87.20	poor	19	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	81.05	good	19	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	50.00	very poor	19	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	0.58	fair	13	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	27.04	good	21	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	9.73	fair	21	NO
TIPPERARY CREEK						
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	6.58	fair	19	NO
TOMICHI CREEK						
	1211	alpine, range includes low or moderate gradient, headwater and creek, granitic or volcanic	6.56	good	5	NO
TRICKLE MOUNTAIN						
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	0.34	very good	19	YES
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	93.86	very good	14	YES

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	59.52	good	14	NO
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	1.40	fair	14	NO
TROUBLESOME CREEK						
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	30.14	very poor	16	NO
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	6.75	fair	16	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	9.16	very poor	19	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	5.10	fair	19	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	28.18	fair	21	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	4.87	good	21	NO
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	15.51	fair	11	NO
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	6.43	poor	11	NO
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	0.53	very poor	11	NO
TROUBLESOME HEADWATERS						
	2112	alpine to montane, steep or very steep gradient, headwater and creek, sedimentary	0.25	fair	7	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	0.61	good	13	NO
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	68.56	good	14	NO
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	6.06	fair	14	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	5.82	very good	14	YES
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	4.49	poor	14	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	119.66	very good	21	YES
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	112.41	good	21	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	102.08	fair	21	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	10.86	fair	16	NO
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	23.74	good	11	NO
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	18.45	fair	11	NO
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	5.23	poor	11	NO
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	3.84	very good	11	YES
UNAWEEP						
	3111	montane, steep or very steep gradient, headwater and creek, granitic or volcanic	2.65	good	5	NO
	4112	foothill to montane, steep or very steep gradient, headwater and creek, sedimentary	22.51	very good	8	YES
	4112	foothill to montane, steep or very steep gradient, headwater and creek, sedimentary	16.10	good	8	NO
UNCOMPAGHRE / RED CLOUD						
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	123.22	good	14	NO
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	72.72	very good	14	YES

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	31.65	fair	14	NO
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	2.47	poor	14	NO
UTE TRAIL						
	3231	montane, range includes low or moderate gradient, large river, granitic or volcanic	10.10	good	4	NO
	3231	montane, range includes low or moderate gradient, large river, granitic or volcanic	6.27	very good	4	YES
	3231	montane, range includes low or moderate gradient, large river, granitic or volcanic	3.60	fair	4	NO
WEST DALLAS CREEK						
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	19.39	fair	16	NO
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	9.56	poor	16	NO
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	6.88	good	16	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	2.17	fair	13	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	0.51	very poor	13	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	0.77	fair	16	NO
WEST LAKE CREEK						
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	0.32	good	21	NO
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	2.92	fair	11	NO
WOODY CREEK HEADWATERS						
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	36.11	poor	19	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	28.51	good	19	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	17.87	fair	19	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	15.70	very good	19	YES
Upper Rio Grande						
AGUA CALIENTE						
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	8.42	very poor	23	NO
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	18.33	very poor	6	NO
	3111	montane, steep or very steep gradient, headwater and creek, granitic or volcanic	1.37	very poor	6	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	1.06	very poor	9	NO
	3233	montane, range includes low or moderate gradient, large river, alluvial or glacial basin	11.37	very poor	7	NO
	3233	montane, range includes low or moderate gradient, large river, alluvial or glacial basin	10.67	good	7	NO
	3233	montane, range includes low or moderate gradient, large river, alluvial or glacial basin	3.00	poor	7	NO
BENNETT CREEK - SOUTH						
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	7.26	good	23	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	5.22	fair	23	NO
CARNERO CREEK						
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	334.91	good	23	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	33.82	very good	23	YES

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	30.71	fair	23	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	0.63	poor	23	NO
	2223	alpine to montane, range includes low or moderate gradient, small river, alluvial or glacial basin	15.40	poor	8	NO
	2223	alpine to montane, range includes low or moderate gradient, small river, alluvial or glacial basin	1.77	very poor	8	NO
	2223	alpine to montane, range includes low or moderate gradient, small river, alluvial or glacial basin	0.37	fair	8	NO
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	11.61	poor	9	NO
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	8.11	fair	9	NO
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	3.66	very good	9	YES
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	2.07	good	9	NO
CHACON CANYON						
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	25.14	fair	9	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	14.97	poor	9	NO
CONEJOS RIVER						
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	35.72	good	23	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	19.31	fair	23	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	15.35	very good	23	YES
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	5.75	very poor	23	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	50.80	good	9	NO
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	22.39	very good	9	YES
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	14.36	fair	9	NO
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	4.78	very poor	9	NO
COYOTE CREEK						
	1213	alpine, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	12.16	very poor	1	NO
	1213	alpine, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	2.19	poor	1	YES
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	0.38	very poor	6	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	0.20	poor	9	NO
CULEBRA RANGE						
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	194.15	good	6	NO
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	63.12	very good	6	YES
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	36.45	fair	6	NO
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	36.06	very poor	6	NO
	2222	alpine to montane, range includes low or moderate gradient, small river, sedimentary	1.37	fair	2	NO
	3213	montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	114.58	poor	10	NO
	3213	montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	112.96	fair	10	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	3213	montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	60.05	good	10	NO
	3213	montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	35.24	very poor	10	NO
	3213	montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	7.18	very good	10	YES
CUMBRES PASS LINK						
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	10.00	very good	9	YES
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	3.72	very good	23	YES
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	6.92	fair	9	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	1.20	good	9	NO
GRAY MOUNTAIN						
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	26.71	good	23	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	5.36	fair	23	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	3.54	very poor	23	NO
GREAT SAND DUNES/SAN LUIS LAKES						
	3213	montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	28.10	good	10	NO
	3213	montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	5.72	very good	10	YES
	3213	montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	3.25	fair	10	NO
GREENIE MOUNTAIN						
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	114.65	fair	23	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	50.62	good	23	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	19.01	poor	23	NO
	2223	alpine to montane, range includes low or moderate gradient, small river, alluvial or glacial basin	62.22	poor	8	NO
	2223	alpine to montane, range includes low or moderate gradient, small river, alluvial or glacial basin	9.77	fair	8	NO
	2223	alpine to montane, range includes low or moderate gradient, small river, alluvial or glacial basin	9.50	very poor	8	NO
	2223	alpine to montane, range includes low or moderate gradient, small river, alluvial or glacial basin	4.55	good	8	NO
	3213	montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	51.06	poor	10	NO
	3213	montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	8.17	fair	10	NO
HIGHWAY SPRING						
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	10.42	poor	23	NO
HONDO CREEK, RITO						
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	6.04	good	23	NO
JEMEZ CANYON RESERVOIR						
	3111	montane, steep or very steep gradient, headwater and creek, granitic or volcanic	11.23	good	6	NO
	3111	montane, steep or very steep gradient, headwater and creek, granitic or volcanic	3.38	fair	6	NO
	3111	montane, steep or very steep gradient, headwater and creek, granitic or volcanic	2.34	poor	6	NO
	3111	montane, steep or very steep gradient, headwater and creek, granitic or volcanic	0.90	very good	6	YES
	4223	foothill to montane, range includes low or moderate gradient, small river, alluvial or glacial basin	1.38	poor	2	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
JEMEZ MOUNTAINS						
	3111	montane, steep or very steep gradient, headwater and creek, granitic or volcanic	190.15	fair	6	NO
	3111	montane, steep or very steep gradient, headwater and creek, granitic or volcanic	140.42	good	6	NO
	3111	montane, steep or very steep gradient, headwater and creek, granitic or volcanic	122.24	very poor	6	NO
	3111	montane, steep or very steep gradient, headwater and creek, granitic or volcanic	96.30	poor	6	NO
	3112	montane, steep or very steep gradient, headwater and creek, sedimentary	153.62	fair	1	NO
	3112	montane, steep or very steep gradient, headwater and creek, sedimentary	86.12	good	1	YES
	3112	montane, steep or very steep gradient, headwater and creek, sedimentary	17.19	very poor	1	NO
	3112	montane, steep or very steep gradient, headwater and creek, sedimentary	13.42	poor	1	NO
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	381.28	fair	3	NO
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	333.02	poor	3	NO
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	289.01	very poor	3	NO
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	209.47	good	3	NO
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	44.97	very good	3	YES
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	19.67	good	9	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	19.60	very poor	9	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	15.65	fair	9	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	6.85	poor	9	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	3.16	very good	9	YES
	3222	montane, range includes low or moderate gradient, small river, sedimentary	43.36	very poor	2	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	12.80	fair	2	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	1.29	poor	2	NO
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	49.41	very poor	9	NO
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	36.57	poor	9	NO
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	5.65	fair	9	NO
	4212	foothill to montane, range includes low or moderate gradient, headwater and creek, sedimentary	171.63	fair	3	NO
	4212	foothill to montane, range includes low or moderate gradient, headwater and creek, sedimentary	141.94	good	3	NO
	4212	foothill to montane, range includes low or moderate gradient, headwater and creek, sedimentary	31.31	poor	3	NO
	4212	foothill to montane, range includes low or moderate gradient, headwater and creek, sedimentary	18.65	very poor	3	NO
	4212	foothill to montane, range includes low or moderate gradient, headwater and creek, sedimentary	0.64	very good	3	YES
	4223	foothill to montane, range includes low or moderate gradient, small river, alluvial or glacial basin	50.87	poor	2	NO
	4223	foothill to montane, range includes low or moderate gradient, small river, alluvial or glacial basin	21.07	fair	2	NO
	4223	foothill to montane, range includes low or moderate gradient, small river, alluvial or glacial basin	16.65	very poor	2	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	4223	foothill to montane, range includes low or moderate gradient, small river, alluvial or glacial basin	12.19	good	2	NO
	4223	foothill to montane, range includes low or moderate gradient, small river, alluvial or glacial basin	8.05	very good	2	YES
	4233	foothill to montane, range includes low or moderate gradient, large river, alluvial or glacial basin	14.27	fair	3	NO
	4233	foothill to montane, range includes low or moderate gradient, large river, alluvial or glacial basin	13.70	poor	3	NO
	4233	foothill to montane, range includes low or moderate gradient, large river, alluvial or glacial basin	12.89	very poor	3	NO
	4233	foothill to montane, range includes low or moderate gradient, large river, alluvial or glacial basin	4.64	good	3	NO
	4233	foothill to montane, range includes low or moderate gradient, large river, alluvial or glacial basin	2.05	very good	3	YES
LA GARITA						
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	127.35	good	23	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	112.88	fair	23	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	78.55	very good	23	YES
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	21.72	poor	23	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	0.97	very poor	23	NO
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	76.99	good	9	NO
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	68.77	fair	9	NO
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	20.13	poor	9	NO
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	12.76	very poor	9	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	4.48	very good	9	YES
OJO CALIENTE						
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	6.18	fair	9	NO
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	0.10	good	9	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	391.40	fair	23	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	176.57	very poor	23	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	148.19	good	23	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	134.33	poor	23	NO
	2223	alpine to montane, range includes low or moderate gradient, small river, alluvial or glacial basin	86.27	fair	8	NO
	2223	alpine to montane, range includes low or moderate gradient, small river, alluvial or glacial basin	71.16	good	8	NO
	2223	alpine to montane, range includes low or moderate gradient, small river, alluvial or glacial basin	18.04	very poor	8	NO
	2223	alpine to montane, range includes low or moderate gradient, small river, alluvial or glacial basin	3.78	poor	8	NO
	2223	alpine to montane, range includes low or moderate gradient, small river, alluvial or glacial basin	3.56	very good	8	YES
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	19.65	fair	9	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	15.35	very poor	9	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	9.66	poor	9	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	4.12	good	9	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	3233	montane, range includes low or moderate gradient, large river, alluvial or glacial basin	11.89	fair	7	NO
	3233	montane, range includes low or moderate gradient, large river, alluvial or glacial basin	6.08	good	7	NO
	3233	montane, range includes low or moderate gradient, large river, alluvial or glacial basin	2.85	very poor	7	NO
	3233	montane, range includes low or moderate gradient, large river, alluvial or glacial basin	1.26	poor	7	NO
	4233	foothill to montane, range includes low or moderate gradient, large river, alluvial or glacial basin	59.66	very poor	3	NO
	4233	foothill to montane, range includes low or moderate gradient, large river, alluvial or glacial basin	19.74	poor	3	NO
	4233	foothill to montane, range includes low or moderate gradient, large river, alluvial or glacial basin	9.59	good	3	NO
	4233	foothill to montane, range includes low or moderate gradient, large river, alluvial or glacial basin	1.77	fair	3	NO
PIEDRA RIVER						
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	0.33	very good	9	YES
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	65.79	very good	23	YES
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	13.18	good	23	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	7.27	fair	23	NO
PUNCHE VALLEY						
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	172.79	fair	23	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	97.91	poor	23	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	54.29	good	23	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	45.49	very poor	23	NO
	2223	alpine to montane, range includes low or moderate gradient, small river, alluvial or glacial basin	6.50	fair	8	NO
	2223	alpine to montane, range includes low or moderate gradient, small river, alluvial or glacial basin	1.66	good	8	NO
	3111	montane, steep or very steep gradient, headwater and creek, granitic or volcanic	229.52	fair	6	NO
	3111	montane, steep or very steep gradient, headwater and creek, granitic or volcanic	102.31	good	6	NO
	3111	montane, steep or very steep gradient, headwater and creek, granitic or volcanic	66.58	poor	6	NO
	3111	montane, steep or very steep gradient, headwater and creek, granitic or volcanic	46.74	very poor	6	NO
	3213	montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	33.34	very poor	10	NO
	3213	montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	25.72	poor	10	NO
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	4.31	poor	9	NO
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	3.98	fair	9	NO
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	0.41	good	9	NO
	3233	montane, range includes low or moderate gradient, large river, alluvial or glacial basin	44.00	very poor	7	NO
	3233	montane, range includes low or moderate gradient, large river, alluvial or glacial basin	33.12	poor	7	NO
	3233	montane, range includes low or moderate gradient, large river, alluvial or glacial basin	29.72	good	7	NO
	3233	montane, range includes low or moderate gradient, large river, alluvial or glacial basin	10.33	fair	7	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	3233	montane, range includes low or moderate gradient, large river, alluvial or glacial basin	5.46	very good	7	YES
QUESTA						
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	42.85	very poor	6	NO
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	8.16	poor	6	NO
	3233	montane, range includes low or moderate gradient, large river, alluvial or glacial basin	2.23	very poor	7	NO
RAJADERO CANYON						
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	284.57	good	23	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	161.68	fair	23	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	62.69	very good	23	YES
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	19.87	very poor	23	NO
	3213	montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	13.48	very poor	10	NO
	3213	montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	1.02	fair	10	NO
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	34.42	good	9	NO
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	23.11	fair	9	NO
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	18.34	very poor	9	NO
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	17.04	very good	9	YES
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	5.45	poor	9	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
RIO CHAMA						
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	86.40	very poor	9	NO
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	48.53	fair	9	NO
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	17.89	poor	9	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	4.52	fair	23	NO
	2223	alpine to montane, range includes low or moderate gradient, small river, alluvial or glacial basin	2.39	good	8	NO
	2223	alpine to montane, range includes low or moderate gradient, small river, alluvial or glacial basin	1.02	fair	8	NO
	2223	alpine to montane, range includes low or moderate gradient, small river, alluvial or glacial basin	0.56	very poor	8	NO
	3111	montane, steep or very steep gradient, headwater and creek, granitic or volcanic	19.86	fair	6	NO
	3111	montane, steep or very steep gradient, headwater and creek, granitic or volcanic	7.77	very poor	6	NO
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	3.64	very poor	3	NO
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	3.33	poor	3	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	115.21	fair	9	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	70.59	good	9	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	61.73	poor	9	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	53.83	very poor	9	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	161.87	fair	2	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	3222	montane, range includes low or moderate gradient, small river, sedimentary	103.24	poor	2	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	85.00	very poor	2	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	67.66	good	2	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	1.22	very good	2	YES
	3233	montane, range includes low or moderate gradient, large river, alluvial or glacial basin	117.26	fair	7	NO
	3233	montane, range includes low or moderate gradient, large river, alluvial or glacial basin	35.93	very poor	7	NO
	3233	montane, range includes low or moderate gradient, large river, alluvial or glacial basin	30.44	good	7	NO
	3233	montane, range includes low or moderate gradient, large river, alluvial or glacial basin	18.52	poor	7	NO
	3233	montane, range includes low or moderate gradient, large river, alluvial or glacial basin	11.43	very good	7	YES
	4212	foothill to montane, range includes low or moderate gradient, headwater and creek, sedimentary	8.27	very poor	3	NO
	4212	foothill to montane, range includes low or moderate gradient, headwater and creek, sedimentary	1.17	poor	3	NO
	4212	foothill to montane, range includes low or moderate gradient, headwater and creek, sedimentary	0.04	good	3	NO
	4233	foothill to montane, range includes low or moderate gradient, large river, alluvial or glacial basin	151.94	very poor	3	NO
	4233	foothill to montane, range includes low or moderate gradient, large river, alluvial or glacial basin	39.54	fair	3	NO
	4233	foothill to montane, range includes low or moderate gradient, large river, alluvial or glacial basin	25.36	good	3	NO
	4233	foothill to montane, range includes low or moderate gradient, large river, alluvial or glacial basin	15.42	very good	3	YES

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
RIO GRANDE						
	2223	alpine to montane, range includes low or moderate gradient, small river, alluvial or glacial basin	35.94	fair	8	NO
	2223	alpine to montane, range includes low or moderate gradient, small river, alluvial or glacial basin	7.29	good	8	NO
	3213	montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	6.12	fair	10	NO
	3213	montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	0.96	poor	10	NO
	3233	montane, range includes low or moderate gradient, large river, alluvial or glacial basin	13.87	fair	7	NO
	3233	montane, range includes low or moderate gradient, large river, alluvial or glacial basin	0.64	poor	7	NO
RIO GRANDE GORGE						
	3111	montane, steep or very steep gradient, headwater and creek, granitic or volcanic	1.10	poor	6	NO
	3233	montane, range includes low or moderate gradient, large river, alluvial or glacial basin	9.80	very poor	7	NO
	3233	montane, range includes low or moderate gradient, large river, alluvial or glacial basin	0.86	poor	7	NO
RIO GRANDE PYRAMID						
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	3.95	very good	23	YES
RIO HONDO						
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	65.14	good	6	NO
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	22.43	fair	6	NO
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	7.06	very good	6	YES
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	3.82	poor	6	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
SANGRE DE CRISTO MTNS						
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	49.94	good	9	NO
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	0.57	very good	9	YES
	1112	alpine, steep or very steep gradient, headwater and creek, sedimentary	0.06	good	2	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	0.58	good	1	YES
	2222	alpine to montane, range includes low or moderate gradient, small river, sedimentary	0.50	good	2	YES
	3213	montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	127.70	good	10	NO
	3213	montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	95.61	very good	10	YES
	3213	montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	66.27	poor	10	NO
	3213	montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	42.52	fair	10	NO
	3213	montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	10.02	very poor	10	NO
SLV GREASEWOOD						
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	23.18	fair	23	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	10.49	poor	23	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	0.33	good	23	NO
	2223	alpine to montane, range includes low or moderate gradient, small river, alluvial or glacial basin	149.79	fair	8	NO
	2223	alpine to montane, range includes low or moderate gradient, small river, alluvial or glacial basin	80.74	good	8	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	2223	alpine to montane, range includes low or moderate gradient, small river, alluvial or glacial basin	0.39	poor	8	NO
	3213	montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	77.62	good	10	NO
	3213	montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	20.82	fair	10	NO
	3213	montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	12.67	poor	10	NO
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	26.88	fair	9	NO
SOUTH SAN JUAN						
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	30.62	very good	9	YES
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	8.21	good	9	NO
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	3.65	fair	9	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	205.66	very good	23	YES
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	117.31	good	23	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	11.12	fair	23	NO
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	2.93	very good	9	YES
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	0.68	good	9	NO
SOUTHERN SANGRE DE CRISTO MOUNTAINS						
	1112	alpine, steep or very steep gradient, headwater and creek, sedimentary	0.10	very good	2	YES
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	57.64	good	9	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	41.98	very good	9	YES
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	8.04	fair	9	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	3.55	very poor	9	NO
	3213	montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	12.32	good	10	NO
	3213	montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	3.36	very poor	10	NO
	3213	montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	2.22	fair	10	NO
	3213	montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	0.98	poor	10	NO
	4212	foothill to montane, range includes low or moderate gradient, headwater and creek, sedimentary	68.11	very good	3	YES
	4212	foothill to montane, range includes low or moderate gradient, headwater and creek, sedimentary	38.17	good	3	NO
	4212	foothill to montane, range includes low or moderate gradient, headwater and creek, sedimentary	21.91	very poor	3	NO
	4212	foothill to montane, range includes low or moderate gradient, headwater and creek, sedimentary	16.66	fair	3	NO
	4212	foothill to montane, range includes low or moderate gradient, headwater and creek, sedimentary	14.83	poor	3	NO
SQUAW CREEK						
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	0.94	very good	9	YES
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	14.83	very good	23	YES
TAOS PUEBLO						
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	22.66	very poor	6	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	9.20	fair	6	NO
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	5.70	good	6	NO
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	2.62	poor	6	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	0.33	good	9	NO
TRICKLE MOUNTAIN						
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	261.27	good	23	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	156.10	fair	23	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	102.24	very good	23	YES
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	20.95	very poor	23	NO
	3211	montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	2.28	very good	3	YES
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	33.11	fair	9	NO
	3223	montane, range includes low or moderate gradient, small river, alluvial or glacial basin	18.28	good	9	NO
UNCOMPAGHRE / RED CLOUD						
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	100.59	very good	23	YES
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	20.87	good	23	NO
UPPER SAN LUIS VALLEY						
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	161.04	good	9	NO
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	39.72	fair	9	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	6.32	poor	9	NO
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	1.53	very good	9	YES
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	1.50	very poor	9	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	27.12	good	23	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	19.09	fair	23	NO
	2223	alpine to montane, range includes low or moderate gradient, small river, alluvial or glacial basin	28.07	fair	8	NO
	3213	montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	28.98	good	10	NO
	3213	montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	23.81	fair	10	NO
WOLF CREEK						
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	0.29	fair	9	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	30.01	fair	23	NO
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	9.12	good	23	NO
Yampa-White River Basin						
FLAT TOPS						
	2111	alpine to montane, steep or very steep gradient, headwater and creek, granitic or volcanic	164.84	good	4	NO
	2111	alpine to montane, steep or very steep gradient, headwater and creek, granitic or volcanic	105.11	very good	4	YES
	2111	alpine to montane, steep or very steep gradient, headwater and creek, granitic or volcanic	43.38	fair	4	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	2112	alpine to montane, steep or very steep gradient, headwater and creek, sedimentary	2.46	fair	1	YES
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	0.09	good	6	NO
	3112	montane, steep or very steep gradient, headwater and creek, sedimentary	120.89	good	3	NO
	3112	montane, steep or very steep gradient, headwater and creek, sedimentary	39.94	very good	3	YES
	3112	montane, steep or very steep gradient, headwater and creek, sedimentary	30.61	fair	3	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	111.88	very good	5	YES
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	95.72	good	5	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	15.29	fair	5	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	8.15	poor	5	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	46.28	good	6	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	22.75	fair	6	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	3.21	very good	6	YES
	12111	alpine, range includes low or moderate gradient, headwater and creek, granitic or volcanic, headwater lakes	216.83	very good	1	YES
	12111	alpine, range includes low or moderate gradient, headwater and creek, granitic or volcanic, headwater lakes	91.86	good	1	NO
	12111	alpine, range includes low or moderate gradient, headwater and creek, granitic or volcanic, headwater lakes	4.07	fair	1	NO
HUSTON PARK						
	2211	alpine to montane, range includes low or moderate gradient, headwater and creek, granitic or volcanic	0.22	very good	1	YES

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	3111	montane, steep or very steep gradient, headwater and creek, granitic or volcanic	78.16	good	4	NO
	3111	montane, steep or very steep gradient, headwater and creek, granitic or volcanic	37.20	fair	4	NO
	3111	montane, steep or very steep gradient, headwater and creek, granitic or volcanic	20.35	very good	4	YES
	3111	montane, steep or very steep gradient, headwater and creek, granitic or volcanic	9.85	very poor	4	NO
LYNX LINK B						
	3111	montane, steep or very steep gradient, headwater and creek, granitic or volcanic	8.10	good	4	NO
	3111	montane, steep or very steep gradient, headwater and creek, granitic or volcanic	5.54	very good	4	YES
MORRISON CREEK						
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	1.49	good	2	NO
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	1.16	fair	2	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	23.28	good	6	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	11.68	fair	6	NO
MOUNT ZIRKEL						
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	62.40	very good	2	YES
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	54.22	good	2	NO
	1111	alpine, steep or very steep gradient, headwater and creek, granitic or volcanic	27.71	fair	2	NO
	2111	alpine to montane, steep or very steep gradient, headwater and creek, granitic or volcanic	316.07	very good	4	YES
	2111	alpine to montane, steep or very steep gradient, headwater and creek, granitic or volcanic	254.63	good	4	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	2111	alpine to montane, steep or very steep gradient, headwater and creek, granitic or volcanic	76.33	fair	4	NO
	2111	alpine to montane, steep or very steep gradient, headwater and creek, granitic or volcanic	18.81	poor	4	NO
	2111	alpine to montane, steep or very steep gradient, headwater and creek, granitic or volcanic	16.74	very poor	4	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	38.24	good	6	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	7.50	fair	6	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	5.06	very good	6	YES
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	3.87	very poor	6	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	3.36	poor	6	NO
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	1.06	very good	1	YES
	2213	alpine to montane, range includes low or moderate gradient, headwater and creek, alluvial or glacial basin	0.52	good	1	NO
	3111	montane, steep or very steep gradient, headwater and creek, granitic or volcanic	80.95	good	4	NO
	3111	montane, steep or very steep gradient, headwater and creek, granitic or volcanic	4.42	fair	4	NO
	3111	montane, steep or very steep gradient, headwater and creek, granitic or volcanic	4.24	very good	4	YES
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	90.65	good	5	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	62.02	fair	5	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	22.00	very good	5	YES

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	3.07	poor	5	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	109.59	good	6	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	47.64	fair	6	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	43.75	poor	6	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	18.81	very good	6	YES
	3222	montane, range includes low or moderate gradient, small river, sedimentary	11.39	very poor	6	NO
OAK RIDGE						
	3112	montane, steep or very steep gradient, headwater and creek, sedimentary	2.41	poor	3	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	43.39	fair	5	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	1.44	good	5	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	13.50	good	6	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	6.52	fair	6	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	3.10	poor	6	NO
SAGE CREEK						
	2111	alpine to montane, steep or very steep gradient, headwater and creek, granitic or volcanic	17.43	fair	4	NO
	2111	alpine to montane, steep or very steep gradient, headwater and creek, granitic or volcanic	7.28	very good	4	YES
	2111	alpine to montane, steep or very steep gradient, headwater and creek, granitic or volcanic	2.70	good	4	NO

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	190.57	fair	6	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	33.65	good	6	NO
	3112	montane, steep or very steep gradient, headwater and creek, sedimentary	161.75	fair	3	NO
	3112	montane, steep or very steep gradient, headwater and creek, sedimentary	31.34	poor	3	NO
	3112	montane, steep or very steep gradient, headwater and creek, sedimentary	24.83	good	3	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	113.35	very good	5	YES
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	112.06	good	5	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	15.94	fair	5	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	3.30	poor	5	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	187.23	fair	6	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	93.32	good	6	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	8.59	poor	6	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	2.54	very good	6	YES
	3233	montane, range includes low or moderate gradient, large river, alluvial or glacial basin	104.06	fair	2	NO
	3233	montane, range includes low or moderate gradient, large river, alluvial or glacial basin	72.92	good	2	NO
	3233	montane, range includes low or moderate gradient, large river, alluvial or glacial basin	2.50	very good	2	YES

EDU Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
SLATER PARK						
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	21.06	good	6	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	4.65	very good	6	YES
	3111	montane, steep or very steep gradient, headwater and creek, granitic or volcanic	102.81	good	4	NO
	3111	montane, steep or very steep gradient, headwater and creek, granitic or volcanic	62.26	fair	4	NO
	3111	montane, steep or very steep gradient, headwater and creek, granitic or volcanic	0.30	very poor	4	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	166.75	good	5	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	61.71	fair	5	NO
	3212	montane, range includes low or moderate gradient, headwater and creek, sedimentary	26.63	very good	5	YES
	3222	montane, range includes low or moderate gradient, small river, sedimentary	194.72	good	6	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	106.36	very good	6	YES
	3222	montane, range includes low or moderate gradient, small river, sedimentary	50.23	fair	6	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	8.51	poor	6	NO
YAMPA RIVER						
	2111	alpine to montane, steep or very steep gradient, headwater and creek, granitic or volcanic	3.94	good	4	NO
	2111	alpine to montane, steep or very steep gradient, headwater and creek, granitic or volcanic	0.22	fair	4	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	24.55	good	6	NO

EDU

Site Name/Code	System	System Description	length (km)	quality	total # sites where found	best example
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	8.84	fair	6	NO
	2212	alpine to montane, range includes low or moderate gradient, headwater and creek, sedimentary	4.80	very poor	6	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	74.01	fair	6	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	43.91	poor	6	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	22.18	good	6	NO
	3222	montane, range includes low or moderate gradient, small river, sedimentary	4.41	very poor	6	NO
	3233	montane, range includes low or moderate gradient, large river, alluvial or glacial basin	12.96	fair	2	NO
	3233	montane, range includes low or moderate gradient, large river, alluvial or glacial basin	4.35	good	2	NO

APPENDIX 26. SOUTHERN ROCKY MOUNTAINS: Area Distribution of Ecological System - ELU Combinations (only combinations larger than 1% of ecological system area)

SYS-SORT	SYSTEM DESCRIPTION	HECTARES	PCT of WHOLE	ELU DESCRIPTION
1	ALPINE SUBSTRATE - ICE FIELD	37,811	18.31%	Alpine - Granitic/Silicic - Lower side slope dry
1	ALPINE SUBSTRATE - ICE FIELD	23,588	11.42%	Alpine - Granitic/Silicic - NE facing upper side slope
1	ALPINE SUBSTRATE - ICE FIELD	18,134	8.78%	Alpine - Granitic/Silicic - SW facing upper side slope
1	ALPINE SUBSTRATE - ICE FIELD	12,574	6.09%	Alpine - Granitic/Silicic - SW facing cliff
1	ALPINE SUBSTRATE - ICE FIELD	12,381	5.99%	Alpine - Granitic/Silicic - NE facing cliff
1	ALPINE SUBSTRATE - ICE FIELD	12,193	5.90%	Alpine - Granitic/Silicic - NE facing ridge
1	ALPINE SUBSTRATE - ICE FIELD	11,459	5.55%	Alpine - Granitic/Silicic - SW facing ridge
1	ALPINE SUBSTRATE - ICE FIELD	5,680	2.75%	Alpine - Granitic/Silicic - NE facing canyon dry
1	ALPINE SUBSTRATE - ICE FIELD	5,604	2.71%	Alpine - Granitic/Silicic - Lower side slope moist
1	ALPINE SUBSTRATE - ICE FIELD	4,825	2.34%	Alpine - Sandstone - Lower side slope dry
1	ALPINE SUBSTRATE - ICE FIELD	4,114	1.99%	Alpine - Granitic/Silicic - SW facing canyon dry
1	ALPINE SUBSTRATE - ICE FIELD	4,062	1.97%	Alpine - Basaltic/Mafic - Lower side slope dry
1	ALPINE SUBSTRATE - ICE FIELD	3,821	1.85%	Alpine - Basaltic/Mafic - NE facing upper side slope
1	ALPINE SUBSTRATE - ICE FIELD	3,061	1.48%	Alpine - Granitic/Silicic - NE facing canyon moist
1	ALPINE SUBSTRATE - ICE FIELD	2,989	1.45%	Alpine - Basaltic/Mafic - SW facing upper side slope
1	ALPINE SUBSTRATE - ICE FIELD	2,589	1.25%	Alpine - Sandstone - NE facing upper side slope
	Total of > 1% Group	164,883		
	Group Pct of Whole	79.83%		
	Total of Whole	206,537		
	Pct of Ecoregion	1.00%		
2	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	14,778	11.79%	Alpine - Granitic/Silicic - Lower side slope dry
2	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	10,453	8.34%	Alpine - Granitic/Silicic - NE facing upper side slope
2	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	9,735	7.77%	Alpine - Basaltic/Mafic - Lower side slope dry
2	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	8,658	6.91%	Alpine - Granitic/Silicic - SW facing upper side slope
2	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	7,653	6.11%	Alpine - Basaltic/Mafic - NE facing upper side slope
2	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	6,943	5.54%	Alpine - Basaltic/Mafic - SW facing upper side slope
2	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	3,894	3.11%	Alpine - Sandstone - Lower side slope dry
2	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	3,721	2.97%	Alpine - Basaltic/Mafic - Rolling plains dry
2	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	3,533	2.82%	Alpine - Sandstone - NE facing upper side slope
2	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	3,243	2.59%	Alpine - Granitic/Silicic - Lower side slope moist
2	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	3,162	2.52%	Alpine - Young Alluvium/Colluvium/Glacial Deposits - Lower side slope dry
2	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	2,960	2.36%	Alpine - Granitic/Silicic - NE facing cliff
2	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	2,796	2.23%	Alpine - Granitic/Silicic - NE facing ridge
2	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	2,735	2.18%	Alpine - Basaltic/Mafic - Rolling plains moist
2	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	2,622	2.09%	Alpine - Granitic/Silicic - SW facing ridge
2	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	2,345	1.87%	Alpine - Granitic/Silicic - SW facing cliff
2	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	2,310	1.84%	Alpine - Basaltic/Mafic - Lower side slope moist
2	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	2,303	1.84%	Alpine - Sandstone - SW facing upper side slope
2	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	1,425	1.14%	Alpine - Granitic/Silicic - NE facing canyon dry
2	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	1,408	1.12%	Alpine - Young Alluvium/Colluvium/Glacial Deposits - Rolling plains dry
2	ALPINE TUNDRA - DWARF SHRUB & FELL FIELD	1,297	1.03%	Alpine - Granitic/Silicic - SW facing canyon dry

APPENDIX 26. SOUTHERN ROCKY MOUNTAINS: Area Distribution of Ecological System - ELU Combinations (only combinations larger than 1% of ecological system area)

SYS-SORT	SYSTEM DESCRIPTION	HECTARES	PCT of WHOLE	ELU DESCRIPTION
	Total of > 1% Group	97,971		
	Group Pct of Whole	78.17%		
	Total of Whole	125,329		
	Pct of Ecoregion	0.61%		
3	ALPINE DRY TUNDRA & MOIST MEADOW	50,408	7.35%	Alpine - Granitic/Silicic - Lower side slope dry
3	ALPINE DRY TUNDRA & MOIST MEADOW	48,065	7.01%	Alpine - Basaltic/Mafic - Lower side slope dry
3	ALPINE DRY TUNDRA & MOIST MEADOW	44,715	6.52%	Alpine - Granitic/Silicic - NE facing upper side slope
3	ALPINE DRY TUNDRA & MOIST MEADOW	43,043	6.28%	Alpine - Granitic/Silicic - SW facing upper side slope
3	ALPINE DRY TUNDRA & MOIST MEADOW	32,916	4.80%	Alpine - Basaltic/Mafic - NE facing upper side slope
3	ALPINE DRY TUNDRA & MOIST MEADOW	27,861	4.06%	Alpine - Basaltic/Mafic - SW facing upper side slope
3	ALPINE DRY TUNDRA & MOIST MEADOW	12,656	1.85%	Alpine - Granitic/Silicic - NE facing ridge
3	ALPINE DRY TUNDRA & MOIST MEADOW	11,712	1.71%	Alpine - Granitic/Silicic - SW facing ridge
3	ALPINE DRY TUNDRA & MOIST MEADOW	11,655	1.70%	Alpine - Basaltic/Mafic - Rolling plains dry
3	ALPINE DRY TUNDRA & MOIST MEADOW	11,492	1.68%	Montane - Shale - Lower side slope dry
3	ALPINE DRY TUNDRA & MOIST MEADOW	10,947	1.60%	Alpine - Sandstone - Lower side slope dry
3	ALPINE DRY TUNDRA & MOIST MEADOW	10,881	1.59%	Alpine - Granitic/Silicic - Lower side slope moist
3	ALPINE DRY TUNDRA & MOIST MEADOW	10,021	1.46%	Alpine - Granitic/Silicic - NE facing cliff
3	ALPINE DRY TUNDRA & MOIST MEADOW	9,691	1.41%	Alpine - Basaltic/Mafic - Lower side slope moist
3	ALPINE DRY TUNDRA & MOIST MEADOW	9,367	1.37%	Alpine - Granitic/Silicic - SW facing cliff
3	ALPINE DRY TUNDRA & MOIST MEADOW	8,326	1.21%	Alpine - Basaltic/Mafic - Rolling plains moist
3	ALPINE DRY TUNDRA & MOIST MEADOW	8,058	1.18%	Alpine - Young Alluvium/Colluvium/Glacial Deposits - Lower side slope dry
3	ALPINE DRY TUNDRA & MOIST MEADOW	8,001	1.17%	Alpine - Sandstone - NE facing upper side slope
3	ALPINE DRY TUNDRA & MOIST MEADOW	7,945	1.16%	Alpine - Basaltic/Mafic - NE facing ridge
3	ALPINE DRY TUNDRA & MOIST MEADOW	7,915	1.15%	Alpine - Sandstone - SW facing upper side slope
3	ALPINE DRY TUNDRA & MOIST MEADOW	7,322	1.07%	Alpine - Basaltic/Mafic - SW facing ridge
3	ALPINE DRY TUNDRA & MOIST MEADOW	7,295	1.06%	Montane - Shale - Rolling plains dry
	Total of > 1% Group	400,290		
	Group Pct of Whole	58.37%		
	Total of Whole	685,762		
	Pct of Ecoregion	3.33%		
4	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	8,308	10.58%	Foothills - Granitic/Silicic - Lower side slope dry
4	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	5,183	6.60%	Foothills - Granitic/Silicic - Rolling plains dry
4	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	3,414	4.35%	Alpine - Granitic/Silicic - Lower side slope dry
4	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	3,349	4.26%	Alpine - Granitic/Silicic - SW facing upper side slope
4	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	3,144	4.00%	Montane - Granitic/Silicic - Lower side slope dry
4	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	3,090	3.93%	Foothills - Granitic/Silicic - SW facing upper side slope
4	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	2,914	3.71%	Foothills - Granitic/Silicic - NE facing upper side slope
4	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	2,836	3.61%	Alpine - Granitic/Silicic - NE facing upper side slope
4	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	2,271	2.89%	Montane - Sandstone - Lower side slope dry
4	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	1,972	2.51%	Foothills - Granitic/Silicic - Rolling plains moist

APPENDIX 26. SOUTHERN ROCKY MOUNTAINS: Area Distribution of Ecological System - ELU Combinations (only combinations larger than 1% of ecological system area)

SYS-SORT	SYSTEM DESCRIPTION	HECTARES	PCT of WHOLE	ELU DESCRIPTION
4	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	1,869	2.38%	Montane - Granitic/Silicic - Rolling plains dry
4	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	1,819	2.32%	Montane - Granitic/Silicic - SW facing upper side slope
4	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	1,726	2.20%	Montane - Sandstone - SW facing upper side slope
4	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	1,603	2.04%	Montane - Granitic/Silicic - NE facing upper side slope
4	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	1,593	2.03%	Alpine - Young Alluvium/Colluvium/Glacial Deposits - Lower side slope dry
4	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	1,544	1.97%	Montane - Sandstone - Rolling plains dry
4	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	1,163	1.48%	Foothills - Sandstone - Lower side slope dry
4	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	1,104	1.40%	Foothills - Sandstone - SW facing upper side slope
4	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	1,077	1.37%	Alpine - Sandstone - SW facing upper side slope
4	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	1,073	1.37%	Montane - Sandstone - NE facing upper side slope
4	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	1,048	1.33%	Alpine - Sandstone - Lower side slope dry
4	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	983	1.25%	Foothills - Granitic/Silicic - Lower side slope moist
4	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	886	1.13%	Alpine - Granitic/Silicic - NE facing ridge
4	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	843	1.07%	SubAlpine - Granitic/Silicic - Lower side slope dry
4	BRISTLECONE - LIMBER PINE FOREST & WOODLAND	813	1.03%	Alpine - Granitic/Silicic - SW facing ridge
	Total of > 1% Group	55,620		
	Group Pct of Whole	70.81%		
	Total of Whole	78,547		
	Pct of Ecoregion	0.38%		
5	SPRUCE-FIR FOREST	136,647	6.03%	Alpine - Granitic/Silicic - Lower side slope dry
5	SPRUCE-FIR FOREST	133,375	5.89%	Alpine - Basaltic/Mafic - Lower side slope dry
5	SPRUCE-FIR FOREST	103,350	4.56%	Alpine - Basaltic/Mafic - NE facing upper side slope
5	SPRUCE-FIR FOREST	98,163	4.33%	Alpine - Granitic/Silicic - SW facing upper side slope
5	SPRUCE-FIR FOREST	93,652	4.13%	Alpine - Granitic/Silicic - NE facing upper side slope
5	SPRUCE-FIR FOREST	88,859	3.92%	Alpine - Basaltic/Mafic - SW facing upper side slope
5	SPRUCE-FIR FOREST	75,676	3.34%	Montane - Granitic/Silicic - Lower side slope dry
5	SPRUCE-FIR FOREST	54,747	2.42%	Alpine - Young Alluvium/Colluvium/Glacial Deposits - Lower side slope dry
5	SPRUCE-FIR FOREST	51,191	2.26%	Montane - Sandstone - Lower side slope dry
5	SPRUCE-FIR FOREST	46,292	2.04%	Alpine - Sandstone - Lower side slope dry
5	SPRUCE-FIR FOREST	45,360	2.00%	Montane - Basaltic/Mafic - Lower side slope dry
5	SPRUCE-FIR FOREST	40,329	1.78%	Alpine - Sandstone - SW facing upper side slope
5	SPRUCE-FIR FOREST	36,820	1.62%	Alpine - Sandstone - NE facing upper side slope
5	SPRUCE-FIR FOREST	35,942	1.59%	SubAlpine - Granitic/Silicic - Lower side slope dry
5	SPRUCE-FIR FOREST	33,064	1.46%	SubAlpine - Basaltic/Mafic - Lower side slope dry
5	SPRUCE-FIR FOREST	33,011	1.46%	Montane - Granitic/Silicic - NE facing upper side slope
5	SPRUCE-FIR FOREST	30,610	1.35%	Alpine - Granitic/Silicic - Lower side slope moist
5	SPRUCE-FIR FOREST	30,395	1.34%	Alpine - Basaltic/Mafic - Rolling plains dry
5	SPRUCE-FIR FOREST	29,272	1.29%	Montane - Young Alluvium/Colluvium/Glacial Deposits - Lower side slope dry
5	SPRUCE-FIR FOREST	28,172	1.24%	Montane - Sandstone - NE facing upper side slope
5	SPRUCE-FIR FOREST	28,099	1.24%	Montane - Granitic/Silicic - SW facing upper side slope
5	SPRUCE-FIR FOREST	26,969	1.19%	Alpine - Basaltic/Mafic - Lower side slope moist

APPENDIX 26. SOUTHERN ROCKY MOUNTAINS: Area Distribution of Ecological System - ELU Combinations (only combinations larger than 1% of ecological system area)

SYS-SORT	SYSTEM DESCRIPTION	HECTARES	PCT of WHOLE	ELU DESCRIPTION
	Total of > 1% Group	1,279,993		
	Group Pct of Whole	56.49%		
	Total of Whole	2,265,982		
	Pct of Ecoregion	10.99%		
6	LODGEPOLE PINE FOREST	154,468	13.88%	Montane - Granitic/Silicic - Lower side slope dry
6	LODGEPOLE PINE FOREST	80,551	7.24%	Montane - Granitic/Silicic - NE facing upper side slope
6	LODGEPOLE PINE FOREST	63,273	5.69%	Montane - Granitic/Silicic - SW facing upper side slope
6	LODGEPOLE PINE FOREST	49,874	4.48%	Alpine - Granitic/Silicic - Lower side slope dry
6	LODGEPOLE PINE FOREST	46,859	4.21%	Montane - Granitic/Silicic - Rolling plains dry
6	LODGEPOLE PINE FOREST	44,661	4.01%	Montane - Sandstone - Lower side slope dry
6	LODGEPOLE PINE FOREST	41,934	3.77%	Alpine - Granitic/Silicic - NE facing upper side slope
6	LODGEPOLE PINE FOREST	40,354	3.63%	Alpine - Granitic/Silicic - SW facing upper side slope
6	LODGEPOLE PINE FOREST	27,100	2.44%	SubAlpine - Granitic/Silicic - Lower side slope dry
6	LODGEPOLE PINE FOREST	23,803	2.14%	Montane - Granitic/Silicic - Lower side slope moist
6	LODGEPOLE PINE FOREST	22,524	2.02%	Montane - Young Alluvium/Colluvium/Glacial Deposits - Lower side slope dry
6	LODGEPOLE PINE FOREST	22,229	2.00%	Montane - Sandstone - Rolling plains dry
6	LODGEPOLE PINE FOREST	21,893	1.97%	Montane - Sandstone - NE facing upper side slope
6	LODGEPOLE PINE FOREST	19,107	1.72%	SubAlpine - Granitic/Silicic - NE facing upper side slope
6	LODGEPOLE PINE FOREST	17,340	1.56%	Montane - Granitic/Silicic - Rolling plains moist
6	LODGEPOLE PINE FOREST	16,611	1.49%	SubAlpine - Granitic/Silicic - SW facing upper side slope
6	LODGEPOLE PINE FOREST	14,177	1.27%	Montane - Sandstone - SW facing upper side slope
6	LODGEPOLE PINE FOREST	13,288	1.19%	Montane - Young Alluvium/Colluvium/Glacial Deposits - Rolling plains dry
6	LODGEPOLE PINE FOREST	11,985	1.08%	Alpine - Young Alluvium/Colluvium/Glacial Deposits - Lower side slope dry
6	LODGEPOLE PINE FOREST	11,711	1.05%	Foothills - Granitic/Silicic - Lower side slope dry
	Total of > 1% Group	743,741		
	Group Pct of Whole	66.83%		
	Total of Whole	1,112,816		
	Pct of Ecoregion	5.40%		
7	RECENT CLEARCUT CONIFER FOREST (not used)	6,024	8.77%	Montane - Granitic/Silicic - Lower side slope dry
7	RECENT CLEARCUT CONIFER FOREST (not used)	5,330	7.76%	Montane - Granitic/Silicic - Rolling plains dry
7	RECENT CLEARCUT CONIFER FOREST (not used)	4,147	6.03%	Montane - Sandstone - Rolling plains dry
7	RECENT CLEARCUT CONIFER FOREST (not used)	3,482	5.07%	Montane - Sandstone - Lower side slope dry
7	RECENT CLEARCUT CONIFER FOREST (not used)	2,596	3.78%	Montane - Granitic/Silicic - NE facing upper side slope
7	RECENT CLEARCUT CONIFER FOREST (not used)	2,151	3.13%	Montane - Granitic/Silicic - SW facing upper side slope
7	RECENT CLEARCUT CONIFER FOREST (not used)	2,075	3.02%	Montane - Granitic/Silicic - Rolling plains moist
7	RECENT CLEARCUT CONIFER FOREST (not used)	1,882	2.74%	SubAlpine - Granitic/Silicic - Lower side slope dry
7	RECENT CLEARCUT CONIFER FOREST (not used)	1,814	2.64%	Alpine - Young Alluvium/Colluvium/Glacial Deposits - Rolling plains dry
7	RECENT CLEARCUT CONIFER FOREST (not used)	1,665	2.42%	Montane - Young Alluvium/Colluvium/Glacial Deposits - Rolling plains dry
7	RECENT CLEARCUT CONIFER FOREST (not used)	1,543	2.25%	Alpine - Granitic/Silicic - SW facing upper side slope
7	RECENT CLEARCUT CONIFER FOREST (not used)	1,494	2.17%	SubAlpine - Granitic/Silicic - Rolling plains dry

APPENDIX 26. SOUTHERN ROCKY MOUNTAINS: Area Distribution of Ecological System - ELU Combinations (only combinations larger than 1% of ecological system area)

SYS-SORT	SYSTEM DESCRIPTION	HECTARES	PCT of WHOLE	ELU DESCRIPTION
7	RECENT CLEARCUT CONIFER FOREST (not used)	1,471	2.14%	Alpine - Granitic/Silicic - Lower side slope dry
7	RECENT CLEARCUT CONIFER FOREST (not used)	1,360	1.98%	Alpine - Granitic/Silicic - Rolling plains dry
7	RECENT CLEARCUT CONIFER FOREST (not used)	1,338	1.95%	Alpine - Young Alluvium/Colluvium/Glacial Deposits - Lower side slope dry
7	RECENT CLEARCUT CONIFER FOREST (not used)	1,220	1.77%	Montane - Young Alluvium/Colluvium/Glacial Deposits - Lower side slope dry
7	RECENT CLEARCUT CONIFER FOREST (not used)	1,213	1.76%	Montane - Sandstone - SW facing upper side slope
7	RECENT CLEARCUT CONIFER FOREST (not used)	1,155	1.68%	Montane - Sandstone - NE facing upper side slope
7	RECENT CLEARCUT CONIFER FOREST (not used)	1,146	1.67%	Montane - Sandstone - Rolling plains moist
7	RECENT CLEARCUT CONIFER FOREST (not used)	1,100	1.60%	SubAlpine - Granitic/Silicic - SW facing upper side slope
7	RECENT CLEARCUT CONIFER FOREST (not used)	1,083	1.58%	SubAlpine - Young Alluvium/Colluvium/Glacial Deposits - Lower side slope d
7	RECENT CLEARCUT CONIFER FOREST (not used)	1,047	1.52%	SubAlpine - Granitic/Silicic - NE facing upper side slope
7	RECENT CLEARCUT CONIFER FOREST (not used)	1,025	1.49%	Montane - Granitic/Silicic - Lower side slope moist
7	RECENT CLEARCUT CONIFER FOREST (not used)	974	1.42%	Alpine - Granitic/Silicic - NE facing upper side slope
7	RECENT CLEARCUT CONIFER FOREST (not used)	955	1.39%	Alpine - Young Alluvium/Colluvium/Glacial Deposits - NE facing upper side s
7	RECENT CLEARCUT CONIFER FOREST (not used)	827	1.20%	SubAlpine - Young Alluvium/Colluvium/Glacial Deposits - Rolling plains dry
7	RECENT CLEARCUT CONIFER FOREST (not used)	797	1.16%	SubAlpine - Sandstone - Lower side slope dry
7	RECENT CLEARCUT CONIFER FOREST (not used)	788	1.15%	SubAlpine - Sandstone - NE facing upper side slope
7	RECENT CLEARCUT CONIFER FOREST (not used)	690	1.00%	Alpine - Sandstone - SW facing upper side slope
7	RECENT CLEARCUT CONIFER FOREST (not used)	688	1.00%	SubAlpine - Granitic/Silicic - Rolling plains moist
	Total of > 1% Group	53,078		
	Group Pct of Whole	77.24%		
	Total of Whole	68,721		
	Pct of Ecoregion	0.33%		
8	ASPEN FOREST	105,381	7.58%	Montane - Sandstone - Lower side slope dry
8	ASPEN FOREST	77,349	5.56%	Montane - Shale - Lower side slope dry
8	ASPEN FOREST	55,848	4.02%	Montane - Young Alluvium/Colluvium/Glacial Deposits - Lower side slope dry
8	ASPEN FOREST	55,360	3.98%	Montane - Sandstone - SW facing upper side slope
8	ASPEN FOREST	53,075	3.82%	Montane - Sandstone - NE facing upper side slope
8	ASPEN FOREST	48,358	3.48%	Montane - Siltstone/Mudstone - Lower side slope dry
8	ASPEN FOREST	40,560	2.92%	Montane - Granitic/Silicic - Lower side slope dry
8	ASPEN FOREST	32,412	2.33%	Montane - Sandstone - Rolling plains dry
8	ASPEN FOREST	31,429	2.26%	Montane - Shale - NE facing upper side slope
8	ASPEN FOREST	29,009	2.09%	Montane - Shale - SW facing upper side slope
8	ASPEN FOREST	26,210	1.88%	Montane - Basaltic/Mafic - Lower side slope dry
8	ASPEN FOREST	23,355	1.68%	Montane - Siltstone/Mudstone - SW facing upper side slope
8	ASPEN FOREST	20,494	1.47%	Foothills - Sandstone - Lower side slope dry
8	ASPEN FOREST	20,370	1.46%	Montane - Siltstone/Mudstone - NE facing upper side slope
8	ASPEN FOREST	19,143	1.38%	Montane - Sandstone - Lower side slope moist
8	ASPEN FOREST	18,351	1.32%	Montane - Granitic/Silicic - SW facing upper side slope
8	ASPEN FOREST	18,303	1.32%	Montane - Shale - Lower side slope moist
8	ASPEN FOREST	17,896	1.29%	Alpine - Basaltic/Mafic - Lower side slope dry
8	ASPEN FOREST	17,029	1.22%	Montane - Shale - Rolling plains dry

APPENDIX 26. SOUTHERN ROCKY MOUNTAINS: Area Distribution of Ecological System - ELU Combinations (only combinations larger than 1% of ecological system area)

SYS-SORT	SYSTEM DESCRIPTION	HECTARES	PCT of WHOLE	ELU DESCRIPTION
8	ASPEN FOREST	16,542	1.19%	Montane - Young Alluvium/Colluvium/Glacial Deposits - NE facing upper side
8	ASPEN FOREST	15,894	1.14%	Montane - Sandstone - Rolling plains moist
8	ASPEN FOREST	15,170	1.09%	SubAlpine - Basaltic/Mafic - Lower side slope dry
8	ASPEN FOREST	15,057	1.08%	Foothills - Shale - Lower side slope dry
8	ASPEN FOREST	14,913	1.07%	Montane - Young Alluvium/Colluvium/Glacial Deposits - Rolling plains dry
8	ASPEN FOREST	14,829	1.07%	Montane - Young Alluvium/Colluvium/Glacial Deposits - SW facing upper sid
8	ASPEN FOREST	14,818	1.07%	Montane - Young Alluvium/Colluvium/Glacial Deposits - Lower side slope mo
	Total of > 1% Group	817,152		
	Group Pct of Whole	58.75%		
	Total of Whole	1,390,905		
	Pct of Ecoregion	6.74%		
9	MONTANE MIXED CONIFER FOREST	68,676	11.05%	Montane - Sandstone - Lower side slope dry
9	MONTANE MIXED CONIFER FOREST	53,230	8.56%	Montane - Granitic/Silicic - Lower side slope dry
9	MONTANE MIXED CONIFER FOREST	35,366	5.69%	Montane - Sandstone - NE facing upper side slope
9	MONTANE MIXED CONIFER FOREST	30,961	4.98%	Montane - Sandstone - SW facing upper side slope
9	MONTANE MIXED CONIFER FOREST	25,223	4.06%	Montane - Basaltic/Mafic - Lower side slope dry
9	MONTANE MIXED CONIFER FOREST	23,266	3.74%	Montane - Granitic/Silicic - NE facing upper side slope
9	MONTANE MIXED CONIFER FOREST	22,921	3.69%	Montane - Granitic/Silicic - SW facing upper side slope
9	MONTANE MIXED CONIFER FOREST	13,713	2.21%	Montane - Basaltic/Mafic - NE facing upper side slope
9	MONTANE MIXED CONIFER FOREST	12,666	2.04%	Montane - Basaltic/Mafic - SW facing upper side slope
9	MONTANE MIXED CONIFER FOREST	12,311	1.98%	Foothills - Sandstone - Lower side slope dry
9	MONTANE MIXED CONIFER FOREST	11,452	1.84%	Montane - Sandstone - Lower side slope moist
9	MONTANE MIXED CONIFER FOREST	10,117	1.63%	Montane - Basaltic/Mafic - Rolling plains dry
9	MONTANE MIXED CONIFER FOREST	8,900	1.43%	Montane - Sandstone - Rolling plains dry
9	MONTANE MIXED CONIFER FOREST	8,823	1.42%	Montane - Young Alluvium/Colluvium/Glacial Deposits - Lower side slope dry
9	MONTANE MIXED CONIFER FOREST	8,398	1.35%	Montane - Carbonate/Limestone - Lower side slope dry
9	MONTANE MIXED CONIFER FOREST	6,811	1.10%	Foothills - Granitic/Silicic - Lower side slope dry
9	MONTANE MIXED CONIFER FOREST	6,744	1.08%	SubAlpine - Granitic/Silicic - Lower side slope dry
9	MONTANE MIXED CONIFER FOREST	6,191	1.00%	Montane - Siltstone/Mudstone - Lower side slope dry
	Total of > 1% Group	365,768		
	Group Pct of Whole	58.83%		
	Total of Whole	621,727		
	Pct of Ecoregion	3.01%		
10	MOUNTAIN SAGEBRUSH SHRUBLAND	132,256	6.96%	Foothills - Sandstone - Rolling plains dry
10	MOUNTAIN SAGEBRUSH SHRUBLAND	118,961	6.26%	Foothills - Shale - Rolling plains dry
10	MOUNTAIN SAGEBRUSH SHRUBLAND	87,253	4.59%	Foothills - Sandstone - Lower side slope dry
10	MOUNTAIN SAGEBRUSH SHRUBLAND	73,508	3.87%	Montane - Sandstone - Rolling plains dry
10	MOUNTAIN SAGEBRUSH SHRUBLAND	68,182	3.59%	Foothills - Shale - Lower side slope dry
10	MOUNTAIN SAGEBRUSH SHRUBLAND	52,637	2.77%	Foothills - Sandstone - Rolling plains moist
10	MOUNTAIN SAGEBRUSH SHRUBLAND	49,772	2.62%	Montane - Sandstone - Lower side slope dry

APPENDIX 26. SOUTHERN ROCKY MOUNTAINS: Area Distribution of Ecological System - ELU Combinations (only combinations larger than 1% of ecological system area)

SYS-SORT	SYSTEM DESCRIPTION	HECTARES	PCT of WHOLE	ELU DESCRIPTION
10	MOUNTAIN SAGEBRUSH SHRUBLAND	48,423	2.55%	Montane - Granitic/Silicic - Lower side slope dry
10	MOUNTAIN SAGEBRUSH SHRUBLAND	47,244	2.49%	Foothills - Shale - Rolling plains moist
10	MOUNTAIN SAGEBRUSH SHRUBLAND	36,358	1.91%	Montane - Shale - Lower side slope dry
10	MOUNTAIN SAGEBRUSH SHRUBLAND	32,307	1.70%	Foothills - Shale - Flat Moist
10	MOUNTAIN SAGEBRUSH SHRUBLAND	31,768	1.67%	Montane - Basaltic/Mafic - Lower side slope dry
10	MOUNTAIN SAGEBRUSH SHRUBLAND	30,931	1.63%	Montane - Sandstone - Rolling plains moist
10	MOUNTAIN SAGEBRUSH SHRUBLAND	30,535	1.61%	Foothills - Sandstone - NE facing upper side slope
10	MOUNTAIN SAGEBRUSH SHRUBLAND	29,528	1.55%	Foothills - Sandstone - SW facing upper side slope
10	MOUNTAIN SAGEBRUSH SHRUBLAND	29,322	1.54%	Foothills - Shale - Flat Dry
10	MOUNTAIN SAGEBRUSH SHRUBLAND	28,860	1.52%	Montane - Shale - Rolling plains dry
10	MOUNTAIN SAGEBRUSH SHRUBLAND	28,430	1.50%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Flat Dry
10	MOUNTAIN SAGEBRUSH SHRUBLAND	26,855	1.41%	Montane - Sandstone - SW facing upper side slope
10	MOUNTAIN SAGEBRUSH SHRUBLAND	26,412	1.39%	Foothills - Siltstone/Mudstone - Rolling plains dry
10	MOUNTAIN SAGEBRUSH SHRUBLAND	25,703	1.35%	Foothills - Siltstone/Mudstone - Lower side slope dry
10	MOUNTAIN SAGEBRUSH SHRUBLAND	25,677	1.35%	Montane - Granitic/Silicic - SW facing upper side slope
10	MOUNTAIN SAGEBRUSH SHRUBLAND	25,605	1.35%	Foothills - Granitic/Silicic - Lower side slope dry
10	MOUNTAIN SAGEBRUSH SHRUBLAND	25,005	1.32%	Montane - Granitic/Silicic - Rolling plains dry
10	MOUNTAIN SAGEBRUSH SHRUBLAND	24,986	1.32%	Foothills - Sandstone - Flat Dry
10	MOUNTAIN SAGEBRUSH SHRUBLAND	24,655	1.30%	Foothills - Granitic/Silicic - Rolling plains dry
10	MOUNTAIN SAGEBRUSH SHRUBLAND	22,197	1.17%	Montane - Sandstone - Flat Dry
10	MOUNTAIN SAGEBRUSH SHRUBLAND	21,315	1.12%	Montane - Granitic/Silicic - NE facing upper side slope
10	MOUNTAIN SAGEBRUSH SHRUBLAND	20,627	1.09%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Rolling plains dry
10	MOUNTAIN SAGEBRUSH SHRUBLAND	20,443	1.08%	Montane - Sandstone - NE facing upper side slope
10	MOUNTAIN SAGEBRUSH SHRUBLAND	19,985	1.05%	Foothills - Sandstone - Flat Moist
10	MOUNTAIN SAGEBRUSH SHRUBLAND	19,939	1.05%	Foothills - Shale - SW facing upper side slope
	Total of > 1% Group	1,285,679		
	Group Pct of Whole	67.67%		
	Total of Whole	1,899,819		
	Pct of Ecoregion	9.21%		
11	SAGEBRUSH STEPPE	58,921	17.10%	Foothills - Basaltic/Mafic - Flat Dry
11	SAGEBRUSH STEPPE	40,904	11.87%	Foothills - Sandstone - Rolling plains dry
11	SAGEBRUSH STEPPE	37,613	10.91%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Flat Dry
11	SAGEBRUSH STEPPE	28,334	8.22%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Rolling plains dry
11	SAGEBRUSH STEPPE	16,652	4.83%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Flat Moist
11	SAGEBRUSH STEPPE	15,575	4.52%	Foothills - Basaltic/Mafic - Rolling plains dry
11	SAGEBRUSH STEPPE	14,738	4.28%	Foothills - Basaltic/Mafic - Flat Moist
11	SAGEBRUSH STEPPE	12,027	3.49%	Foothills - Sandstone - Rolling plains moist
11	SAGEBRUSH STEPPE	11,888	3.45%	Foothills - Sandstone - Lower side slope dry
11	SAGEBRUSH STEPPE	11,619	3.37%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Rolling plains moist
11	SAGEBRUSH STEPPE	9,173	2.66%	Foothills - Basaltic/Mafic - Rolling plains moist
11	SAGEBRUSH STEPPE	5,977	1.73%	Foothills - Basaltic/Mafic - Lower side slope dry

APPENDIX 26. SOUTHERN ROCKY MOUNTAINS: Area Distribution of Ecological System - ELU Combinations (only combinations larger than 1% of ecological system area)

SYS-SORT	SYSTEM DESCRIPTION	HECTARES	PCT of WHOLE	ELU DESCRIPTION
11	SAGEBRUSH STEPPE	5,946	1.73%	Montane - Basaltic/Mafic - Flat Dry
11	SAGEBRUSH STEPPE	5,169	1.50%	Foothills - Sandstone - Flat Dry
11	SAGEBRUSH STEPPE	4,842	1.41%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Lower side slope dry
11	SAGEBRUSH STEPPE	4,518	1.31%	Foothills - Sandstone - Flat Moist
11	SAGEBRUSH STEPPE	4,272	1.24%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Flat Wet
11	SAGEBRUSH STEPPE	4,095	1.19%	Foothills - Sandstone - SW facing upper side slope
11	SAGEBRUSH STEPPE	3,849	1.12%	Foothills - Shale - Rolling plains dry
	Total of > 1% Group	296,110		
	Group Pct of Whole	85.92%		
	Total of Whole	344,625		
	Pct of Ecoregion	1.67%		
12	MONTANE GRASSLAND	27,251	5.12%	Montane - Basaltic/Mafic - Rolling plains dry
12	MONTANE GRASSLAND	26,313	4.95%	Montane - Basaltic/Mafic - Lower side slope dry
12	MONTANE GRASSLAND	19,602	3.68%	Montane - Sandstone - Rolling plains dry
12	MONTANE GRASSLAND	18,236	3.43%	Montane - Siltstone/Mudstone - Rolling plains dry
12	MONTANE GRASSLAND	16,889	3.17%	Montane - Granitic/Silicic - Lower side slope dry
12	MONTANE GRASSLAND	16,129	3.03%	Montane - Granitic/Silicic - Rolling plains dry
12	MONTANE GRASSLAND	13,235	2.49%	Montane - Young Alluvium/Colluvium/Glacial Deposits - Rolling plains dry
12	MONTANE GRASSLAND	11,840	2.23%	Montane - Basaltic/Mafic - Rolling plains moist
12	MONTANE GRASSLAND	10,895	2.05%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Flat Dry
12	MONTANE GRASSLAND	10,402	1.95%	Montane - Sandstone - Rolling plains moist
12	MONTANE GRASSLAND	10,164	1.91%	Montane - Young Alluvium/Colluvium/Glacial Deposits - Rolling plains moist
12	MONTANE GRASSLAND	9,940	1.87%	Montane - Young Alluvium/Colluvium/Glacial Deposits - Flat Moist
12	MONTANE GRASSLAND	9,365	1.76%	Montane - Sandstone - Flat Moist
12	MONTANE GRASSLAND	9,320	1.75%	Montane - Sandstone - Lower side slope dry
12	MONTANE GRASSLAND	8,712	1.64%	Foothills - Sandstone - Rolling plains dry
12	MONTANE GRASSLAND	8,096	1.52%	Montane - Basaltic/Mafic - SW facing upper side slope
12	MONTANE GRASSLAND	8,014	1.51%	Foothills - Granitic/Silicic - Lower side slope dry
12	MONTANE GRASSLAND	7,663	1.44%	Montane - Shale - Rolling plains dry
12	MONTANE GRASSLAND	7,552	1.42%	Montane - Young Alluvium/Colluvium/Glacial Deposits - Flat Dry
12	MONTANE GRASSLAND	7,331	1.38%	Montane - Granitic/Silicic - Rolling plains moist
12	MONTANE GRASSLAND	7,283	1.37%	Montane - Sandstone - Flat Dry
12	MONTANE GRASSLAND	7,200	1.35%	Montane - Siltstone/Mudstone - Lower side slope dry
12	MONTANE GRASSLAND	6,947	1.31%	Montane - Basaltic/Mafic - NE facing upper side slope
12	MONTANE GRASSLAND	6,197	1.16%	Foothills - Granitic/Silicic - Rolling plains dry
12	MONTANE GRASSLAND	5,974	1.12%	Montane - Siltstone/Mudstone - Rolling plains moist
12	MONTANE GRASSLAND	5,707	1.07%	Montane - Old Alluvium - Rolling plains dry
12	MONTANE GRASSLAND	5,417	1.02%	Montane - Shale - Rolling plains moist
12	MONTANE GRASSLAND	5,386	1.01%	Montane - Shale - Flat Moist
12	MONTANE GRASSLAND	5,365	1.01%	SubAlpine - Basaltic/Mafic - Lower side slope dry
	Total of > 1% Group	312,424		

APPENDIX 26. SOUTHERN ROCKY MOUNTAINS: Area Distribution of Ecological System - ELU Combinations (only combinations larger than 1% of ecological system area)

SYS-SORT	SYSTEM DESCRIPTION	HECTARES	PCT of WHOLE	ELU DESCRIPTION
	Group Pct of Whole	58.72%		
	Total of Whole	532,073		
	Pct of Ecoregion	2.58%		
13	UPPER MONTANE RIPARIAN FOREST & WOODLAND (no	7,891	14.63%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Flat Moist
13	UPPER MONTANE RIPARIAN FOREST & WOODLAND (no	5,663	10.50%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Flat Dry
13	UPPER MONTANE RIPARIAN FOREST & WOODLAND (no	5,600	10.38%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Rolling plains dry
13	UPPER MONTANE RIPARIAN FOREST & WOODLAND (no	3,135	5.81%	Foothills - Shale - Rolling plains dry
13	UPPER MONTANE RIPARIAN FOREST & WOODLAND (no	2,560	4.75%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Flat Wet
13	UPPER MONTANE RIPARIAN FOREST & WOODLAND (no	2,424	4.49%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Rolling plains moist
13	UPPER MONTANE RIPARIAN FOREST & WOODLAND (no	2,098	3.89%	Foothills - Sandstone - Rolling plains dry
13	UPPER MONTANE RIPARIAN FOREST & WOODLAND (no	1,948	3.61%	Foothills - Shale - Flat Moist
13	UPPER MONTANE RIPARIAN FOREST & WOODLAND (no	1,629	3.02%	Foothills - Shale - Rolling plains moist
13	UPPER MONTANE RIPARIAN FOREST & WOODLAND (no	1,610	2.98%	Foothills - Shale - Lower side slope dry
13	UPPER MONTANE RIPARIAN FOREST & WOODLAND (no	1,543	2.86%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Lower side slope dry
13	UPPER MONTANE RIPARIAN FOREST & WOODLAND (no	1,322	2.45%	Foothills - Shale - Flat Dry
13	UPPER MONTANE RIPARIAN FOREST & WOODLAND (no	1,189	2.20%	Foothills - Sandstone - Lower side slope dry
13	UPPER MONTANE RIPARIAN FOREST & WOODLAND (no	1,113	2.06%	Foothills - Sandstone - Flat Moist
13	UPPER MONTANE RIPARIAN FOREST & WOODLAND (no	971	1.80%	Foothills - Sandstone - Rolling plains moist
13	UPPER MONTANE RIPARIAN FOREST & WOODLAND (no	779	1.44%	Foothills - Shale - Flat Wet
13	UPPER MONTANE RIPARIAN FOREST & WOODLAND (no	632	1.17%	Foothills - Granitic/Silicic - Lower side slope dry
13	UPPER MONTANE RIPARIAN FOREST & WOODLAND (no	598	1.11%	Foothills - Sandstone - Flat Dry
13	UPPER MONTANE RIPARIAN FOREST & WOODLAND (no	561	1.04%	Montane - Shale - Lower side slope dry
	Total of > 1% Group	43,262		
	Group Pct of Whole	80.22%		
	Total of Whole	53,931		
	Pct of Ecoregion	0.26%		
14	MONTANE RIPARIAN SHRUBLAND (not used)	2,507	8.81%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Flat Moist
14	MONTANE RIPARIAN SHRUBLAND (not used)	2,120	7.45%	Foothills - Sandstone - Rolling plains dry
14	MONTANE RIPARIAN SHRUBLAND (not used)	1,568	5.51%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Rolling plains dry
14	MONTANE RIPARIAN SHRUBLAND (not used)	1,532	5.39%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Flat Dry
14	MONTANE RIPARIAN SHRUBLAND (not used)	1,214	4.27%	Foothills - Granitic/Silicic - Lower side slope dry
14	MONTANE RIPARIAN SHRUBLAND (not used)	986	3.47%	Foothills - Shale - Rolling plains dry
14	MONTANE RIPARIAN SHRUBLAND (not used)	977	3.43%	Montane - Young Alluvium/Colluvium/Glacial Deposits - Flat Moist
14	MONTANE RIPARIAN SHRUBLAND (not used)	811	2.85%	Foothills - Sandstone - Lower side slope dry
14	MONTANE RIPARIAN SHRUBLAND (not used)	734	2.58%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Flat Wet
14	MONTANE RIPARIAN SHRUBLAND (not used)	677	2.38%	Foothills - Sandstone - Rolling plains moist
14	MONTANE RIPARIAN SHRUBLAND (not used)	668	2.35%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Rolling plains moist
14	MONTANE RIPARIAN SHRUBLAND (not used)	645	2.27%	Foothills - Granitic/Silicic - Rolling plains dry
14	MONTANE RIPARIAN SHRUBLAND (not used)	630	2.21%	Foothills - Shale - Flat Moist
14	MONTANE RIPARIAN SHRUBLAND (not used)	626	2.20%	Foothills - Carbonate/Limestone - Flat Moist

APPENDIX 26. SOUTHERN ROCKY MOUNTAINS: Area Distribution of Ecological System - ELU Combinations (only combinations larger than 1% of ecological system area)

SYS-SORT	SYSTEM DESCRIPTION	HECTARES	PCT of WHOLE	ELU DESCRIPTION
14	MONTANE RIPARIAN SHRUBLAND (not used)	588	2.07%	Montane - Granitic/Silicic - Lower side slope dry
14	MONTANE RIPARIAN SHRUBLAND (not used)	566	1.99%	Foothills - Shale - Flat Dry
14	MONTANE RIPARIAN SHRUBLAND (not used)	551	1.94%	Foothills - Sandstone - Flat Dry
14	MONTANE RIPARIAN SHRUBLAND (not used)	547	1.92%	Foothills - Sandstone - Flat Moist
14	MONTANE RIPARIAN SHRUBLAND (not used)	526	1.85%	Montane - Sandstone - Flat Dry
14	MONTANE RIPARIAN SHRUBLAND (not used)	407	1.43%	Montane - Young Alluvium/Colluvium/Glacial Deposits - Lower side slope dry
14	MONTANE RIPARIAN SHRUBLAND (not used)	406	1.43%	Montane - Sandstone - Flat Moist
14	MONTANE RIPARIAN SHRUBLAND (not used)	392	1.38%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Lower side slope dry
14	MONTANE RIPARIAN SHRUBLAND (not used)	381	1.34%	Foothills - Shale - Rolling plains moist
14	MONTANE RIPARIAN SHRUBLAND (not used)	363	1.28%	Foothills - Shale - Lower side slope dry
14	MONTANE RIPARIAN SHRUBLAND (not used)	326	1.15%	Alpine - Granitic/Silicic - Lower side slope dry
14	MONTANE RIPARIAN SHRUBLAND (not used)	311	1.09%	Foothills - Carbonate/Limestone - Flat Dry
14	MONTANE RIPARIAN SHRUBLAND (not used)	306	1.08%	Foothills - Granitic/Silicic - Rolling plains moist
	Total of > 1% Group	21,361		
	Group Pct of Whole	75.10%		
	Total of Whole	28,445		
	Pct of Ecoregion	0.14%		
15	DOUGLAS FIR - PONDEROSA PINE FOREST	44,208	11.27%	Montane - Granitic/Silicic - Lower side slope dry
15	DOUGLAS FIR - PONDEROSA PINE FOREST	30,382	7.75%	Montane - Basaltic/Mafic - Lower side slope dry
15	DOUGLAS FIR - PONDEROSA PINE FOREST	28,422	7.25%	Foothills - Granitic/Silicic - Lower side slope dry
15	DOUGLAS FIR - PONDEROSA PINE FOREST	25,234	6.44%	Montane - Granitic/Silicic - NE facing upper side slope
15	DOUGLAS FIR - PONDEROSA PINE FOREST	21,126	5.39%	Montane - Granitic/Silicic - SW facing upper side slope
15	DOUGLAS FIR - PONDEROSA PINE FOREST	13,145	3.35%	Montane - Basaltic/Mafic - NE facing upper side slope
15	DOUGLAS FIR - PONDEROSA PINE FOREST	11,955	3.05%	Foothills - Granitic/Silicic - NE facing upper side slope
15	DOUGLAS FIR - PONDEROSA PINE FOREST	9,771	2.49%	Montane - Granitic/Silicic - Rolling plains dry
15	DOUGLAS FIR - PONDEROSA PINE FOREST	8,989	2.29%	Montane - Basaltic/Mafic - SW facing upper side slope
15	DOUGLAS FIR - PONDEROSA PINE FOREST	8,818	2.25%	Foothills - Granitic/Silicic - SW facing upper side slope
15	DOUGLAS FIR - PONDEROSA PINE FOREST	7,140	1.82%	Montane - Young Alluvium/Colluvium/Glacial Deposits - Lower side slope dry
15	DOUGLAS FIR - PONDEROSA PINE FOREST	6,210	1.58%	Montane - Sandstone - Lower side slope dry
15	DOUGLAS FIR - PONDEROSA PINE FOREST	5,442	1.39%	Alpine - Basaltic/Mafic - NE facing upper side slope
15	DOUGLAS FIR - PONDEROSA PINE FOREST	5,414	1.38%	SubAlpine - Basaltic/Mafic - NE facing upper side slope
15	DOUGLAS FIR - PONDEROSA PINE FOREST	5,294	1.35%	SubAlpine - Basaltic/Mafic - Lower side slope dry
15	DOUGLAS FIR - PONDEROSA PINE FOREST	4,952	1.26%	Alpine - Granitic/Silicic - Lower side slope dry
15	DOUGLAS FIR - PONDEROSA PINE FOREST	4,689	1.20%	Montane - Granitic/Silicic - Lower side slope moist
15	DOUGLAS FIR - PONDEROSA PINE FOREST	4,588	1.17%	Alpine - Granitic/Silicic - SW facing upper side slope
15	DOUGLAS FIR - PONDEROSA PINE FOREST	4,481	1.14%	SubAlpine - Basaltic/Mafic - SW facing upper side slope
15	DOUGLAS FIR - PONDEROSA PINE FOREST	4,350	1.11%	Alpine - Basaltic/Mafic - SW facing upper side slope
15	DOUGLAS FIR - PONDEROSA PINE FOREST	4,333	1.11%	Montane - Basaltic/Mafic - Lower side slope moist
15	DOUGLAS FIR - PONDEROSA PINE FOREST	4,237	1.08%	Alpine - Granitic/Silicic - NE facing upper side slope
15	DOUGLAS FIR - PONDEROSA PINE FOREST	4,179	1.07%	Montane - Sandstone - NE facing upper side slope
	Total of > 1% Group	267,356		

APPENDIX 26. SOUTHERN ROCKY MOUNTAINS: Area Distribution of Ecological System - ELU Combinations (only combinations larger than 1% of ecological system area)

SYS-SORT	SYSTEM DESCRIPTION	HECTARES	PCT of WHOLE	ELU DESCRIPTION
	Group Pct of Whole	68.19%		
	Total of Whole	392,097		
	Pct of Ecoregion	1.90%		
16	PONDEROSA PINE WOODLAND	166,836	7.96%	Foothills - Granitic/Silicic - Lower side slope dry
16	PONDEROSA PINE WOODLAND	136,481	6.51%	Montane - Granitic/Silicic - Lower side slope dry
16	PONDEROSA PINE WOODLAND	133,996	6.39%	Foothills - Sandstone - Lower side slope dry
16	PONDEROSA PINE WOODLAND	71,227	3.40%	Foothills - Granitic/Silicic - NE facing upper side slope
16	PONDEROSA PINE WOODLAND	69,219	3.30%	Montane - Sandstone - Lower side slope dry
16	PONDEROSA PINE WOODLAND	67,980	3.24%	Montane - Granitic/Silicic - SW facing upper side slope
16	PONDEROSA PINE WOODLAND	67,495	3.22%	Montane - Granitic/Silicic - NE facing upper side slope
16	PONDEROSA PINE WOODLAND	62,643	2.99%	Foothills - Shale - Lower side slope dry
16	PONDEROSA PINE WOODLAND	56,471	2.69%	Foothills - Granitic/Silicic - SW facing upper side slope
16	PONDEROSA PINE WOODLAND	54,352	2.59%	Montane - Basaltic/Mafic - Lower side slope dry
16	PONDEROSA PINE WOODLAND	53,484	2.55%	Foothills - Sandstone - Rolling plains dry
16	PONDEROSA PINE WOODLAND	52,589	2.51%	Foothills - Sandstone - NE facing upper side slope
16	PONDEROSA PINE WOODLAND	46,109	2.20%	Foothills - Sandstone - SW facing upper side slope
16	PONDEROSA PINE WOODLAND	45,627	2.18%	Montane - Granitic/Silicic - Rolling plains dry
16	PONDEROSA PINE WOODLAND	41,539	1.98%	Montane - Sandstone - Rolling plains dry
16	PONDEROSA PINE WOODLAND	37,253	1.78%	Montane - Sandstone - SW facing upper side slope
16	PONDEROSA PINE WOODLAND	35,771	1.71%	Montane - Sandstone - NE facing upper side slope
16	PONDEROSA PINE WOODLAND	32,248	1.54%	Foothills - Siltstone/Mudstone - Lower side slope dry
16	PONDEROSA PINE WOODLAND	28,720	1.37%	Foothills - Granitic/Silicic - Rolling plains dry
16	PONDEROSA PINE WOODLAND	26,458	1.26%	Foothills - Shale - Rolling plains dry
16	PONDEROSA PINE WOODLAND	25,607	1.22%	Montane - Basaltic/Mafic - Rolling plains dry
16	PONDEROSA PINE WOODLAND	24,659	1.18%	Montane - Basaltic/Mafic - NE facing upper side slope
16	PONDEROSA PINE WOODLAND	24,403	1.16%	Foothills - Sandstone - Rolling plains moist
16	PONDEROSA PINE WOODLAND	22,929	1.09%	Foothills - Shale - SW facing upper side slope
16	PONDEROSA PINE WOODLAND	22,608	1.08%	Montane - Sandstone - Rolling plains moist
16	PONDEROSA PINE WOODLAND	21,287	1.02%	Foothills - Carbonate/Limestone - Lower side slope dry
	Total of > 1% Group	1,427,988		
	Group Pct of Whole	68.10%		
	Total of Whole	2,097,019		
	Pct of Ecoregion	10.17%		
17	PINYON - JUNIPER WOODLAND	219,347	9.32%	Foothills - Sandstone - Lower side slope dry
17	PINYON - JUNIPER WOODLAND	143,359	6.09%	Foothills - Sandstone - Rolling plains dry
17	PINYON - JUNIPER WOODLAND	132,725	5.64%	Foothills - Shale - Lower side slope dry
17	PINYON - JUNIPER WOODLAND	109,787	4.67%	Foothills - Siltstone/Mudstone - Lower side slope dry
17	PINYON - JUNIPER WOODLAND	91,759	3.90%	Foothills - Siltstone/Mudstone - Rolling plains dry
17	PINYON - JUNIPER WOODLAND	90,185	3.83%	Foothills - Sandstone - SW facing upper side slope
17	PINYON - JUNIPER WOODLAND	86,078	3.66%	Foothills - Sandstone - NE facing upper side slope

APPENDIX 26. SOUTHERN ROCKY MOUNTAINS: Area Distribution of Ecological System - ELU Combinations
(only combinations larger than 1% of ecological system area)

SYS-SORT	SYSTEM DESCRIPTION	HECTARES	PCT of WHOLE	ELU DESCRIPTION
17	PINYON - JUNIPER WOODLAND	77,189	3.28%	Foothills - Shale - Rolling plains dry
17	PINYON - JUNIPER WOODLAND	66,827	2.84%	Foothills - Granitic/Silicic - Lower side slope dry
17	PINYON - JUNIPER WOODLAND	61,612	2.62%	Foothills - Sandstone - Rolling plains moist
17	PINYON - JUNIPER WOODLAND	57,837	2.46%	Foothills - Shale - SW facing upper side slope
17	PINYON - JUNIPER WOODLAND	51,253	2.18%	Foothills - Shale - NE facing upper side slope
17	PINYON - JUNIPER WOODLAND	45,149	1.92%	Foothills - Siltstone/Mudstone - SW facing upper side slope
17	PINYON - JUNIPER WOODLAND	43,069	1.83%	Montane - Basaltic/Mafic - Lower side slope dry
17	PINYON - JUNIPER WOODLAND	41,489	1.76%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Lower side slope dry
17	PINYON - JUNIPER WOODLAND	41,004	1.74%	Montane - Granitic/Silicic - Lower side slope dry
17	PINYON - JUNIPER WOODLAND	40,418	1.72%	Foothills - Siltstone/Mudstone - Rolling plains moist
17	PINYON - JUNIPER WOODLAND	37,730	1.60%	Foothills - Siltstone/Mudstone - NE facing upper side slope
17	PINYON - JUNIPER WOODLAND	35,752	1.52%	Foothills - Shale - Rolling plains moist
17	PINYON - JUNIPER WOODLAND	30,254	1.29%	Foothills - Basaltic/Mafic - Lower side slope dry
17	PINYON - JUNIPER WOODLAND	29,079	1.24%	Foothills - Granitic/Silicic - SW facing upper side slope
17	PINYON - JUNIPER WOODLAND	27,627	1.17%	Montane - Granitic/Silicic - SW facing upper side slope
17	PINYON - JUNIPER WOODLAND	26,324	1.12%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Rolling plains dry
17	PINYON - JUNIPER WOODLAND	23,589	1.00%	Foothills - Granitic/Silicic - NE facing upper side slope
	Total of > 1% Group	1,609,439		
	Group Pct of Whole	68.39%		
	Total of Whole	2,353,307		
	Pct of Ecoregion	11.41%		
18	JUNIPER SAVANNA	38,117	7.77%	Foothills - Sandstone - Lower side slope dry
18	JUNIPER SAVANNA	30,148	6.15%	Foothills - Sandstone - Rolling plains dry
18	JUNIPER SAVANNA	22,371	4.56%	Foothills - Siltstone/Mudstone - Rolling plains dry
18	JUNIPER SAVANNA	22,173	4.52%	Foothills - Siltstone/Mudstone - Lower side slope dry
18	JUNIPER SAVANNA	21,412	4.36%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Rolling plains dry
18	JUNIPER SAVANNA	16,643	3.39%	Foothills - Basaltic/Mafic - Flat Dry
18	JUNIPER SAVANNA	15,878	3.24%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Lower side slope dry
18	JUNIPER SAVANNA	15,370	3.13%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Flat Dry
18	JUNIPER SAVANNA	15,245	3.11%	Foothills - Basaltic/Mafic - Rolling plains dry
18	JUNIPER SAVANNA	14,001	2.85%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Flat Moist
18	JUNIPER SAVANNA	13,990	2.85%	Foothills - Shale - Rolling plains dry
18	JUNIPER SAVANNA	13,970	2.85%	Foothills - Sandstone - NE facing upper side slope
18	JUNIPER SAVANNA	13,476	2.75%	Foothills - Sandstone - SW facing upper side slope
18	JUNIPER SAVANNA	12,016	2.45%	Foothills - Shale - Lower side slope dry
18	JUNIPER SAVANNA	11,791	2.40%	Foothills - Basaltic/Mafic - Lower side slope dry
18	JUNIPER SAVANNA	11,620	2.37%	Foothills - Sandstone - Rolling plains moist
18	JUNIPER SAVANNA	11,601	2.36%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Rolling plains moist
18	JUNIPER SAVANNA	10,969	2.24%	Foothills - Siltstone/Mudstone - Rolling plains moist
18	JUNIPER SAVANNA	8,704	1.77%	Foothills - Siltstone/Mudstone - SW facing upper side slope
18	JUNIPER SAVANNA	7,829	1.60%	Foothills - Carbonate/Limestone - Rolling plains dry

APPENDIX 26. SOUTHERN ROCKY MOUNTAINS: Area Distribution of Ecological System - ELU Combinations (only combinations larger than 1% of ecological system area)

SYS-SORT	SYSTEM DESCRIPTION	HECTARES	PCT of WHOLE	ELU DESCRIPTION
18	JUNIPER SAVANNA	7,529	1.53%	Foothills - Granitic/Silicic - Lower side slope dry
18	JUNIPER SAVANNA	7,222	1.47%	Foothills - Basaltic/Mafic - Rolling plains moist
18	JUNIPER SAVANNA	6,269	1.28%	Foothills - Siltstone/Mudstone - NE facing upper side slope
18	JUNIPER SAVANNA	6,203	1.26%	Foothills - Basaltic/Mafic - SW facing upper side slope
18	JUNIPER SAVANNA	6,143	1.25%	Foothills - Basaltic/Mafic - NE facing upper side slope
18	JUNIPER SAVANNA	5,599	1.14%	Foothills - Shale - Rolling plains moist
18	JUNIPER SAVANNA	5,427	1.11%	Foothills - Siltstone/Mudstone - Flat Moist
18	JUNIPER SAVANNA	5,144	1.05%	Foothills - Shale - NE facing upper side slope
18	JUNIPER SAVANNA	4,914	1.00%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - SW facing upper sid
	Total of > 1% Group	381,770		
	Group Pct of Whole	77.82%		
	Total of Whole	490,596		
	Pct of Ecoregion	2.38%		
19	LOWER MONTANE - FOOTHILLS SHRUBLAND	48,786	5.42%	Foothills - Sandstone - Lower side slope dry
19	LOWER MONTANE - FOOTHILLS SHRUBLAND	31,540	3.50%	Foothills - Granitic/Silicic - Lower side slope dry
19	LOWER MONTANE - FOOTHILLS SHRUBLAND	31,153	3.46%	Foothills - Sandstone - Rolling plains dry
19	LOWER MONTANE - FOOTHILLS SHRUBLAND	26,691	2.96%	Foothills - Shale - Lower side slope dry
19	LOWER MONTANE - FOOTHILLS SHRUBLAND	22,457	2.49%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Flat Dry
19	LOWER MONTANE - FOOTHILLS SHRUBLAND	21,597	2.40%	Foothills - Shale - Rolling plains dry
19	LOWER MONTANE - FOOTHILLS SHRUBLAND	20,265	2.25%	Foothills - Sandstone - NE facing upper side slope
19	LOWER MONTANE - FOOTHILLS SHRUBLAND	18,740	2.08%	Foothills - Siltstone/Mudstone - Lower side slope dry
19	LOWER MONTANE - FOOTHILLS SHRUBLAND	17,756	1.97%	Montane - Sandstone - Lower side slope dry
19	LOWER MONTANE - FOOTHILLS SHRUBLAND	15,910	1.77%	Montane - Basaltic/Mafic - Lower side slope dry
19	LOWER MONTANE - FOOTHILLS SHRUBLAND	15,488	1.72%	Foothills - Sandstone - SW facing upper side slope
19	LOWER MONTANE - FOOTHILLS SHRUBLAND	15,012	1.67%	Montane - Granitic/Silicic - Lower side slope dry
19	LOWER MONTANE - FOOTHILLS SHRUBLAND	13,803	1.53%	Foothills - Granitic/Silicic - NE facing upper side slope
19	LOWER MONTANE - FOOTHILLS SHRUBLAND	13,314	1.48%	Montane - Sandstone - SW facing upper side slope
19	LOWER MONTANE - FOOTHILLS SHRUBLAND	12,690	1.41%	Alpine - Sandstone - Lower side slope dry
19	LOWER MONTANE - FOOTHILLS SHRUBLAND	12,144	1.35%	Alpine - Granitic/Silicic - Lower side slope dry
19	LOWER MONTANE - FOOTHILLS SHRUBLAND	11,976	1.33%	Montane - Shale - Lower side slope dry
19	LOWER MONTANE - FOOTHILLS SHRUBLAND	11,590	1.29%	Foothills - Sandstone - Rolling plains moist
19	LOWER MONTANE - FOOTHILLS SHRUBLAND	11,217	1.25%	Foothills - Granitic/Silicic - Rolling plains dry
19	LOWER MONTANE - FOOTHILLS SHRUBLAND	10,413	1.16%	Foothills - Granitic/Silicic - SW facing upper side slope
19	LOWER MONTANE - FOOTHILLS SHRUBLAND	10,111	1.12%	Montane - Sandstone - NE facing upper side slope
19	LOWER MONTANE - FOOTHILLS SHRUBLAND	9,939	1.10%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Lower side slope dry
19	LOWER MONTANE - FOOTHILLS SHRUBLAND	9,341	1.04%	Alpine - Basaltic/Mafic - Lower side slope dry
19	LOWER MONTANE - FOOTHILLS SHRUBLAND	9,126	1.01%	Foothills - Shale - Rolling plains moist
	Total of > 1% Group	421,055		
	Group Pct of Whole	46.74%		
	Total of Whole	900,753		
	Pct of Ecoregion	4.37%		

APPENDIX 26. SOUTHERN ROCKY MOUNTAINS: Area Distribution of Ecological System - ELU Combinations (only combinations larger than 1% of ecological system area)

SYS-SORT	SYSTEM DESCRIPTION	HECTARES	PCT of WHOLE	ELU DESCRIPTION
20	GAMBEL'S OAK SHRUBLAND	66,792	9.21%	Foothills - Sandstone - Lower side slope dry
20	GAMBEL'S OAK SHRUBLAND	60,684	8.37%	Foothills - Shale - Lower side slope dry
20	GAMBEL'S OAK SHRUBLAND	31,828	4.39%	Montane - Shale - Lower side slope dry
20	GAMBEL'S OAK SHRUBLAND	28,265	3.90%	Foothills - Sandstone - NE facing upper side slope
20	GAMBEL'S OAK SHRUBLAND	25,749	3.55%	Foothills - Sandstone - Rolling plains dry
20	GAMBEL'S OAK SHRUBLAND	24,968	3.44%	Foothills - Siltstone/Mudstone - Lower side slope dry
20	GAMBEL'S OAK SHRUBLAND	23,824	3.28%	Foothills - Sandstone - SW facing upper side slope
20	GAMBEL'S OAK SHRUBLAND	21,165	2.92%	Montane - Sandstone - Lower side slope dry
20	GAMBEL'S OAK SHRUBLAND	20,945	2.89%	Foothills - Shale - NE facing upper side slope
20	GAMBEL'S OAK SHRUBLAND	20,818	2.87%	Montane - Shale - SW facing upper side slope
20	GAMBEL'S OAK SHRUBLAND	19,867	2.74%	Montane - Sandstone - SW facing upper side slope
20	GAMBEL'S OAK SHRUBLAND	19,116	2.64%	Montane - Sandstone - NE facing upper side slope
20	GAMBEL'S OAK SHRUBLAND	18,347	2.53%	Montane - Shale - NE facing upper side slope
20	GAMBEL'S OAK SHRUBLAND	16,877	2.33%	Foothills - Shale - SW facing upper side slope
20	GAMBEL'S OAK SHRUBLAND	15,438	2.13%	Foothills - Shale - Rolling plains dry
20	GAMBEL'S OAK SHRUBLAND	14,556	2.01%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Lower side slope dry
20	GAMBEL'S OAK SHRUBLAND	13,447	1.85%	Montane - Young Alluvium/Colluvium/Glacial Deposits - Lower side slope dry
20	GAMBEL'S OAK SHRUBLAND	11,525	1.59%	Foothills - Sandstone - Rolling plains moist
20	GAMBEL'S OAK SHRUBLAND	11,313	1.56%	Montane - Siltstone/Mudstone - Lower side slope dry
20	GAMBEL'S OAK SHRUBLAND	10,403	1.43%	Montane - Sandstone - Rolling plains dry
20	GAMBEL'S OAK SHRUBLAND	10,374	1.43%	Montane - Shale - Rolling plains dry
20	GAMBEL'S OAK SHRUBLAND	9,021	1.24%	Foothills - Shale - Rolling plains moist
20	GAMBEL'S OAK SHRUBLAND	8,997	1.24%	Foothills - Sandstone - Lower side slope moist
20	GAMBEL'S OAK SHRUBLAND	8,374	1.15%	Foothills - Shale - Lower side slope moist
20	GAMBEL'S OAK SHRUBLAND	8,161	1.12%	Foothills - Siltstone/Mudstone - NE facing upper side slope
20	GAMBEL'S OAK SHRUBLAND	8,029	1.11%	Montane - Siltstone/Mudstone - SW facing upper side slope
20	GAMBEL'S OAK SHRUBLAND	7,331	1.01%	Montane - Shale - Lower side slope moist
	Total of > 1% Group	536,209		
	Group Pct of Whole	73.92%		
	Total of Whole	725,427		
	Pct of Ecoregion	3.52%		
21	WINTERFAT SHRUB STEPPE	38,410	9.77%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Flat Dry
21	WINTERFAT SHRUB STEPPE	35,514	9.03%	Foothills - Shale - Rolling plains dry
21	WINTERFAT SHRUB STEPPE	24,722	6.29%	Foothills - Sandstone - Rolling plains dry
21	WINTERFAT SHRUB STEPPE	20,956	5.33%	Foothills - Shale - Lower side slope dry
21	WINTERFAT SHRUB STEPPE	18,688	4.75%	Foothills - Shale - Flat Moist
21	WINTERFAT SHRUB STEPPE	16,130	4.10%	Foothills - Shale - Rolling plains moist
21	WINTERFAT SHRUB STEPPE	14,246	3.62%	Montane - Basaltic/Mafic - Rolling plains dry
21	WINTERFAT SHRUB STEPPE	14,105	3.59%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Rolling plains dry
21	WINTERFAT SHRUB STEPPE	13,093	3.33%	Foothills - Sandstone - Lower side slope dry

APPENDIX 26. SOUTHERN ROCKY MOUNTAINS: Area Distribution of Ecological System - ELU Combinations (only combinations larger than 1% of ecological system area)

SYS-SORT	SYSTEM DESCRIPTION	HECTARES	PCT of WHOLE	ELU DESCRIPTION
21	WINTERFAT SHRUB STEPPE	11,016	2.80%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Flat Moist
21	WINTERFAT SHRUB STEPPE	10,112	2.57%	Montane - Basaltic/Mafic - Lower side slope dry
21	WINTERFAT SHRUB STEPPE	9,661	2.46%	Foothills - Shale - Flat Dry
21	WINTERFAT SHRUB STEPPE	8,909	2.27%	Foothills - Sandstone - Rolling plains moist
21	WINTERFAT SHRUB STEPPE	7,661	1.95%	Foothills - Basaltic/Mafic - Flat Dry
21	WINTERFAT SHRUB STEPPE	7,360	1.87%	Foothills - Shale - SW facing upper side slope
21	WINTERFAT SHRUB STEPPE	6,703	1.70%	Foothills - Siltstone/Mudstone - Rolling plains dry
21	WINTERFAT SHRUB STEPPE	6,385	1.62%	Montane - Basaltic/Mafic - Rolling plains moist
21	WINTERFAT SHRUB STEPPE	6,336	1.61%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Rolling plains moist
21	WINTERFAT SHRUB STEPPE	5,256	1.34%	Foothills - Shale - NE facing upper side slope
21	WINTERFAT SHRUB STEPPE	4,734	1.20%	Foothills - Old Alluvium - Rolling plains dry
21	WINTERFAT SHRUB STEPPE	4,636	1.18%	Montane - Young Alluvium/Colluvium/Glacial Deposits - Rolling plains dry
21	WINTERFAT SHRUB STEPPE	4,550	1.16%	Foothills - Sandstone - SW facing upper side slope
21	WINTERFAT SHRUB STEPPE	4,505	1.15%	Montane - Basaltic/Mafic - Flat Dry
21	WINTERFAT SHRUB STEPPE	4,302	1.09%	Foothills - Basaltic/Mafic - Rolling plains dry
21	WINTERFAT SHRUB STEPPE	4,111	1.05%	Foothills - Sandstone - NE facing upper side slope
21	WINTERFAT SHRUB STEPPE	4,083	1.04%	Montane - Young Alluvium/Colluvium/Glacial Deposits - Flat Dry
	Total of > 1% Group	306,181		
	Group Pct of Whole	77.86%		
	Total of Whole	393,247		
	Pct of Ecoregion	1.91%		
22	GREASEWOOD FLAT & EPHEMERAL MEADOW COMPLE	114,912	59.58%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Flat Dry
22	GREASEWOOD FLAT & EPHEMERAL MEADOW COMPLE	36,482	18.92%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Flat Moist
22	GREASEWOOD FLAT & EPHEMERAL MEADOW COMPLE	13,763	7.14%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Flat Wet
22	GREASEWOOD FLAT & EPHEMERAL MEADOW COMPLE	9,657	5.01%	Foothills - Eolian Sand - Flat Dry
22	GREASEWOOD FLAT & EPHEMERAL MEADOW COMPLE	2,905	1.51%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Rolling plains dry
22	GREASEWOOD FLAT & EPHEMERAL MEADOW COMPLE	2,256	1.17%	Foothills - Eolian Sand - Flat Moist
	Total of > 1% Group	179,975		
	Group Pct of Whole	93.32%		
	Total of Whole	192,856		
	Pct of Ecoregion	0.94%		
23	INTERMONTANE - FOOTHILL GRASSLAND	202,758	105.13%	Foothills - Shale - Rolling plains dry
23	INTERMONTANE - FOOTHILL GRASSLAND	140,328	72.76%	Foothills - Sandstone - Rolling plains dry
23	INTERMONTANE - FOOTHILL GRASSLAND	97,622	50.62%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Flat Moist
23	INTERMONTANE - FOOTHILL GRASSLAND	97,078	50.34%	Foothills - Shale - Flat Moist
23	INTERMONTANE - FOOTHILL GRASSLAND	88,498	45.89%	Foothills - Shale - Flat Dry
23	INTERMONTANE - FOOTHILL GRASSLAND	78,293	40.60%	Foothills - Siltstone/Mudstone - Rolling plains dry
23	INTERMONTANE - FOOTHILL GRASSLAND	76,309	39.57%	Foothills - Shale - Rolling plains moist
23	INTERMONTANE - FOOTHILL GRASSLAND	67,852	35.18%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Rolling plains dry
23	INTERMONTANE - FOOTHILL GRASSLAND	62,846	32.59%	Foothills - Granitic/Silicic - Rolling plains dry

APPENDIX 26. SOUTHERN ROCKY MOUNTAINS: Area Distribution of Ecological System - ELU Combinations (only combinations larger than 1% of ecological system area)

SYS-SORT	SYSTEM DESCRIPTION	HECTARES	PCT of WHOLE	ELU DESCRIPTION
23	INTERMONTANE - FOOTHILL GRASSLAND	49,836	25.84%	Foothills - Sandstone - Rolling plains moist
23	INTERMONTANE - FOOTHILL GRASSLAND	48,434	25.11%	Foothills - Sandstone - Flat Moist
23	INTERMONTANE - FOOTHILL GRASSLAND	45,893	23.80%	Foothills - Granitic/Silicic - Lower side slope dry
23	INTERMONTANE - FOOTHILL GRASSLAND	45,173	23.42%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Flat Dry
23	INTERMONTANE - FOOTHILL GRASSLAND	44,995	23.33%	Foothills - Sandstone - Lower side slope dry
23	INTERMONTANE - FOOTHILL GRASSLAND	40,979	21.25%	Foothills - Shale - Lower side slope dry
23	INTERMONTANE - FOOTHILL GRASSLAND	40,032	20.76%	Foothills - Sandstone - Flat Dry
23	INTERMONTANE - FOOTHILL GRASSLAND	33,292	17.26%	Foothills - Siltstone/Mudstone - Flat Moist
23	INTERMONTANE - FOOTHILL GRASSLAND	32,280	16.74%	Foothills - Siltstone/Mudstone - Rolling plains moist
23	INTERMONTANE - FOOTHILL GRASSLAND	28,491	14.77%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Rolling plains moist
23	INTERMONTANE - FOOTHILL GRASSLAND	28,063	14.55%	Foothills - Carbonate/Limestone - Rolling plains dry
23	INTERMONTANE - FOOTHILL GRASSLAND	25,487	13.22%	Foothills - Basaltic/Mafic - Flat Dry
23	INTERMONTANE - FOOTHILL GRASSLAND	23,255	12.06%	Foothills - Siltstone/Mudstone - Flat Dry
23	INTERMONTANE - FOOTHILL GRASSLAND	22,948	11.90%	Foothills - Granitic/Silicic - Rolling plains moist
23	INTERMONTANE - FOOTHILL GRASSLAND	22,146	11.48%	Foothills - Carbonate/Limestone - Flat Dry
23	INTERMONTANE - FOOTHILL GRASSLAND	21,622	11.21%	Foothills - Carbonate/Limestone - Flat Moist
23	INTERMONTANE - FOOTHILL GRASSLAND	19,963	10.35%	Foothills - Shale - Flat Wet
23	INTERMONTANE - FOOTHILL GRASSLAND	19,815	10.27%	Foothills - Siltstone/Mudstone - Lower side slope dry
23	INTERMONTANE - FOOTHILL GRASSLAND	17,367	9.00%	Foothills - Granitic/Silicic - NE facing upper side slope
23	INTERMONTANE - FOOTHILL GRASSLAND	15,969	8.28%	Montane - Granitic/Silicic - Rolling plains dry
23	INTERMONTANE - FOOTHILL GRASSLAND	15,399	7.98%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Lower side slope dry
23	INTERMONTANE - FOOTHILL GRASSLAND	15,072	7.82%	Foothills - Sandstone - NE facing upper side slope
23	INTERMONTANE - FOOTHILL GRASSLAND	14,585	7.56%	Montane - Basaltic/Mafic - Rolling plains dry
23	INTERMONTANE - FOOTHILL GRASSLAND	13,223	6.86%	Foothills - Sandstone - SW facing upper side slope
23	INTERMONTANE - FOOTHILL GRASSLAND	13,201	6.85%	Foothills - Carbonate/Limestone - Rolling plains moist
23	INTERMONTANE - FOOTHILL GRASSLAND	12,738	6.60%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Flat Wet
23	INTERMONTANE - FOOTHILL GRASSLAND	12,587	6.53%	Foothills - Basaltic/Mafic - Rolling plains dry
23	INTERMONTANE - FOOTHILL GRASSLAND	12,107	6.28%	Foothills - Basaltic/Mafic - Flat Moist
23	INTERMONTANE - FOOTHILL GRASSLAND	11,788	6.11%	Foothills - Granitic/Silicic - SW facing upper side slope
23	INTERMONTANE - FOOTHILL GRASSLAND	11,052	5.73%	Foothills - Shale - NE facing upper side slope
23	INTERMONTANE - FOOTHILL GRASSLAND	9,209	4.78%	Foothills - Shale - SW facing upper side slope
23	INTERMONTANE - FOOTHILL GRASSLAND	9,066	4.70%	Foothills - Sandstone - Flat Wet
23	INTERMONTANE - FOOTHILL GRASSLAND	8,546	4.43%	Montane - Basaltic/Mafic - Rolling plains moist
23	INTERMONTANE - FOOTHILL GRASSLAND	8,496	4.41%	Foothills - Granitic/Silicic - Flat Dry
23	INTERMONTANE - FOOTHILL GRASSLAND	8,422	4.37%	Foothills - Basaltic/Mafic - Rolling plains moist
23	INTERMONTANE - FOOTHILL GRASSLAND	8,171	4.24%	Foothills - Siltstone/Mudstone - Flat Wet
23	INTERMONTANE - FOOTHILL GRASSLAND	7,647	3.97%	Foothills - Siltstone/Mudstone - SW facing upper side slope
23	INTERMONTANE - FOOTHILL GRASSLAND	7,253	3.76%	Montane - Basaltic/Mafic - Flat Dry
23	INTERMONTANE - FOOTHILL GRASSLAND	6,868	3.56%	Foothills - Siltstone/Mudstone - NE facing upper side slope
23	INTERMONTANE - FOOTHILL GRASSLAND	6,850	3.55%	Montane - Granitic/Silicic - Rolling plains moist
23	INTERMONTANE - FOOTHILL GRASSLAND	6,475	3.36%	Montane - Sandstone - Rolling plains dry
23	INTERMONTANE - FOOTHILL GRASSLAND	6,424	3.33%	Foothills - Old Alluvium - Flat Moist

APPENDIX 26. SOUTHERN ROCKY MOUNTAINS: Area Distribution of Ecological System - ELU Combinations (only combinations larger than 1% of ecological system area)

SYS-SORT	SYSTEM DESCRIPTION	HECTARES	PCT of WHOLE	ELU DESCRIPTION
23	INTERMONTANE - FOOTHILL GRASSLAND	6,302	3.27%	Montane - Basaltic/Mafic - Lower side slope dry
23	INTERMONTANE - FOOTHILL GRASSLAND	6,246	3.24%	Foothills - Granitic/Silicic - Flat Moist
23	INTERMONTANE - FOOTHILL GRASSLAND	5,716	2.96%	Montane - Basaltic/Mafic - Flat Moist
23	INTERMONTANE - FOOTHILL GRASSLAND	5,318	2.76%	Montane - Granitic/Silicic - Flat Dry
23	INTERMONTANE - FOOTHILL GRASSLAND	5,106	2.65%	Foothills - Eolian Sand - Rolling plains dry
23	INTERMONTANE - FOOTHILL GRASSLAND	5,057	2.62%	Foothills - Old Alluvium - Rolling plains dry
23	INTERMONTANE - FOOTHILL GRASSLAND	5,056	2.62%	Montane - Sandstone - Lower side slope dry
23	INTERMONTANE - FOOTHILL GRASSLAND	4,998	2.59%	Foothills - Eolian Sand - Flat Moist
23	INTERMONTANE - FOOTHILL GRASSLAND	4,752	2.46%	Foothills - Granitic/Silicic - Lower side slope moist
23	INTERMONTANE - FOOTHILL GRASSLAND	4,615	2.39%	Foothills - Shale - Rolling plains wet
23	INTERMONTANE - FOOTHILL GRASSLAND	4,591	2.38%	Foothills - Carbonate/Limestone - Lower side slope dry
23	INTERMONTANE - FOOTHILL GRASSLAND	4,420	2.29%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - NE facing upper side
23	INTERMONTANE - FOOTHILL GRASSLAND	4,251	2.20%	Montane - Young Alluvium/Colluvium/Glacial Deposits - Rolling plains dry
23	INTERMONTANE - FOOTHILL GRASSLAND	4,096	2.12%	Montane - Granitic/Silicic - Flat Moist
23	INTERMONTANE - FOOTHILL GRASSLAND	4,036	2.09%	Montane - Granitic/Silicic - Lower side slope dry
23	INTERMONTANE - FOOTHILL GRASSLAND	3,883	2.01%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - SW facing upper sid
23	INTERMONTANE - FOOTHILL GRASSLAND	3,764	1.95%	Foothills - Carbonate/Limestone - Flat Wet
23	INTERMONTANE - FOOTHILL GRASSLAND	3,738	1.94%	Foothills - Sandstone - Lower side slope moist
23	INTERMONTANE - FOOTHILL GRASSLAND	3,704	1.92%	Foothills - Sandstone - Rolling plains wet
23	INTERMONTANE - FOOTHILL GRASSLAND	3,328	1.73%	Foothills - Eolian Sand - Flat Dry
23	INTERMONTANE - FOOTHILL GRASSLAND	3,162	1.64%	Foothills - Old Alluvium - Flat Dry
23	INTERMONTANE - FOOTHILL GRASSLAND	2,831	1.47%	Foothills - Shale - Lower side slope moist
23	INTERMONTANE - FOOTHILL GRASSLAND	2,747	1.42%	Foothills - Eolian Sand - Rolling plains moist
23	INTERMONTANE - FOOTHILL GRASSLAND	2,627	1.36%	Foothills - Old Alluvium - Rolling plains moist
23	INTERMONTANE - FOOTHILL GRASSLAND	2,615	1.36%	Foothills - Granitic/Silicic - Rolling plains wet
23	INTERMONTANE - FOOTHILL GRASSLAND	2,470	1.28%	Foothills - Basaltic/Mafic - Lower side slope dry
23	INTERMONTANE - FOOTHILL GRASSLAND	2,374	1.23%	Montane - Sandstone - NE facing upper side slope
23	INTERMONTANE - FOOTHILL GRASSLAND	2,368	1.23%	Montane - Sandstone - Rolling plains moist
23	INTERMONTANE - FOOTHILL GRASSLAND	2,346	1.22%	SubAlpine - Basaltic/Mafic - Rolling plains dry
23	INTERMONTANE - FOOTHILL GRASSLAND	2,097	1.09%	Montane - Young Alluvium/Colluvium/Glacial Deposits - Rolling plains moist
23	INTERMONTANE - FOOTHILL GRASSLAND	2,035	1.05%	Foothills - Carbonate/Limestone - NE facing upper side slope
23	INTERMONTANE - FOOTHILL GRASSLAND	1,944	1.01%	Montane - Granitic/Silicic - NE facing upper side slope
23	INTERMONTANE - FOOTHILL GRASSLAND	1,943	1.01%	Foothills - Granitic/Silicic - Flat Wet
23	INTERMONTANE - FOOTHILL GRASSLAND	1,921	1.00%	Montane - Siltstone/Mudstone - Flat Dry
	Total of > 1% Group	1,889,250		
	Group Pct of Whole	96.85%		
	Total of Whole	1,950,608		
	Pct of Ecoregion	9.46%		
24	FOOTHILLS RIPARIAN WOODLAND & SHRUBLAND (not u	5,451	71.25%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Flat Moist
24	FOOTHILLS RIPARIAN WOODLAND & SHRUBLAND (not u	728	9.52%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Flat Wet
24	FOOTHILLS RIPARIAN WOODLAND & SHRUBLAND (not u	597	7.81%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Flat Dry

APPENDIX 26. SOUTHERN ROCKY MOUNTAINS: Area Distribution of Ecological System - ELU Combinations (only combinations larger than 1% of ecological system area)

SYS-SORT	SYSTEM DESCRIPTION	HECTARES	PCT of WHOLE	ELU DESCRIPTION
24	FOOTHILLS RIPARIAN WOODLAND & SHRUBLAND (not u	277	3.61%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Rolling plains dry
24	FOOTHILLS RIPARIAN WOODLAND & SHRUBLAND (not u	239	3.12%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Rolling plains moist
24	FOOTHILLS RIPARIAN WOODLAND & SHRUBLAND (not u	87	1.13%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Lower side slope dry
	Total of > 1% Group	7,378		
	Group Pct of Whole	96.44%		
	Total of Whole	7,651		
	Pct of Ecoregion	0.04%		
25	STABILIZED SAND DUNE	23,236	57.30%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Flat Dry
25	STABILIZED SAND DUNE	6,462	15.94%	Foothills - Eolian Sand - Flat Dry
25	STABILIZED SAND DUNE	2,506	6.18%	Foothills - Eolian Sand - Rolling plains dry
25	STABILIZED SAND DUNE	2,278	5.62%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Rolling plains dry
25	STABILIZED SAND DUNE	895	2.21%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Flat Wet
25	STABILIZED SAND DUNE	738	1.82%	Foothills - Eolian Sand - Flat Moist
25	STABILIZED SAND DUNE	654	1.61%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Rolling plains moist
25	STABILIZED SAND DUNE	582	1.44%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Flat Moist
25	STABILIZED SAND DUNE	523	1.29%	Foothills - Eolian Sand - Rolling plains moist
	Total of > 1% Group	37,872		
	Group Pct of Whole	93.40%		
	Total of Whole	40,549		
	Pct of Ecoregion	0.20%		
26	ACTIVE SAND DUNE & SWALE COMPLEX	2,316	21.37%	Foothills - Eolian Sand - Flat Dry
26	ACTIVE SAND DUNE & SWALE COMPLEX	2,277	21.02%	Montane - Eolian Sand - Lower side slope dry
26	ACTIVE SAND DUNE & SWALE COMPLEX	1,140	10.52%	Montane - Eolian Sand - SW facing upper side slope
26	ACTIVE SAND DUNE & SWALE COMPLEX	1,089	10.05%	Montane - Eolian Sand - Rolling plains dry
26	ACTIVE SAND DUNE & SWALE COMPLEX	833	7.69%	Foothills - Eolian Sand - Rolling plains dry
26	ACTIVE SAND DUNE & SWALE COMPLEX	660	6.09%	Montane - Eolian Sand - NE facing upper side slope
26	ACTIVE SAND DUNE & SWALE COMPLEX	438	4.04%	Montane - Eolian Sand - Rolling plains moist
26	ACTIVE SAND DUNE & SWALE COMPLEX	410	3.78%	Foothills - Eolian Sand - Lower side slope dry
26	ACTIVE SAND DUNE & SWALE COMPLEX	392	3.62%	Montane - Eolian Sand - Lower side slope moist
26	ACTIVE SAND DUNE & SWALE COMPLEX	190	1.76%	Foothills - Eolian Sand - Rolling plains moist
26	ACTIVE SAND DUNE & SWALE COMPLEX	170	1.57%	Foothills - Eolian Sand - Flat Moist
26	ACTIVE SAND DUNE & SWALE COMPLEX	124	1.14%	Foothills - Eolian Sand - Flat Wet
	Total of > 1% Group	10,037		
	Group Pct of Whole	92.64%		
	Total of Whole	10,834		
	Pct of Ecoregion	0.05%		
27	MARSH & WET MEADOW	4,808	9.23%	Foothills - Siltstone/Mudstone - Rolling plains dry
27	MARSH & WET MEADOW	4,170	8.00%	Foothills - Shale - Rolling plains dry
27	MARSH & WET MEADOW	3,088	5.93%	Foothills - Sandstone - Rolling plains dry

APPENDIX 26. SOUTHERN ROCKY MOUNTAINS: Area Distribution of Ecological System - ELU Combinations (only combinations larger than 1% of ecological system area)

SYS-SORT	SYSTEM DESCRIPTION	HECTARES	PCT of WHOLE	ELU DESCRIPTION
27	MARSH & WET MEADOW	3,069	5.89%	Foothills - Shale - Flat Moist
27	MARSH & WET MEADOW	2,494	4.79%	Foothills - Siltstone/Mudstone - Flat Dry
27	MARSH & WET MEADOW	2,477	4.75%	Foothills - Shale - Rolling plains moist
27	MARSH & WET MEADOW	2,163	4.15%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Flat Dry
27	MARSH & WET MEADOW	2,073	3.98%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Flat Moist
27	MARSH & WET MEADOW	1,880	3.61%	Foothills - Shale - Flat Dry
27	MARSH & WET MEADOW	1,562	3.00%	Foothills - Siltstone/Mudstone - Rolling plains moist
27	MARSH & WET MEADOW	1,531	2.94%	Foothills - Sandstone - Rolling plains moist
27	MARSH & WET MEADOW	1,508	2.89%	Foothills - Sandstone - Lower side slope dry
27	MARSH & WET MEADOW	1,504	2.89%	Montane - Young Alluvium/Colluvium/Glacial Deposits - Flat Moist
27	MARSH & WET MEADOW	1,438	2.76%	Foothills - Siltstone/Mudstone - Flat Moist
27	MARSH & WET MEADOW	894	1.72%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Flat Wet
27	MARSH & WET MEADOW	764	1.47%	Montane - Young Alluvium/Colluvium/Glacial Deposits - Flat Dry
27	MARSH & WET MEADOW	663	1.27%	Foothills - Siltstone/Mudstone - Lower side slope dry
27	MARSH & WET MEADOW	625	1.20%	Foothills - Sandstone - SW facing upper side slope
27	MARSH & WET MEADOW	613	1.18%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Rolling plains dry
27	MARSH & WET MEADOW	584	1.12%	Foothills - Sandstone - NE facing upper side slope
27	MARSH & WET MEADOW	552	1.06%	Foothills - Shale - Flat Wet
27	MARSH & WET MEADOW	525	1.01%	Foothills - Sandstone - Flat Moist
	Total of > 1% Group	38,981		
	Group Pct of Whole	74.82%		
	Total of Whole	52,098		
	Pct of Ecoregion	0.25%		
29	MONTANE - FOOTHILL CLIFF & CANYON	4,851	8.43%	Foothills - Shale - Rolling plains dry
29	MONTANE - FOOTHILL CLIFF & CANYON	4,355	7.57%	Foothills - Shale - Lower side slope dry
29	MONTANE - FOOTHILL CLIFF & CANYON	2,321	4.03%	Foothills - Sandstone - Rolling plains dry
29	MONTANE - FOOTHILL CLIFF & CANYON	2,290	3.98%	Foothills - Shale - Flat Moist
29	MONTANE - FOOTHILL CLIFF & CANYON	2,093	3.64%	Foothills - Sandstone - Lower side slope dry
29	MONTANE - FOOTHILL CLIFF & CANYON	2,011	3.50%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Flat Moist
29	MONTANE - FOOTHILL CLIFF & CANYON	1,876	3.26%	Foothills - Shale - Rolling plains moist
29	MONTANE - FOOTHILL CLIFF & CANYON	1,844	3.21%	Foothills - Shale - SW facing upper side slope
29	MONTANE - FOOTHILL CLIFF & CANYON	1,457	2.53%	Foothills - Shale - Flat Dry
29	MONTANE - FOOTHILL CLIFF & CANYON	1,240	2.16%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Flat Dry
29	MONTANE - FOOTHILL CLIFF & CANYON	1,172	2.04%	Foothills - Shale - SW facing cliff
29	MONTANE - FOOTHILL CLIFF & CANYON	1,138	1.98%	Foothills - Shale - NE facing upper side slope
29	MONTANE - FOOTHILL CLIFF & CANYON	1,088	1.89%	Foothills - Sandstone - SW facing upper side slope
29	MONTANE - FOOTHILL CLIFF & CANYON	1,086	1.89%	Foothills - Sandstone - Rolling plains moist
29	MONTANE - FOOTHILL CLIFF & CANYON	1,059	1.84%	Foothills - Siltstone/Mudstone - Lower side slope dry
29	MONTANE - FOOTHILL CLIFF & CANYON	983	1.71%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Rolling plains dry
29	MONTANE - FOOTHILL CLIFF & CANYON	846	1.47%	Foothills - Shale - SW facing canyon dry
29	MONTANE - FOOTHILL CLIFF & CANYON	773	1.34%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Lower side slope dry

APPENDIX 26. SOUTHERN ROCKY MOUNTAINS: Area Distribution of Ecological System - ELU Combinations (only combinations larger than 1% of ecological system area)

SYS-SORT	SYSTEM DESCRIPTION	HECTARES	PCT of WHOLE	ELU DESCRIPTION
29	MONTANE - FOOTHILL CLIFF & CANYON	733	1.27%	Montane - Basaltic/Mafic - Lower side slope dry
29	MONTANE - FOOTHILL CLIFF & CANYON	718	1.25%	Foothills - Shale - NE facing cliff
29	MONTANE - FOOTHILL CLIFF & CANYON	716	1.24%	Foothills - Sandstone - Flat Moist
29	MONTANE - FOOTHILL CLIFF & CANYON	656	1.14%	Foothills - Carbonate/Limestone - Rolling plains dry
29	MONTANE - FOOTHILL CLIFF & CANYON	615	1.07%	Foothills - Carbonate/Limestone - Flat Moist
29	MONTANE - FOOTHILL CLIFF & CANYON	608	1.06%	Foothills - Sandstone - NE facing upper side slope
	Total of > 1% Group	36,525		
	Group Pct of Whole	63.49%		
	Total of Whole	57,525		
	Pct of Ecoregion	0.28%		
30	AGRICULTURE - DRY (not used)	44,820	14.91%	Foothills - Shale - Rolling plains dry
30	AGRICULTURE - DRY (not used)	25,037	8.33%	Foothills - Sandstone - Rolling plains dry
30	AGRICULTURE - DRY (not used)	19,379	6.45%	Foothills - Shale - Rolling plains moist
30	AGRICULTURE - DRY (not used)	17,593	5.85%	Foothills - Shale - Flat Dry
30	AGRICULTURE - DRY (not used)	17,403	5.79%	Foothills - Shale - Lower side slope dry
30	AGRICULTURE - DRY (not used)	17,402	5.79%	Foothills - Shale - Flat Moist
30	AGRICULTURE - DRY (not used)	12,053	4.01%	Foothills - Sandstone - Rolling plains moist
30	AGRICULTURE - DRY (not used)	11,805	3.93%	Foothills - Eolian Sand - Flat Moist
30	AGRICULTURE - DRY (not used)	9,829	3.27%	Foothills - Sandstone - Flat Dry
30	AGRICULTURE - DRY (not used)	9,541	3.17%	Foothills - Sandstone - Flat Moist
30	AGRICULTURE - DRY (not used)	9,026	3.00%	Foothills - Eolian Sand - Rolling plains dry
30	AGRICULTURE - DRY (not used)	7,989	2.66%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Flat Moist
30	AGRICULTURE - DRY (not used)	7,825	2.60%	Foothills - Sandstone - Lower side slope dry
30	AGRICULTURE - DRY (not used)	7,799	2.59%	Foothills - Eolian Sand - Flat Dry
30	AGRICULTURE - DRY (not used)	7,164	2.38%	Foothills - Siltstone/Mudstone - Rolling plains dry
30	AGRICULTURE - DRY (not used)	6,513	2.17%	Foothills - Eolian Sand - Rolling plains moist
30	AGRICULTURE - DRY (not used)	5,193	1.73%	Foothills - Shale - SW facing upper side slope
30	AGRICULTURE - DRY (not used)	5,111	1.70%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Flat Dry
30	AGRICULTURE - DRY (not used)	4,929	1.64%	Foothills - Shale - NE facing upper side slope
30	AGRICULTURE - DRY (not used)	4,374	1.46%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Rolling plains dry
30	AGRICULTURE - DRY (not used)	4,121	1.37%	Foothills - Shale - Flat Wet
30	AGRICULTURE - DRY (not used)	3,669	1.22%	Foothills - Siltstone/Mudstone - Rolling plains moist
30	AGRICULTURE - DRY (not used)	3,177	1.06%	Foothills - Siltstone/Mudstone - Lower side slope dry
	Total of > 1% Group	261,749		
	Group Pct of Whole	87.08%		
	Total of Whole	300,585		
	Pct of Ecoregion	1.46%		
32	AGRICULTURE - ORCHARD (not used)	113	52.56%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Flat Moist
32	AGRICULTURE - ORCHARD (not used)	59	27.27%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Flat Dry
32	AGRICULTURE - ORCHARD (not used)	33	15.15%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Flat Wet

APPENDIX 26. SOUTHERN ROCKY MOUNTAINS: Area Distribution of Ecological System - ELU Combinations (only combinations larger than 1% of ecological system area)

SYS-SORT	SYSTEM DESCRIPTION	HECTARES	PCT of WHOLE	ELU DESCRIPTION
32	AGRICULTURE - ORCHARD (not used)	5	2.45%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Rolling plains moist
32	AGRICULTURE - ORCHARD (not used)	5	2.21%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Rolling plains dry
	Total of > 1% Group	214		
	Group Pct of Whole	99.42%		
	Total of Whole	215		
	Pct of Ecoregion	0.00%		
31	AGRICULTURE - IRRIGATED (not used)	231,747	22.02%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Flat Dry
31	AGRICULTURE - IRRIGATED (not used)	150,540	14.30%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Flat Moist
31	AGRICULTURE - IRRIGATED (not used)	45,700	4.34%	Foothills - Shale - Rolling plains dry
31	AGRICULTURE - IRRIGATED (not used)	44,775	4.25%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Flat Wet
31	AGRICULTURE - IRRIGATED (not used)	43,662	4.15%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Rolling plains dry
31	AGRICULTURE - IRRIGATED (not used)	43,075	4.09%	Foothills - Shale - Flat Moist
31	AGRICULTURE - IRRIGATED (not used)	29,959	2.85%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Rolling plains moist
31	AGRICULTURE - IRRIGATED (not used)	28,915	2.75%	Foothills - Sandstone - Rolling plains dry
31	AGRICULTURE - IRRIGATED (not used)	25,151	2.39%	Foothills - Shale - Flat Dry
31	AGRICULTURE - IRRIGATED (not used)	24,439	2.32%	Foothills - Shale - Rolling plains moist
31	AGRICULTURE - IRRIGATED (not used)	21,807	2.07%	Montane - Young Alluvium/Colluvium/Glacial Deposits - Flat Moist
31	AGRICULTURE - IRRIGATED (not used)	20,898	1.99%	Montane - Young Alluvium/Colluvium/Glacial Deposits - Flat Dry
31	AGRICULTURE - IRRIGATED (not used)	16,365	1.55%	Foothills - Sandstone - Flat Moist
31	AGRICULTURE - IRRIGATED (not used)	16,077	1.53%	Foothills - Sandstone - Rolling plains moist
31	AGRICULTURE - IRRIGATED (not used)	15,922	1.51%	Foothills - Shale - Lower side slope dry
31	AGRICULTURE - IRRIGATED (not used)	14,848	1.41%	Montane - Young Alluvium/Colluvium/Glacial Deposits - Rolling plains dry
31	AGRICULTURE - IRRIGATED (not used)	12,122	1.15%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Lower side slope dry
31	AGRICULTURE - IRRIGATED (not used)	11,155	1.06%	Foothills - Sandstone - Flat Dry
	Total of > 1% Group	797,155		
	Group Pct of Whole	75.73%		
	Total of Whole	1,052,585		
	Pct of Ecoregion	5.10%		
33	MINING OPERATION (not used)	793	9.07%	Foothills - Shale - Rolling plains dry
33	MINING OPERATION (not used)	433	4.96%	Foothills - Sandstone - Lower side slope dry
33	MINING OPERATION (not used)	411	4.71%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Flat Moist
33	MINING OPERATION (not used)	311	3.56%	Alpine - Sandstone - Lower side slope dry
33	MINING OPERATION (not used)	294	3.36%	Foothills - Sandstone - Rolling plains dry
33	MINING OPERATION (not used)	288	3.30%	Foothills - Shale - Lower side slope dry
33	MINING OPERATION (not used)	232	2.66%	Alpine - Young Alluvium/Colluvium/Glacial Deposits - Flat Moist
33	MINING OPERATION (not used)	225	2.57%	Foothills - Shale - SW facing canyon dry
33	MINING OPERATION (not used)	221	2.53%	Foothills - Shale - Rolling plains moist
33	MINING OPERATION (not used)	213	2.43%	Alpine - Basaltic/Mafic - Lower side slope dry
33	MINING OPERATION (not used)	209	2.39%	Foothills - Sandstone - NE facing upper side slope
33	MINING OPERATION (not used)	200	2.29%	SubAlpine - Young Alluvium/Colluvium/Glacial Deposits - Rolling plains dry

APPENDIX 26. SOUTHERN ROCKY MOUNTAINS: Area Distribution of Ecological System - ELU Combinations (only combinations larger than 1% of ecological system area)

SYS-SORT	SYSTEM DESCRIPTION	HECTARES	PCT of WHOLE	ELU DESCRIPTION
33	MINING OPERATION (not used)	189	2.16%	Foothills - Sandstone - SW facing upper side slope
33	MINING OPERATION (not used)	183	2.10%	Alpine - Young Alluvium/Colluvium/Glacial Deposits - Lower side slope dry
33	MINING OPERATION (not used)	183	2.10%	Foothills - Shale - Flat Moist
33	MINING OPERATION (not used)	174	1.99%	Foothills - Shale - Flat Dry
33	MINING OPERATION (not used)	164	1.88%	Alpine - Granitic/Silicic - Lower side slope dry
33	MINING OPERATION (not used)	159	1.82%	Foothills - Sandstone - Rolling plains moist
33	MINING OPERATION (not used)	154	1.76%	Alpine - Granitic/Silicic - SW facing upper side slope
33	MINING OPERATION (not used)	146	1.67%	Foothills - Shale - NE facing upper side slope
33	MINING OPERATION (not used)	139	1.59%	Alpine - Basaltic/Mafic - NE facing upper side slope
33	MINING OPERATION (not used)	136	1.56%	Alpine - Sandstone - SW facing upper side slope
33	MINING OPERATION (not used)	134	1.53%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Flat Dry
33	MINING OPERATION (not used)	124	1.42%	Foothills - Sandstone - Lower side slope moist
33	MINING OPERATION (not used)	114	1.30%	Foothills - Shale - NE facing canyon dry
33	MINING OPERATION (not used)	108	1.24%	Foothills - Shale - SW facing cliff
33	MINING OPERATION (not used)	98	1.12%	Alpine - Granitic/Silicic - NE facing upper side slope
33	MINING OPERATION (not used)	98	1.12%	Foothills - Carbonate/Limestone - Flat Moist
33	MINING OPERATION (not used)	89	1.02%	Montane - Sandstone - Rolling plains moist
33	MINING OPERATION (not used)	87	1.00%	SubAlpine - Young Alluvium/Colluvium/Glacial Deposits - Flat Dry
	Total of > 1% Group	6,306		
	Group Pct of Whole	72.20%		
	Total of Whole	8,734		
	Pct of Ecoregion	0.04%		
34	URBAN (not used)	20,896	16.14%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Flat Moist
34	URBAN (not used)	7,721	5.96%	Foothills - Sandstone - Rolling plains dry
34	URBAN (not used)	7,144	5.52%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Rolling plains dry
34	URBAN (not used)	7,032	5.43%	Foothills - Shale - Rolling plains dry
34	URBAN (not used)	6,645	5.13%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Flat Dry
34	URBAN (not used)	6,610	5.11%	Foothills - Sandstone - Flat Moist
34	URBAN (not used)	5,325	4.11%	Foothills - Old Alluvium - Flat Moist
34	URBAN (not used)	5,001	3.86%	Foothills - Sandstone - Rolling plains moist
34	URBAN (not used)	4,896	3.78%	Foothills - Shale - Flat Moist
34	URBAN (not used)	3,649	2.82%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Rolling plains moist
34	URBAN (not used)	3,489	2.69%	Foothills - Shale - Rolling plains moist
34	URBAN (not used)	2,910	2.25%	Foothills - Shale - Flat Dry
34	URBAN (not used)	2,746	2.12%	Foothills - Sandstone - Flat Dry
34	URBAN (not used)	2,614	2.02%	Foothills - Sandstone - Lower side slope dry
34	URBAN (not used)	2,562	1.98%	Foothills - Young Alluvium/Colluvium/Glacial Deposits - Flat Wet
34	URBAN (not used)	2,429	1.88%	Foothills - Eolian Sand - Flat Moist
34	URBAN (not used)	1,587	1.23%	Foothills - Old Alluvium - Rolling plains dry
34	URBAN (not used)	1,568	1.21%	Foothills - Old Alluvium - Flat Dry
34	URBAN (not used)	1,550	1.20%	Foothills - Eolian Sand - Rolling plains dry

APPENDIX 26. SOUTHERN ROCKY MOUNTAINS: Area Distribution of Ecological System - ELU Combinations
(only combinations larger than 1% of ecological system area)

SYS-SORT	SYSTEM DESCRIPTION	HECTARES	PCT of WHOLE	ELU DESCRIPTION
34	URBAN (not used)	1,343	1.04%	Foothills - Shale - Lower side slope dry
34	URBAN (not used)	1,312	1.01%	Montane - Granitic/Silicic - Lower side slope dry
	Total of > 1% Group	99,028		
	Group Pct of Whole	76.49%		
	Total of Whole	129,471		
	Pct of Ecoregion	0.63%		
	Total Ecoregion	20,622,519		

APPENDIX 27

THE NATURE CONSERVANCY
FIELD STAFF CONTACT INFORMATION (BY COUNTY)

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APPENDIX 28

PHOTOGRAPHS OF SELECTED SRM CONSERVATION TARGETS AND CONSERVATION AREAS

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Please note that some images (e.g., wolverine, fish) are from the Colorado Natural Diversity Information Source web site (http://ndis.nrel.colostate.edu/escop/photos/) and should not be used for commercial purposes (see NDIS web site for restrictions).

Selected Conservation Targets

1. *Amphibians*: Northern leopard frog (*Rana pipiens*) by © Geoff Hammerson, The Nature Conservancy (Northernleop.jpg)
2. *Amphibians:* Boreal toad (*Bufo boreas*) by © Geoff Hammerson, The Nature Conservancy (borealtoad.jpg)
3. *Birds:* Greater sandhill cranes (*Grus canadensis*) by © Wendy Shattil/Bob Rozinski (greatsand.jpg)
4. *Birds:* Mountain plover (*Charadrius montanus*) by © Harold Holt (mtn_plovr.jpg)
5. *Birds:* Gunnison sage grouse (*Centrocercus minimus*) by © Lance Beeny (Gunnsagegrouse.jpg)
6. *Fish:* Colorado River cutthroat trout (*Oncorhynchus clarki pleuriticus*) © Colorado Division of Wildlife (Corivercut.jpg)
7. *Fish:* Greenback cutthroat trout (*Oncorhynchus clarki pleuriticus*) by © John Woodling, Colorado Division of Wildlife (Greenback.jpg)
8. *Fish:* Rio Grande chub: (*Gila pandora*) by © John Woodling, Colorado Division of Wildlife (Riograndechub.jpg)
9. *Invertebrates:* Ellis dotted blue (*Euphilotes ellisi*) by © Steve Cary (Ellisblue.jpg)
10. *Invertebrates:* Capulin mountain arctic (*Oeneis alberta capulinensis*) by © Steve Cary (Capulinarctic.jpg)
11. *Invertebrates:* Hobomok skipper (*Poanes hobomok wetona*) by © Steve Cary (Poanes.jpg)
12. *Mammals:* Canadian lynx (*Lynx canadensis*) by © Janet Hass (Lynx.jpg)
13. *Mammals:* Preble's jumping mouse (*Zapus hudsonius preblei*) by © Wendy Shattil/Bob Rozinski (preblesmouse.jpg)
14. *Mammals:* Wolverine (*Gulo gulo*) by © D. A. Sutton (wolverine.jpg)
15. *Plants*: Hoary willow (Salix candida) by © Harold E. Malde (Salixcandida.jpg)
16. *Plants:* Penland penstemon (*Penstemon penlandii*) by © Bill Jennings (Penpen.jpg)
17. *Plants:* Penland alpine fen mustard (*Eutrema edwardsii* spp. *penlandii*) by © Bill Jennings (Eutrema.jpg)
18. *Plants:* North Park Phacelia (*Phacelia formosula*) by © Bill Jennings (Phacform.jpg)
19. *Plants:* Weber saussurea (Saussurea weberi) by © Susan Spackman (Saussurea.jpg)
20. *Plants:* Weber's scarlet gila (*Ipomopsis aggregata* ssp. *weberi*) by © Susan Spackman (Ipomopsis.jpg)
21. *Ecological Systems:* Bristlecone-Limber Pine Forest and Woodland by © Tom Andrews (SangrebristleconeTA.jpg)

22. *Ecological Systems:* Montane Fen by © Renee Rondeau (Culebra Range) (Montane fen.jpg)
23. *Ecological Systems:* Lower Montane Riparian Woodland (Glenwood Canyon) by © Renee Rondeau (Lowermontrip.jpg)
24. *Ecological Systems:* Alpine Tundra Dry Meadow (Culebra Range) by © Renee Rondeau (Alpinetundra.jpg)
25. *Ecological Systems:* Spruce Fir Forest (Hell Canyon RNA, South Cameron Pass) by © Tom Andrews (SprucefirTA.jpg)
26. *Ecological Systems:* Aspen Forest (Deadman Creek RNA, Sangre de Cristo Mountains) by © Tom Andrews (SangreaspenTA.jpg)
27. *Ecological Systems:* Intermountain/Foothills Grassland by © Tom Andrews (IntermongrassTA.jpg)
28. *Ecological Systems:* Ponderosa Pine Woodland (Hot Creek RNA, Rajadero Canyon) by © Tom Andrews (RajaderoTA.jpg)

Selected Conservation Areas

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2. *Box Elder Creek* (Jackson Canyon), Wyoming (© Joel B. Dyer): Boxelder.jpg
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5. *Culebra Range*, New Mexico (© Harold E. Malde): Culebra NM.jpg
6. *Glenwood Canyon* (Deep Creek), Colorado (© Renee Rondeau): Lowermontrip.jpg
7. *Great Sand Dunes/San Luis Lakes* (© Harold E. Malde): GreatsandHM.jpg
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10. *Mt. Zirkel*, Colorado (© John Fielder): Mtzirkel.jpg
11. *Mosquito Range*, Colorado (© Susan Spackman): Mosquito range.jpg
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17. *Rajadero Canyon* (Hot Creek RNA), Colorado: Ponderosa Pine Woodland (© Tom Andrews): RajaderoTA.jpg
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19. *Sangre de Cristo Mtns*. (Deadman Creek RNA), Colorado (© Tom Andrews): SangreaspenTA.jpg
20. *San Miguel River*, Colorado (© John Fielder): Sanm2.tif
21. *South Cameron Pass* (Hell Canyon RNA), Colorado (© Tom Andrews): SprucefirTA.jpg
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