An Ecological Analysis of Conservation Priorities in the Sonoran Desert Ecoregion

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Sand Tanks-Sauceda Mountains Complex: Conservation Site 32 in Arizona *(Photo: R. Marshall)*

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ARIZONA CHAPTER

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EXECUTIVE SUMMARY

A bi-national team was convened in 1998 to compile and analyze biological and ecological data for the 55-million acre (22 million ha) Sonoran Desert Ecoregion, which comprises parts of Arizona, California, Sonora, and Baja, California. The objective of this project was to use a science-based approach to identify a network of Conservation Sites throughout the Ecoregion that, with proper management, would ensure the long-term persistence of the Ecoregion's biodiversity, including rare and common species, native vegetation communities, and the ecological processes needed to maintain these elements of biodiversity. The technical team convened to compile and analyze data included staff from The Nature Conservancy, Sonoran Institute, Instituto del Medio Ambiente y el Desarrollo Sustentable del estado de Sonora, and Arizona Game and Fish Department with assistance from more than 100 experts from public agencies, academic institutions, conservation organizations, Tribes, and private resource professionals. To generate awareness of the project and attract participation by natural resource entities throughout the Ecoregion we initiated an outreach program that included development of a project website and presentations at more than 20 local, regional, and national meetings, symposia, conferences, etc.

We selected a representative sample of the Ecoregion's species and natural vegetation communities to serve as Conservation Targets, the basic unit of analysis for this exercise. We selected a total of 353 species from six taxonomic groups (amphibians/reptiles, birds, fish invertebrates, mammals, plants). Emphasis was placed on selecting species endemic to the Ecoregion. We also used 78 natural vegetation communities to represent a broader level of biological organization across the Ecoregion. The approach of using both fine-scale data on species and coarse-scale data on vegetation communities was presumed to be a robust way to represent the broadest array of biodiversity.

We used a variety of data sets, including species' population data housed in Natural Heritage Programs, spatially-referenced data on vegetation, land use, hydrography, topography, land management, etc. To fill data gaps and obtain contemporary data we convened a two-day experts workshop at the University of Arizona where 106 experts participated from 51 agencies, universities, Tribes, private resource professionals, and conservation groups. All data were subjected to a set of Conservation Criteria that established numeric goals for each Conservation Target. Contemporary data provided by experts were used as the nuclei for identifying the network of Conservation Sites. Sites throughout the Ecoregion were evaluated for the number and types of Conservation Targets considered viable within their boundaries. We also constructed a biophysical model using spatial data for climate, vegetation, elevation, slope, and aspect to derive an independent index of the diversity of the Sonoran Desert Ecoregion.

In total, 100 large landscapes and 79 small, localized areas were identified across the Ecoregion as a network of Conservation Sites where conservation opportunities should be pursued. The network includes 23,108,106 acres (9,355,508 ha) of lands in Mexico and the U.S. Landscape-scale Conservation Sites capture entire ecosystems, such as a complex of

mountain ranges and valleys, where ecological processes remain largely intact. The 79 localized Sites capture some of the Ecoregion's rarest plants and animals and were, generally, isolated from areas identified for the larger landscape Sites. When compared to the biophysical model, the identified network of landscape-scale Conservation Sites captured 89% of the Ecoregion's biophysical variation. Areas that were not adequately represented—mostly in the Plains of Sonora and Arizona Uplands portions of the State of Sonora—include some of the least well-known areas in the Ecoregion.

A "GAP" management analysis of the Ecoregion revealed that, at present, less the 20% of the network of Conservation Sites is managed to promote the long-term persistence of Conservation Targets. Of the 18 Conservation Sites identified to conserve the Ecoregion's riverine, riparian, and aquatic systems, only 9% are managed to promote the long-term persistence of biodiversity. Several recommendations were identified for improving the conservation status of the network of Conservation Sites. The results of this project can serve regional and local conservation efforts by: (1) identifying the most important areas Ecoregion-wide for conservation of biological diversity; (2) providing a baseline characterization from which to evaluate the status of Conservation Targets and trends in major stressors across the Ecoregion, and; (3) providing an ecoregional context for designing and evaluating projects, drafting conservation proposals, and anticipating and framing budget needs.

Given that Conservation Sites overlap lands managed by public, private, and communal entities, a variety of approaches may be needed to accomplish the overall goal of biodiversity conservation. For lands already designated for conservation purposes, implementing conservation programs that abate or minimize major stressors to Conservation Targets will enable true adaptive management. Several agencies and organizations throughout the Ecoregion are already having success with this approach. For lands in which conservation is one of multiple management goals, integrating Ecoregional data and a goals-based approach into comprehensive land management planning will help insure that the Ecoregion's biodiversity is adequately characterized, evaluated, accounted for, and conserved through development of appropriate management programs. For lands in which the goal does not include conservation, opportunities should be identified to increase attention to conservation of biodiversity by developing collaborative programs among public and private entities (*e.g.*, U.S. Fish and Wildlife Service's Partners for Wildlife Program, UMA or environmental management area designations in Sonora, conservation easements, etc.).

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A Note On The Format Of This Document: Due to the large amount of data used in this analysis and the large number of pages of some of the tabular output, we split the reporting of results between the main text and appendices. Summaries of data for the Ecoregion as a whole are incorporated into the body of the text. Longer summaries that provide data on individual species or conservation areas are placed in the appendices.

I. INTRODUCTION

Background and Purpose

The Sonoran Desert Ecoregion encompasses 55 million acres (22 million hectares) in southern Arizona, southeastern California, northern Baja, California, and northwestern Sonora (**Figure 1**). Especially rich in biological diversity the Sonoran Desert was identified by Olson and Dinerstein (1998) as one of the top 200 Ecoregions worldwide that deserve special conservation attention. The Ecoregion harbors a high proportion of endemic plants, reptiles, and fish. Over 2500 pollinators are known (invertebrates, birds, and bats) including the highest known diversity of bee species in the world (Phillips and Wentworth Comus 2000). More than 500 bird species migrate through, breed, or permanently reside in the Ecoregion—nearly two-thirds of all species that occur in northern Mexico, the United States and Canada. The Ecoregion is equally diverse in its human population with more than a dozen Native American Tribes represented, as well as many recent migrants to the region. In 1990 the Ecoregion contained 6.9 million residents, nearly double the population size in 1970. In 2020 the population is expected to reach 12 million!

A variety of impacts that adversely affect the Ecoregion's biodiversity are on the increase. Nabhan and Holdsworth (1999) provide a detailed account of the current threats to the Sonoran Ecoregion's biodiversity. Conversion of natural habitat to urban, suburban, and agricultural areas continues to result in widespread habitat loss. Overuse of natural surface water and groundwater resources and the loss of natural hydrologic regimes threaten the viability of the Ecoregion's most diverse areas—our riverine, riparian, and estuarine habitats. Increasing recreational use of the desert is resulting in habitat loss and declines in some species. Finally, improper livestock management and the spread of exotic, invasive plants and animals threaten the viability of both terrestrial and riverine/riparian systems.

From the standpoint of biodiversity conservation, it is economically and strategically prudent to understand where and how to manage for conservation purposes well before species and ecosystems become "endangered." Recovering species that have declined to low numbers or ecosystems that have been heavily degraded is far more expensive and problematic than maintaining our extant biodiversity. The Ecoregion's increasing population growth, coupled with continued depletion of water and land resources, suggest the future costs of not acting now will be high. Since available funds for conservation rarely meet conservation needs across a landscape, higher future costs may simply translate to further species losses and irreversible degradation of some ecosystems.

While Mexico and the U.S. share the desert's biological and ecological attributes, the International Border delineates two vastly different patterns of land tenure and management. In Mexico, most of the land is held privately or communally through the

Ejido system; a relatively small percentage of land enjoys official protected or conservation status (**Figure 2** and **Table 1**). The 1992 change in Mexico's Constitution enabling the sale and transfer of communal lands leaves areas important for biodiversity vulnerable to new land uses potentially incompatible with conservation; on the other hand the Constitutional change offers opportunities to use conservation tools such as easements. In the U.S. portion of the Ecoregion the majority of land is in public ownership with various levels of conservation status, except for river corridors which are mostly in private ownership (**Figure 2**). As more private lands are developed in the U.S for human uses, public lands will play an even larger role in biodiversity conservation serving as refugia for species and natural vegetation communities, and for providing ecosystem services such as flood protection, water purification, groundwater recharge, pollination, and nutrient cycling, among others.

The prospect of declining biodiversity in the Sonoran Desert Ecoregion need not become a reality, however. This Ecoregion enjoys a high degree of awareness and commitment among its population to resolve conservation issues, and extensive cross-border collaboration on conservation issues. Lacking is an Ecoregion-wide assessment of biological and ecological attributes that can point to conservation priorities. So called "landscape-scale analyses" that evaluate and identify conservation options and priorities over large areas such as the Sonoran Desert Ecoregion are now widely regarded as a critical tool for arming conservation practitioners, policy makers, and the general public with the best scientific information upon which to implement conservation strategies (Pendergast *et al.* 1999, Carrol and Meffe 1997). We need to look no further than our own Ecoregion to see the largest Habitat Conservation Planning effort in U.S. history being initiated by Pima County in southern Arizona. That effort is attempting to develop a long-term plan to protect more than 70 rare species.

This document summarizes the methods and results of a two-year bi-national project to identify a network of areas in the Sonoran Desert Ecoregion where, if managed appropriately for conservation, would help insure the long-term persistence of the Ecoregion's biodiversity. We convened a bi-national team to compile and analyze biological and ecological data and to identify a potential network of conservation areas. We used an analytical method (The Nature Conservancy 1997) that subjects traditional species data sets, spatial land data, and data derived from experts to a set of criteria that evaluates areas for inclusion in the network. Highlights of this method include: (1) consideration of both species and natural vegetation communities resulting in a fine- and coarse-scale analyses of important areas across the Ecoregion; (2) integration of a variety of data sources including contemporary data from more than 100 experts working throughout the Ecoregion in federal, state, tribal, and local agencies, academic institutions, conservation groups, and private sector natural resource professionals, and; (3) identification of a network of conservation sites that emphasizes habitat conservation for multiple species and ecological processes.

Table 1. Land Area Statistics For the Sonoran Desert Ecoregion.

States	***Acres***	***Hectares***	***% of Ecoregion***
Arizona	22,296,209	9,023,152	40.4
Sonora	21,960,094	8,887,128	39.8
California	6,323,537	2,559,100	11.4
Baja	4,620,003	1,869,690	8.4
Total	**55,199,843**	**22,339,070**	
Biotic Subdivisions			
Lower Colorado River Valley	30,041,203	12,157,508	54.4
Arizona Upland	14,413,246	5,832,960	26.1
Plains of Sonora	8,388,473	3,394,769	15.2
Central Gulf Coast	2,356,921	953,833	4.3
Total	**55,199,843**	**22,339,070**	
Land Manager/Owner			
Mexico Private/Communal Land	23,064,090	9,333,909	41.8
Bureau of Land Management	9,226,331	3,733,853	16.7
U.S. Private Land	5,385,109	2,179,326	9.8
Tribal Land	3,998,746	1,618,268	7.2
Department of Defense	3,198,015	1,294,221	5.8
State Land	3,087,365	1,249,480	5.6
Mexico Biosphere Reserves	2,792,019	1,129,914	5.1
U.S. Fish & Wildlife Service	1,623,914	657,190	2.9
Mexico Proposed Protected Areas	944,418	382,200	1.7
U.S. Forest Service	869,025	351,691	1.6
National Park Service	401,570	162,510	<1
State Park	345,092	139,656	<1
The Nature Conservancy	23,761	9,616	<1
Total	**54,959,455**	**22,241,834**	
Special Status Areas			
Wilderness (BLM & USFS) *****	3,780,497	139,656	6.8
BLM Areas of Critical Environmental Concern *****	843,225	341,248	1.5
Lands Unaccounted For			
Portions of Salton Sea not attributed	172,354	69,779	
Portions of CA not attributed	100,000	40,485	
Total Unaccounted Lands	**272,354**	**110,264**	

****** Not included in total under "Land Manager/Owner" because these lands are subsets of BLM and USFS lands.*

There are many advantages to identifying conservation priorities at the scale of an Ecoregion. Ecoregions are useful units for understanding and addressing environmental issues that transcend agency, watershed, and political boundaries, such as air pollution, water consumption, invasive exotic plants and animals (Bailey 1998). Conservation needs are framed at a scale amenable to implementation by local, regional and national entities. Finally, a landscape-scale analysis provides one context for evaluating funding needs and expenditures of conservation management dollars.

Identifying conservation priorities at an Ecoregional scale reinforces the shared responsibility for biodiversity conservation among many private and public entities and emphasizes the fact that ecosystem management efforts that end abruptly at administrative or international boundaries are, in the long-term, unlikely to accomplish the overall goal of biodiversity conservation. Working at the scale of an Ecoregion does not address all conservation needs, however. This effort does not obviate the need to address species-specific issues for threatened and endangered species listed under the Endangered Species Act. Nor does it explicitly address certain goals that may be important in local planning efforts, such as open space and "viewsheds."

Development of this project was facilitated by a technical team comprised of staff from The Nature Conservancy, Sonoran Institute, Instituto del Medio Ambiente y desarrollo Sustentable del Estado de Sonora (IMADES), and the Arizona Game and Fish Department with the assistance and input of more than 100 experts from all four states comprising the Ecoregion. The technical team compiled all digital and expert-derived data, and worked through the various steps described in this document to identify the network of Conservation Sites.

The Sonoran Desert Environment

Readers interested in a comprehensive treatment of Sonoran Desert ecology should refer to the publications by the Arizona-Sonora Desert Museum, *A Natural History of the Sonoran Desert* (Phillips and Wentworth Comus 2000); and University of Arizona Press, *Ecology of Sonoran Desert Plants and Plant Communities* (Robichaux 1999). Below we provide a brief overview of the Desert's history, geography, and ecological attributes.

The Sonoran Desert is the most tropical of the three North American warm deserts (Sonoran, Mojave and Chihuahuan). The geographic extent of the Sonoran Desert is thought to have evolved only during the last 1.5 million years as the Ecoregion became increasingly arid (MacMahon and Wagner 1985). Throughout this period, climatic fluctuations resulted in expansion and contraction of desert vegetation. The modern geographic extent and vegetation communities of the Sonoran Desert are thought to have been established within the past 4,500-9,000 years under modern climatic regimes (Van Devender 1990). The boundaries of the Sonoran Desert are most sharply defined where steep elevational gradients result in abrupt changes in micro-climate and vegetation,

especially along the mountain ranges in south-central Arizona and north-central Baja California. In other areas, such as along the California-Arizona border, elevational gradients are gradual and the ecoregional boundary could be viewed as an arbitrary break between the Sonoran and Mojave deserts (**Figure 3**). Based on Brown and Lowe (1980), modified from Shreve (1942, 1951) and Shreve and Wiggins (1964), the Sonoran Desert consists of six Subdivisions, spanning from 23^0 to 35^0 north latitude. These Subdivisions include the Lower Colorado River Valley, Arizona Uplands, Plains of Sonora, Central Gulf Coast, Vizcaíno, and Magdalena. The Vizcaíno and Magdalena Subdivisions were omitted from this analysis (*see section IV below*), so the area evaluated in this effort lies north of 27^0 longitude. All of the Sonoran Desert Ecoregion drains either into the Colorado River or directly into the Gulf of California, except for several closed basins, including the Salton Sea and Laguna Salada.

The climate of the Sonoran Desert Ecoregion is continental, with moderation in climatic extremes provided by the Gulf of California. Average high temperature ranges from 50^0F (10^0C) in January to 91^0F (33^0 C) in July, though this range varies with latitude and elevation. Occasional severe frosts occur at higher elevations, and cold temperatures likely limit the distribution of the emblematic saguaro cactus, among other species (Spalding 1909). Although frost-free periods range from eight to twelve months, the potential growing season is also limited by drought. Rainfall exhibits a bimodal pattern with frontal systems bringing rain in the late fall and early winter and convectional systems resulting in sporadic but intense thunderstorms in the late summer. Total rainfall increases as one moves west to east, with greater rainfall in higher elevations along the northern and eastern edges of the Ecoregion. Winter brings 0.8 to 6.0 inches (20-152 mm) of precipitation and summer 0 to 6.0 inches (0-150 mm).

Most of the Sonoran Desert lies below 2,600 ft (~800 meters) (**Figure 4**). Much of the bedrock is granite and gneiss with extensive areas of volcanic origin, the largest volcanic mountain being Pinacate Peak in northern Sonora. The Sonoran Desert has much of the geologic diversity of the Basin and Range province with both calcareous and acidic bedrock types. The low, rocky ranges typically remain below 4,000 ft (~1,200 m), generally oriented from northwest to southeast. The Sonoran Ecoregion harbors the most extensive desert dune system in North America—the Gran Desierto in northwestern Sonora.

We used four of the Ecoregion's biotic Subdivisions to stratify the analyses and to develop Conservation Criteria that would capture geographic and ecological diversity. Attributes of the Ecoregion's four Subdivisions considered in this analysis are described below. Land area statistics for the four Subdivisions are provided in **Table 1**.

Lower Colorado River Valley Subdivision

This largest and most arid Subdivision of the Ecoregion encompasses 30 million acres (9.3 million ha). It is dominated by rolling plains and vegetation communities dominated by creosote bush-white bursage (Brown 1982, 1994). Coastal and interior dune systems are best developed here (*e.g.,* Gran Desierto, Algodones Dunes, Mohawk Dunes, Pinta Sands). Playa lakes, or closed basins temporarily filled with water, are also best developed in this Subdivision (*e.g.*, Salton Sea). The Colorado and Gila River systems, both originating at higher elevations north and east of the desert, historically supported extensive areas of cottonwood-willow riparian woodlands and marsh habitats. Both river systems also fed the once extensive Colorado River Delta. Many riparian systems now support extensive agricultural production. California fan palm oases occur with desert seeps in canyons mostly north and west of the Salton Sea.

A gradual transition to Mojave Desert vegetation occurs along a line from the southern border of Joshua Tree National Park northeast to the border with Arizona. In northeast Baja, CA, low-lying creosote-bursage desert scrub transitions rapidly to interior and coastal chaparral along mountain slopes to the west, and increasingly towards agave-bursage scrub to the south. Major urban centers of this Subdivision include Phoenix, Yuma, El Centro, and Mexicali.

Arizona Uplands Subdivision

Comprising 14.4 million acres (5.8 million ha) this Subdivision forms the transition between the plains of the Lower Colorado River Valley and the higher elevations of the Apache Highlands Ecoregion to the north and east. The Arizona Uplands receives significantly greater winter rainfall than the other four Subdivisions (Brown 1982, 1994). Palo verde-mixed cacti desert scrub communities form the matrix vegetation community, with extensive stands of saguaro cacti intermingled with cholla, organ pipe, barrel cacti and prickly pear, palo verde, jojoba, brittlebush, creosote bush, ocotillo, mesquite, cat-claw acacia, and ironwood. Cottonwood-willow riparian woodlands and velvet mesquite bosque were historically significant along major rivers such as the Salt, Gila, San Pedro, Santa Cruz, Bill Williams, and Magdalena, but most have been eliminated or severely altered through agricultural conversion, invasive exotic introductions, dams, diversions, and overdraft of groundwater. At elevations above 3300 feet (~1000 m) Sonoran desert scrub communities give way to semi-desert grassland and Chihuahuan desert scrub (Whittaker & Niering 1964). Major urban centers within this Subdivision include the city of Tucson.

Plains of Sonora Subdivision

Comprising approximately 8.4 million acres (3.4 million ha) this southern, interior Subdivision forms the transition between coastal desert scrub to inland, sub-tropical short tree and thornscrub communities of the Sierra Madre Occidental. Elevations range from

roughly 300 ft to 2,500 ft (~100 to 750 m), with a climate of dry, warm winters and moderately warm, wet summers (Brown 1982, 1994). Ironwood and brittlebush form the dominant desert scrub community on the Plains. Much of the central interior of this Subdivision was historically dominated by savanna grassland. Agricultural land uses have resulted in a loss of grasses and conversion towards mesquite, acacia, and other thornscrub. In general, species richness, vegetation density, short tree abundance, and the appearance of tropical plant species within desert scrub communities increases from north to south through this Subdivision. Columnar cacti, such as saguaro and organ pipe, steadily decrease in abundance to the south with saguaros reaching their southern limit near Hermosillo (McGinnies 1981). Riparian woodlands historically supported mesquite bosques, with tropical trees such as pochote and tree morning glory. Agricultural conversion is most concentrated along riparian zones and on the alluvial delta of the Río Sonora. Major urban centers include Hermosillo.

Central Gulf Coast Subdivision

The Ecoregion's smallest Subdivision (2.3 million ac; 0.9 million ha) sits along the west coast of Sonora in a roughly a 20-mile wide strip of coastal plain and steep mountain ranges, including the islands of Tiburón and San Esteban. Rainfall in this hottest Subdivision is sporadic and unreliable (Brown 1982, 1994). Heterogeneous and sparsely-vegetated communities of short-trees, columnar cacti, and mixed shrubs, including copal, torchwood, cardón, ironwood, palo verde, mesquite, and ocotillo, are common. Saltbush, *Frankenia,* saltmarsh, and mangrove swamp occur on low interior plains and coastal lowlands. A high degree of plant species endemism and a suite of species more common to Baja California (Vizcaíno Subdivision) is a characteristic of Central Gulf Coast vegetation communities. Agricultural conversion is concentrated along riparian zones and on the alluvial delta of the Rio Sonora. Major urban centers include Guaymas.

Human Environment

Humans have relied upon the Southwest's natural resources since their arrival more than 10,000 years ago. The most recent overviews of tribal peoples in the Sonoran Desert (Heizer 1978; Ortiz 1983) list more than a dozen groups with historic ties to the Ecoregion. Many early cultures inhabiting the Sonoran Desert Ecoregion relied on a broad strategy of hunting and gathering as a means of survival. The earliest examples of this strategy occurred in the Archaic Period, beginning as early as 7,500 or more years ago continuing until roughly AD 200 (Cordell 1997). Archaic peoples collected plants and hunted a variety of small game animals. Most lived in small settlements that shifted throughout the year depending on the seasonal availability of different types of food.

The Pima, Yaqui, and many of the Tohono O'odham grew crops in irrigated fields, supplementing crops with hunted and gathered food. Water control was a prerequisite to

reliable food production and larger sedentary settlements. Many approaches to irrigation used by these indigenous peoples would be adopted by the Europeans who eventually settled in the region and faced the same challenges of growing food in an arid environment.

The first Europeans to enter the Sonoran Desert Ecoregion were Spanish explorers in the 1530s and early 1540s who came from points south primarily in search of riches (Hartman 1989). By 1700 Spanish settlements were widely dispersed throughout much of Sonora and southern Arizona (Spicer 1962, Gerhard 1993). Spanish expansion northward continued following the Mexican War of Independence in 1821, though the non-indigenous population grew slowly reaching only about 7,600 by 1760, and perhaps 15,000 by 1821 (Gerhard 1993).

Following the Mexican-American War of 1846 Anglo Americans from the United States expanded into newly-acquired American territories of Arizona, California, and New Mexico. Much of the initial settlement followed the general pattern of Hispanic efforts with emphasis on agriculture, animal husbandry, and mining (Sheridan 1995). Livestock use, in particular, increased with the largest stocking rates in the Ecoregion's history occurring at the end of the 19th century. Large-scale water control at the turn of the century, developed further with the construction of major dams in the U.S. beginning in 1912, increased the rate of development within the Ecoregion by providing a more reliable economic foundation. The establishment of rail links with parts of Mexico and the U.S. further promoted economic growth by vastly improving communication and interaction with areas outside of the Ecoregion.

Control of the Ecoregion's rivers and the advent of pumping technology to extract groundwater in the first half of the 20th century spawned a large agricultural economy based primarily on cotton and more recently on a range of other vegetable, grain, and forage crops. Floodplains of many of the Ecoregion's rivers were converted from native riparian vegetation to large-scale agricultural production. However, since 1970 the amount of irrigated land has declined due to salinization, increased pumping costs, and groundwater and soil contamination (Nabhan and Holdsworth 1999).

Mining for precious metals was a major impetus for exploration and early settlement by European colonizers. In the 20th century copper mining became a dominant industry in Arizona, with the state accounting for more than 60 percent of U.S. copper production (USGS 1999). A 1992 revision in Mexico's mining law that provided for foreign investment resulted in an expansion of mining in northern Mexico, Sonora in particular (Nabhan and Holdsworth 1999).

The end of World War II ushered in the beginning of the Ecoregion's most rapid period of population and economic growth and expansion of land uses. Much of the population growth occurred through migration to the "sunbelt" from regions well outside of the Sonoran Desert, primarily in search of economic opportunity. Population in the Sonoran Desert Ecoregion in 1970 totaled approximately 3.5 million (Nabhan and

Holdsworth 1999). By 1990 the population had reached 6.9 million. Average annual population growth reached 4.1% during the 1970s, slowing only slightly to 3.3% during the 1980s and to 3.2% in the first half of the 1990s (Gorenflo 2000). For comparison, the average annual population growth for the entire U.S. is 0.84%, and 1.6% for Mexico. At a growth rate of 3.2%, population doubles approximately every 22 years. Rapid, sustained population growth is anticipated to continue through at least the next two decades on both sides of the border with the total population nearing 12 million by 2020 (Nabhan and Holdsworth 1999). **Figure 5** depicts projected population growth by U.S. County and Mexico Municipios.

Issues directly and indirectly related to conservation of biodiversity have resulted in government action at national, state, and local levels in both Mexico and U.S. (Emanuel 2000). Witness the State of Sonora System of Protected Natural Areas (SANPES), the California Desert Protection Act, designated National Conservation Areas in Arizona, and Pima County's Multi-Species Habitat Conservation Planning Effort. As the Ecoregion's population continues to increase so will attention to issues concerning biodiversity. The analyses compiled in this document provide one framework in which to evaluate future decisions about use of natural resources and conservation of biodiversity.

Outreach and Coordination

This initial exercise of compiling and analyzing data for the Sonoran Desert Ecoregion involved scientists and technical experts familiar with the desert's natural landscapes. To help ensure broad understanding of the effort by those not directly engaged in the initial exercise, Sonoran Institute and The Nature Conservancy developed and carried out an outreach program over a 24-month period to a broad suite of interests within and beyond the Ecoregion. The purpose of this effort was to build an understanding of the process; to illustrate how the results might be used in Ecoregion-wide conservation management issues; and to garner support for participation by staff from various agencies, groups, and institutions. Over the 24-month period we took the opportunity (and continue to do so) to introduce the project at numerous meetings throughout the Ecoregion. In some cases special meetings were called. However, the outreach effort largely took advantage of other gatherings to inform and update varied audiences, with special attention given to public land managers, non-governmental organizations, Tribal and community leaders. These opportunities included the following:

1st Annual Border Environment Conference: Ciudad Juarez, Mexico, March 1998. Target audience: Mexico and U.S. conservation and community development non-governmental organizations.

Border XXI Program: San Diego, March 1998; Ensenada, Baja California, May 1999. Target audience: regional/national staff of U.S. and Mexico agencies collaborating on EPA/SEMARNAP joint environmental management.

Borderlands Protected Areas Managers: Cabeza Prieta National Wildlife Refuge, March 1998; Tucson, August 1998; Ajo, March 1999; Tumacacori, August 1999. Target audience: public land managers of National Park Service, Fish and Widlife Service, Bureau of Land Management, Department of Defense, SEMARNAP in Arizona and Sonora.

Field Coordinating Committee: Santa Fe, April 1998. Target audience; local and regional staff of Department of Interior agencies active along the US-Mexico border.

Arizona Riparian Council: Yuma, April 1998. Target audience: Mexican and U.S. agency, university, and other professional managers and scientists.

Sonoran Desert Ecosystem Partnership W**orking Group: Organ Pipe Cactus National Monument, April 1998.** Target audience: public land managers of NPS, FWS, BLM, SEMARNAP in Arizona and Sonora.

International Sonoran Desert Alliance: Sonoyta, April 1998; Puerto Penasco, December 1999. Target audience: community-based borderlands conservation organization with memberships in 13 cities, towns and settlements in Arizona and Sonora.

1st Symposium on Water and Environmental Issues of the Colorado River Border Region: San Luis Rio Colorado, Mexico, April 1998. Target audience: scientists, managers, politicians, and non-governmental organizations gathered to discuss how the binational compact governing Colorado River water use could be used to ensure allocation for ecosystem function.

Barry M. Goldwater Range Partners Working Group: Luke Air Force Base, May 1998; Tucson, January 2000. Target audience: U.S. Marine Corps, Air Force military and civilian staff, Dept. of Interior staff, and non-governmental organizations.

9th US/Mexico Border States Conference: Tucson, June 1998. Target audience: scientists, resource managers working along the U.S./Mexico border.

4th Maya Forest Workshop On Cross-Border Coordination: San Cristobal de las Casas, Chiapas, Mexico, June 1998. Target audience: SEMARNAP personnel.

Dept. of Defense Legacy Program Environmental Staff: Washington January 1999. Target audience: civilian environmental staff at DOD HQ, Pentagon.

Dept. of Interior U.S./Mexico Border Program: Washington January 1999. Target audience was: associated with Interior's involvement with Border XXI, Letter of Intent, and Federal Coordinating Committee.

U.S. Fish and Wildlife Service Office of Migratory Birds: Washington January 1999. Target audience: national staff in Migratory Bird and Refuge offices involved with Joint Venture programs.

World Wildlife Fund Chihuahuan Desert Ecoregional Planning Team: Washington, January 1999; Tucson, November 1999. Target audience: program officers coordinating the Chihuahuan Desert Ecoregional Effort.

National Defense Industry Association Conference: Denver, March 1999. Target audience: civilian and military environmental staff, private defense contractors.

U.S. Fish and Wildlife Servic Sonoran Desert All Bird Joint Venture: Tucson, April 1999. Target audience: U.S. state and federal agencies participating in the design of Joint Venture and it's integration with the Sonoran Ecoregion Project.

Exotic, Invasive Plants Workshop: Organ Pipe Cactus National Monument, June 1999. Target audience: resource management staff from federal and state agencies along border in U.S. and Mexico.

2nd Annual US/Mexico Protected Area Collaboration Letter of Intent, Tucson, July 1999. Target audience: national, regional, and local staffs of U.S., Mexico, and Tribal agencies participating in implementation of the sister protected area Letter of Intent for Arizona and Sonora.

Strategic Environmental Defense Research Program: Washington, December 1999. Target audience: civilian and military environmental staff, university staff, and defense contractors.

Southwest Strategy Regional Executive Committee: Phoenix, February 2000. Target audience: regional directors of Dept. of Interior, Dept. of Defense, and Dept. of Agriculture agencies participating in the SW Strategy.

Science Technical Advisory Team for Pima County's Multi-Species Habitat Conservation Planning effort: Tucson, March 2000. Target audience: scientists, agency natural resource managers, consulting professionals and members of the public participating in planning effort.

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II. BIODIVERSITY CONSERVATION TARGETS

For the purpose of this Ecoregional analysis we adopted the definition of biodiversity articulated by Redford and Richter (1999): *the natural variety and variability among living organisms, the ecological complexes in which they naturally occur, and the ways in which they interact with each other and the natural environment.* We used the key components of biodiversity—variety, variability, ecological complexes, and interaction—in identifying the basic unit for this analysis, the Conservation Target.

An ideal analysis might include all species found in the Ecoregion as Conservation Targets. This is impractical, however, because the Sonoran Desert Ecoregion harbors thousands of species, at the minimum, and our knowledge and available data are limited to a small subset. In order to overcome these gaps while still incorporating the key components of biodiversity described above, we used the *Coarse Filter-Fine Filter* approach in identifying a list of Conservation Targets.

The Coarse Filter is represented by ecological groups, or assemblages of plant species that are found in recurring patterns across the landscape. We assumed that because ecological groups occur at larger scales than individual species they also capture abiotic components that support biodiversity and ecological processes (*e.g*, soil types, microclimates). They, therefore, are used to represent the vast majority of species in the Ecoregion from common plants, to insects, to soil microbes. The Fine Filter is comprised of the species for which distributional and population data are better known and catalogued in databases such as those housed in Natural Heritage Programs. They are species that, due to their rarity or habitat requirements, would not likely be represented adequately by the coarse filter. The primary advantages of the *Coarse Filter-Fine Filter* approach include: (1) evaluates biodiversity at two different scales emphasizing the habitats in which the Ecoregion's species inhabit; (2) maximizes the number of species represented; (3) captures the variability in ecological conditions in which species occur; and (4) helps compensate for data gaps that result from uneven species inventory across an Ecoregion. We solicited expert input on the Conservation Targets list prior to and during the two-day experts workshop described below and made modifications (both additions and deletions) based on their input.

Fine Filter Conservation Targets

For Fine Filter Conservation Targets we selected a representative cross section of species (and selected subspecies) from the following taxonomic groups: amphibians, birds, fish, invertebrates, mammals, plants, and reptiles. We selected both rare and common species. A total of 353 species was selected as Fine Filter Conservation Targets (**Appendix 1**). We used the Natural Heritage Program ranking system to assist in selecting Fine Filter Targets. That system uses a five-category ranking to describe a species' rarity. A ranking of Global 1 (G1) characterizes the rarest species, while G5 characterizes the

most common (see **Appendix 2**). Global ranks for each Conservation Target were reviewed and further categorized to aid in assessment and application of Conservation Criteria identified below. For example, complex global ranks such as G2G3 were conservatively treated as G2 for purposes of meeting Conservation Criteria. See **Appendix 2** for rules used in streamlining global ranks. Fine Filter Conservation Targets were classified as endemic, limited, disjunct, widespread, or peripheral, relative to the Sonoran Desert Ecoregion (see **Table 2** for definitions and **Appendix 1** for Target classifications). This attribute was used to ensure that the selection of Targets was based on criteria other than global ranks (*i.e.*, distribution).

Table 2. Global Distribution Characteristics for Conservation Targets in the Sonoran Desert Ecoregion[1].

Distribution	Characteristics
Restricted/ Endemic	Species or vegetation community occurs primarily in one Ecoregion: it is either entirely endemic to the Ecoregion or has more than 80% of its range within Ecoregion.
Limited	Species or vegetation community occurs in the Ecoregion, but also within a few other adjacent Ecoregions (*i.e.*, its core range is in one or two Ecoregions, yet it may be found in several other Ecoregions).
Widespread	Species or vegetation community is distributed widely in several to many Ecoregions, and is distributed relatively equally among Ecoregions. Widespread does not necessarily mean "common." For example, some wetland types are distributed widely, although total acreage is small and the occurrences are widely separated.
Disjunct	Species or vegetation community occurs in the Ecoregion as a disjunct from the core of its distribution (less than 10% of its total distribution is in Ecoregion), and is more commonly found in other Ecoregions. Disjunct occurrences of communities reflect similarly disjunct occurrences of key environmental factors or ecological processes, and these occurrences may represent variation in composition, structure, and potential for evolutionary divergence.
Peripheral	Species or vegetation community is more commonly found in other adjacent Ecoregions (less than 10% of its total distribution is in the ecoregion of interest). Peripheral occurrences may or may not represent significant variation relative to occurrences in adjacent ecoregions. Goals for peripheral communities should account for the fact that most of their conservation will take place in other ecoregions. Opportunistic capture of these types often may be sufficient. Selection of examples for conservation should be informed by consideration of how they compare in size, quality, and variation with those in the adjacent or other ecoregions.

[1] distribution characteristics from Anderson *et al.* 1999.

We selected nearly all G1 through G3 species for which data were available, for these are the Ecoregion's rarest elements (**Table 3**). We also selected a number of

common species, including wide-ranging species that require large areas for dispersal or are nomadic (*e.g.*, bighorn sheep and Sonoran pronghorn, respectively). Most species believed to be endemic to the Ecoregion were also included, regardless of their G rank. Experts nominated a number of species that remain unranked in national databases, yet are known by local experts to be rare, endemic, or in decline. Most of these species were included as Conservation Targets but left unranked (attributed as GU).

Table 3. Conservation Targets for the Sonoran Desert Ecoregion by Taxonomic Group and Global Rank.

Taxon	Total	G1 (rarest)	G2	G3	G4	G5 (most common)	GU (un-ranked)
Amphibian	**7**	1	2	2	2		
Bird	**31**	3	3	9	6	8	2
Vegetation Communities[1]	**79**	2	7	15	16	10	29
Fish	**25**	7	4	7	1	2	4
Invertebrate	**56**	9	6	3	3	3	32
Mammal	**31**	3	3	3	8	3	11
Plant	**171**	31	40	55	15	5	25
Reptile	**32**	3	3	9	4	2	11
Total	**432**	**59**	**68**	**103**	**55**	**33**	**114**

[1] Total includes 78 natural vegetation community types plus "ecological gradient." The 78 vegetation communities were combined into 23 ecological groups for evaluating Conservation Criteria. See Section III.

Coarse Filter Conservation Targets

All terrestrial natural vegetation communities native to the Sonoran Desert Ecoregion were identified as Conservation Targets. We started with available data for 78 natural vegetation communities at the *Association*- and *Series*-level (Brown 1982, 1994), and then aggregated them into 23 ecological groups (**Appendix 1**). Ecological groups reflect similarity in environmental setting and characteristic ecological processes. For example, six wetland vegetation associations were aggregated into a Desert Riparian Woodland ecological group. Similarly, six desertscrub associations were aggregated into a palo verde-mixed cacti desertscrub ecological group. Some, but not all, ecological groups match directly the *Series*-level types defined by Brown (1982, 1994). We used ecological groups as the unit of analysis for the coarse filter. This grouping also aided in linking classification units to available vegetation data and land cover maps. **Figure 6** presents natural vegetation community data (at the level of ecological group) compiled for the Sonoran Desert Ecoregion. Sources for mapped vegetation data included GAP Analysis maps for California and Arizona (Arizona Gap Program 1998, Davis *et al.* 1998), a refined

vegetation coverage in California from the Bureau of Land Management, and a processed satellite image produced by IMADES for the Mexican states of Sonora and Baja California (IMADES 1998).

Ecological groups and the natural vegetation communities that define them were also categorized by their global distribution pattern (**Table 2**) and typical spatial expression in the Ecoregion (**Table 4**) to ensure that records were captured based on both qualitative and quantitative characteristics and to ensure that aspects of biodiversity of this Ecoregion were based on criteria other than global ranks (*e.g.*, distribution).

Aquatic Conservation Targets

A comprehensive aquatic community classification is not available for the Sonoran Desert Ecoregion. Nonetheless, several aquatic communities were identified, including seeps, basins or *tinajas*, and springs, intermittent and perennial streams, and playa lakes. Riparian and wetland communities also served to capture related aquatic communities. For the most part, aquatic elements of biodiversity were addressed through the identification of Fine Filter aquatic species. For example, recognizing that the Ecoregion's fish fauna and their riverine habitat are among the most threatened entities in the Ecoregion, we included nearly all native fish species as Conservation Targets.

Other Conservation Targets

Experts identified areas within the Sonoran Desert Ecoregion that harbor particularly high levels of biodiversity for individual taxonomic groups or provide important habitat for large numbers of a particular species (*e.g.*, stopover locations for neotropical migratory birds, or particular diverse assemblages of invertebrates). Since these features are of obvious importance to the particular taxonomic group and, perhaps, other taxa, we included the following elements as Conservation Targets: migratory bird concentration area, bee biodiversity area, and aquatic invertebrate biodiversity area.

To highlight areas that capture a wide range of ecological conditions we also used the "ecological gradient" as an explicit Conservation Target. Ecological gradients capture variability in landscape features such as slope, elevation, aspect, abiotic diversity such as soil types and levels of insolation, as well as biotic diversity in the form of vegetation communities. The primary assumption behind the ecological gradient is that maintaining a high level of variability in these features translates to variability in ecological conditions, protection of genetic diversity within populations, and, thus, opportunities for species' distributions to change with changing environmental conditions.

Table 4. Typical Spatial Patterns for Natural Vegetation Communities Used to Define Ecological Groups in the Sonoran Desert Ecoregion[1].

Spatial Pattern	Characteristics
Matrix	Vegetation communities form extensive and contiguous cover 2,000 to 500,000 ha in size. Occur on Ecoregion's most extensive landforms and typically have wide ecological tolerances; aggregate of all matrix communities covers 70-80% of Ecoregion; often influenced by large-scale processes (*e.g.*, climate patterns). *Examples*: saguaro cactus-velvet mesquite shrubland.
Large Patch	Vegetation communities with interrupted cover ranging in size from 50 to 2,000 ha. Aggregate of all large patch communities may cover as much as 20% of the Ecoregion. *Examples:* blue palo verde-ironwood-smoke tree woodland, jojoba-yellow paloverde shrubland.
Small Patch	Vegetation communities that form small, discrete areas of cover one to 50 ha in size. Occur in very specific ecological settings, such as on specialized landform types or in unusual microhabitats. May contain disproportionately large percentage of Ecoregion's total flora, and also support a specific and restricted set of specialized fauna. *Examples:* cattail marsh, California fan palm oasis.
Linear	Communities occur as linear strips. Often represent ecotone between terrestrial and aquatic systems. Aggregate of all linear communities covers only a small percentage of the natural vegetation of the Ecoregion. Local scale processes, such river flow regimes, strongly influence community structure and function, leaving communities highly vulnerable to alterations in the surrounding land and water-scape. *Examples:* cottonwood-willow riparian woodland, coastal dune communities.

[1] spatial pattern characteristics from Anderson *et al.* 1999.

III. CONSERVATION CRITERIA

The objective of this project is to identify a network of areas that, with proper management, would help insure the long-term persistence of the Ecoregion's biodiversity. The extent to which this can be accomplished is a function of (1) selecting a representative set of Conservation Targets; (2) selecting Conservation Criteria that are robust enough to ensure long-term persistence; and (3) identifying a sufficient number and distribution of viable populations across the Ecoregion to meet Conservation Criteria.

Conservation Criteria for Fine Filter Conservation Targets

Because detailed demographic and habitat data are not available for most Conservation Targets, Criteria represent a working hypothesis for the question, *How much is enough to retain viability over the long-term?* For most Conservation Targets it is currently not possible to answer this question with certainty. As with all scientific endeavors, this hypothesis should be tested and periodically reassessed. Conservation Criteria for fine filter Targets are provided in **Table 5**. We believe these Criteria are moderate for most Targets. For vulnerable or declining Targets, the Criteria may be inadequate. None of the Criteria used in this analysis should be used in lieu of criteria or goals established under other analyses (*i.e.*, recovery plans for listed endangered or threatened species). We used several assumptions in developing Conservation Criteria:

- The four ecological Subdivisions of the Sonoran Desert Ecoregion represent significant ecological variation for Conservation Targets. Representing and replicating examples of each Target within each of the Subdivisions in which it naturally occurs aids in conserving the Target's natural range of ecological conditions and genetic diversity, thereby increasing the probability the Target could evolve in a changing environment.

- The viability of individual Conservation Target records identified by experts as "medium" or "high" indicates viability for at least the next 25 years.

- For Conservation Targets with natural ranges extending beyond the Sonoran Ecoregion, similar Critera will be applied in other Ecoregional analyses to ensure that rangewide variability is conserved.

- The global status ranks applied to Conservation Targets (G1, G2, etc.) reflect the potential for irrecoverable loss of a species or natural vegetation community type. Maintaining rangewide numbers of viable populations at the level of G3 and above provides sufficient levels of conservation.

Table 5. Conservation Criteria for Fine Filter Conservation Targets**.**

Criteria 1:	Maintain all viable occurrences of G1 and G2 Conservation Targets and those listed as "endangered" or "threatened." *Specific numerical targets could not be uniformly identified for this group since, in some cases, their natural distribution is extremely limited (e.g., one or two sites).*
Criteria 2:	Maintain all viable native fish populations and the stream reaches where they occur. *Experts concluded that the native fish fauna, as a whole, had been degraded to the point where further losses would only result in diminished viability or functional extinction, and that, in some cases, without significant restoration some Conservation Targets would not be restored to viability.*
Criteria 3:	For rare, vulnerable taxa, or species of special concern (G3, G4, G5 Targets that are endemic or that have limited distribution in Ecoregion), maintain ≥ 6 viable occurrences in each Subdivision, or ≥ 24 occurrences for all Subdivisions in which the species occurs, to maintain their status at the rank of G3 or above.
Criteria 4:	For species of special concern (endemic G4-G5; S1-S2) maintain ≥ 6 viable occurrences in each Subdivision (or ≥ 24 occurrences for all Subdivisions in which the species occurs).
Criteria 5:	Conserve all known critical ecological features such as migratory bird concentration areas, bat roosts, estuaries, springs, invertebrate concentration areas.

Conservation Criteria for Coarse Filter Conservation Targets

For ecological groups we considered the distribution of their respective vegetation communities relative to the Ecoregion, their typical spatial pattern, and the scale of classification resolution in developing Conservation Criteria (Anderson *et al.* 1999). Conservation Criteria are expressed in two forms depending on the typical spatial pattern of the ecological group. For the two ecological groups that form the "matrix" of the Ecoregion (creosote-bursage and palo verde mixed cacti desert scrub) Conservation Criteria are expressed as a percentage of the historical extent of component vegetation communities (*circa* 1600-1800), while those for patch-forming communities are expressed as a number of occurrences (**Table 6**).

In the context of identifying a network of Conservation Sites, expressing Criteria as an areal extent has several advantages. Matrix-forming vegetation communities communities are overwhelmingly dominant on the landscapes of the *Lower Colorado River Valley* and Arizona Upland Subdivisions. They also dominate large, interconnected areas identified as Conservation Sites. Splitting this interconnected network into discrete

occurrences (*e.g.*, a point on a map vs a broad interconnected area) in order to assess how well Conservation Criteria were met has little meaning given the ecological importance of matrix community types in the long-term conservation of biodiversity. Areal measures have been commonly applied to reserve design criteria at national scales utilizing theory derived from island biogeography (MacArthur and Wilson 1967, Wilcox 1992, Soule and Sanjayan 1998). Because, over time, larger areas support more species, Criteria expressed as an areal extent are a more robust hedge against species loss in an increasingly fragmented landscape. For example, Wilcox (1992) estimated that with a 90% decrease in habitat extent (*e.g.*, Conservation Criteria = 10%), one could expect a 30% decrease over time in the species supported by the habitat. Using inferences from this relationship, the practical experience of managing reserves in fragmented landscapes, and the greater likelihood of intensive development occurring on less disturbed lands remaining outside of conservation areas, we selected an initial Conservation Criteria for matrix-forming communities of 30% by Ecoregional Subdivision.

Ecosystems are dynamic, changing at varying rates with short-term cycles and long-term trajectories. An ecological "coarse filter" should include consideration of ecological and environmental change. In essence, we are attempting to conserve a moving target. However, in many places short-term cycles *and* long-term trajectories have been abruptly altered through human land use, and have had obvious impact on native biodiversity (Wilson 1992). We placed areal estimates in a historical context by expressing the desired extent as a percentage of estimated area *circa* 1600-1800, the time period immediately prior to wide-spread European-American settlement. The 1600-1800 time period marks the beginning of the most extensive and rapid human/technology-driven changes to ecosystems, but is recent enough to reflect vegetation patterns under modern climatic conditions. It therefore, provides a useful and important reference point.

We estimated the historical extent of the two matrix ecological groups by the following method. We used GAP Analysis data and its equivalent for Mexico (Arizona Gap Analysis Progam 1998, Davis *et al*. 1998, IMADES 1998) to estimate the area currently comprised of urban development and agriculture for the Lower Colorado River Valley and Arizona Upland Subdivisions—the two Subdivisions in which the matrix ecological groups occur. We then added the amount of developed land from the Subdivisions to the current extent of each matrix vegetation type to derive the estimated historical extent. Because most of the urban and agricultural development in those Subdivisions is in low-lying flat areas (*i.e.*, valley bottoms and river corridors that are most likely to be dominated by creosote-bursage) we added 95% of the urban/agricultural area to the current extent of creosote-bursage scrub, and 5% of the urban/agricultural area to the current extent palo verde-mixed cacti scrub. Two factors suggest this was a reasonable approach to estimating historical extent for these matrix vegetation communities: (1) desert communities change slowly where not disturbed by human activity, so it is reasonable to assume that areas not under human development have vegetation communities similar to what was present before European settlement of the area, and; (2) since less than 10% of

the Ecoregion is in urban and agricultural development the overall area being factored is not large.

As noted above, Conservation Criteria for the ecological groups that exhibit large patch, small patch, or linear patch spatial patterns are expressed as a number of occurrences (**Table 6**). These Criteria follow similar assumptions and numerical estimates described by Anderson *et al*. (1999) and take into account the low classification resolution. To capture a community's variability, Criteria include representation among the Subdivisions in which the community naturally occurs (*i.e.*, spatial stratification) and replication. Few theoretical or empirical studies have addressed the question of how extensive and how many different examples of a particular vegetation community are needed to ensure conservation over the long term. As a starting point, we selected a minimum Criteria for replication: at least two viable occurrences of each natural vegetation community should be conserved within each Subdivision in which the community naturally occurs.

Table 6. Conservation Criteria for Natural Vegetation Communities in the Sonoran Desert Ecoregion Defined at the Scale of Ecological Group[1].

Distribution Relative to Ecoregion	Conservation Criteria for *large patch*, *small patch*, and *linear* vegetation community types (expressed as a number of sites) and for *matrix* vegetation communities (expressed as a percentage of historic extent).	
	Spatial Pattern in Ecoregion[2]	
	Ecological Groups Exhibiting Large Patch, Small Patch, or Linear Patch Spatial Patterns	*Ecological Groups Exhibiting a Matrix Spatial Pattern*
Endemic	60 sites[3]	30% [4]
Limited/Disjunct	40 sites[3]	
Widespread	20 sites[3]	
Peripheral	5-10 (evaluate case by case)[3]	

[1] We evaluated the extent to which Conservation Criteria were met using natural vegetation communities aggregated at the ecological group level.
[2] See **Table 4** for definitions of spatial patterns.
[3] Examples for particular patch type should be distributed among Subdivisions in which type naturally occurs (e.g., Lower Colorado River Valley, Arizona Uplands, Central Gulf Coast, Plains of Sonora).
[4] Historic extent *circa* 1600-1800.

IV. DATA PREPARATION AND SOURCES

Delineation of Ecoregion Boundaries

Ecoregions are large areas of land and water that share similar climate, physiography, and biotic communities (Bailey 1998). The Sonoran Desert Ecoregion was initially defined using the U.S. Forest Service ECOMAP Province scale (Bailey 1994). A bi-national workshop was held in 1996 to link the U.S. boundaries with those in Mexico, relying in part on work developed by the World Wildlife Fund (Dinerstein *et al.* 1995) in cooperation with CONABIO (La Comisión Nacional Para El Conocimiento Y Uso De La Biodiversidad). During this consensus process, U.S. and Mexican participants separated out most Baja, California portions of the Sonoran Desert, as defined by Brown and Lowe (1980; *i.e.*, Magdelana, Vizcaíno, and portions of the Central Gulf Coast Subdivision) from the northern and eastern parts of the Ecoregion (**Figure 3**). They included portions of the Sinaloan thornscrub community, as defined by Brown and Lowe (1980), within the Sonoran Desert Ecoregion.

To capture small portions of the Sonoran Desert in Arizona omitted by Bailey (1994), the ecoregional technical team adopted boundaries as described by Brown (1982, 1994). As a basis for structuring analyses the team also adopted four of Brown's Biotic Subdivisions described above (Lower Colorado River Valley, Arizona Uplands, Central Gulf Coast, and Plains of Sonora).

Data Sources

Natural Heritage Program Data

Natural Heritage Program Databases from Arizona, California, and Sonora provided 3,547 records for Conservation Targets and other species that occur within the Sonoran Desert Ecoregion but were not selected as Conservation Targets for this analysis. All records are spatially referenced and depicted on a map as a point. Some, but not all records, include estimates of viability and dates of last observation. Heritage data were not available for Baja, California.

Both the California and Arizona Natural Heritage Programs have managed detailed information for natural vegetation communities. These records are also spatially referenced, depicted as a point. Approximately 100 records were deemed usable for this analysis. All were coded to link them to ecological groups (described above). Since records for Arizona, and many examples from California, are as much as 20 years old, many community records were utilized only to confirm more recent expert-derived examples, or to suggest additional sites for refinement of the analysis.

Expert-Derived Data

To complement Natural Heritage data with contemporary information on Conservation Targets and the areas in which they occur, we convened an experts workshop to assist in populating the database used for this analysis. Expert sessions, where individuals work as part of a group, have proved to be an important tool in sorting through and integrating the complex set of environmental variables important to a species (McCoy *et al.* 1999). In May of 1998 we convened 106 experts from Arizona, Baja California, California, and Sonora for a two-day gathering at the University of Arizona in Tucson. Researchers and natural resource management professionals were invited from academic institutions, federal, state, and municipal government agencies, Native American Tribes, conservation organizations, and private corporations. Experts worked in taxonomically-aligned groups (*i.e.,* birds, invertebrates, fish, mammals, natural vegetation communities, plants, reptiles/amphibians) to identify areas needed to meet Conservation Critera established for each Conservation Target. Each taxonomic group had a facilitator, translator, and recorder.

Experts provided approximately 1,755 new data records for the Ecoregion. All expert data were digitized as polygons into a spatially-referenced geographic information data management system (**Figure 7**) and data forms were completed for each polygon that included the following pieces of information:

1) Location information for Conservation Targets and justification for boundaries drawn to delineate the area in which Conservation Targets were identified (on 1:500,000 scale maps).
2) Species and/or natural vegetation communities found at delineated site.
3) Information on the presumed viability of the Conservation Target, stated in general categories of high, medium and low. Some experts provided a brief description of characteristic processes and/or apparent threats or alterations.
4) Location and ownership/management information.
5) Date the Conservation Target was last observed by the expert.
6) Additional contacts and information on potential management opportunities.

Other Data Sources

Additional information on Conservation Targets was derived, or simply corroborated, from existing reports on designated wilderness and other conservation areas in Arizona and California. The Bureau of Land Management in California kindly provided data from their Colorado Desert Planning effort (Bureau of Land Management 1998). Additional Target occurrence information on natural vegetation communities, primarily at the scale of ecological group, was derived using available vegetation maps (described above).

All of the above data was compiled in a geographic information system using Arcview 3.1 (Environmental Systems Research Institute 1998). In addition, we obtained a variety of digital data layers to support analyses, including data on the Ecoregion's rivers, topography, land cover, soils, vegetation, human infrastructure (*e.g.*, roads, utility lines, etc.), land management status, and Thematic Mapper satellite imagery, among others.

Biophysical Analysis

We developed an additional spatial data set to characterize biophysical variation in the Sonoran Desert Ecoregion under the premise that abiotic features (*e.g.*, rainfall, temperature, insolation, landform, soil texture/pH, etc.) influence the distribution of Conservation Targets, particularly natural vegetation communities. We used the analysis to evaluate how well the network of areas identified for conservation represent the biophysical diversity of the Ecoregion.

The biophysical representation is an additional measure of ecological diversity to supplement our limited location-specific information on the natural vegetation communities that define our ecological groups. It enables delineation of Conservation Sites that encompass the characteristic range of environmental and, potentially, ecological gradients found in the Ecoregion. Conserving ecological gradients should aid in protecting ecological processes and the natural variation in habitat occupied by Conservation Targets. Protecting a range of environmental gradients should also protect genetic variation within species, thereby providing opportunities for speciation and adaptation to changing environments.

Comprehensive abiotic data sets for the entire Sonoran Ecoregion were not available, so we used five variables as indirect measures and developed a set of classes for each variable to map their distribution throughout the Ecoregion (**Table 7**). The complete coding system for the biophysical model is provided in **Appendix 3**. Biophysical units were mapped by superimposing a one-hectare grid over the Ecoregion. The combination of each variable and class resulted in a set of 438 unique biophysical units for the Sonoran Desert Ecoregion. See **Figure 8** for a spatial representation of biophysical units.

Sixty biophysical units related to agriculture and urban land uses were removed from the analysis. In addition, to avoid inclusion of biophysical units resulting from error in map data sources, those units representing less than 0.05% of each Ecoregional Subdivision were eliminated from consideration with the exception of steep slopes and cliff units, due to their natural occurrence as small areas and subsequent tendency for under-representation. This left 248 biophysical units for review and analysis. Biophysical units with less than 10% of their mapped extent captured by conservation sites were identified as potentially under-represented units.

Table 7. Variables and Classes Utilized to Assess Biophysical Representation in the Sonoran Desert Ecoregion.

Variable	Spatial Data Source	Classes
Climate	Brown & Lowe Subdivisions as surrogate for climate	4 classes: Lower Colorado, Arizona Upland, Central Gulf Coast, Plains of Sonora
Vegetation	Vegetation map depicting ecological groups (**Figure 6**)	15 vegetation classes
Elevation	Digital Elevation Model	4 classes: -75 to 400 m above sea level (ASL), 401-800 m ASL, 801-1075 m ASL, >1075 m ASL
Slope	Digital Elevation Model	3 classes: flat 0-6 degrees, mod.-steep 7-35 degrees, steep-cliff >35 degrees
Aspect	Digital Elevation Model	3 classes: flat, S/SW aspect (91-314 degrees), N/NE aspect (315-90 degrees)

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V. IDENTIFICATION OF CONSERVATION SITES

Analytical Steps

Conservation Sites were identified through a combination of computer assisted and manual processes that evaluated the following data: (1) records for Conservation Targets from Natural Heritage Program databases; (2) Target occurrence data provided by experts and from primary and grey literature not currently in a digital database (*e.g.*, wilderness study area reports); (3) spatial data sets for the Ecoregion's topography, hydrography, land use/land cover, GAP vegetation (and equivalent data for Mexico), land management status, and Thematic Mapper satellite imagery; and (4) indices of biophysical variation from biophysical modelling exercise.

Expert-nominated areas that captured multiple Conservation Targets from multiple taxa were used as the nuclei for identifying Conservation Sites. These nuclei can be readily seen in **Figure 7** as a convergence of overlapping polygons of different colors. The colors distinguish among the various taxonomic groups. Most polygons nominated by experts contained multiple Conservation Targets. Therefore, the convergence of taxonomic polygons not only captured multiple taxa, but also multiple Conservation Targets within a taxon.

Expert-nominated areas (polygons) varied in the precision with which boundaries were delineated, so we evaluated each expert polygon against the rationale provided for the polygon to determine if additional information was needed to refine the polygon's size and shape. Boundary adjustments were made based on additional information and to correct for errors in digitization.

Conservation Target data from Heritage Programs were then displayed to identify additional Targets contained within or proximate to the expert-identified areas. We modified the boundary of expert-nominated areas to capture additional Conservation Targets where such a modification would not include areas with incompatible land uses (*e.g.*, urban areas) or include Target occurrences that were not considered viable (*e.g.*, fish Targets in the de-watered portion of the Gila River in Maricopa and Yuma counties). These boundary adjustments typically resulted in small adjustments to sites (*i.e.,* extending or contracting boundary one to several miles).

In many cases, experts nominated areas for which corroborating Heritage data was available. In most cases we adopted the experts' boundaries for an area because Heritage point data typically does not capture the entire Target population found in a particular area.

Combined Heritage and experts data were then displayed over spatial data sets to: (1) determine if additional Conservation Targets would be captured by modifying delineated boundaries; (2) capture ecological gradients represented in the biophysical model; or (3) determine if the proposed area overlapped with incompatible land uses and,

therefore, should be modified to capture only areas where conservation potential exists. Boundary adjustments were also made to capture adjacent areas that contained similar, unfragmented habitat such as riparian areas adjacent to riverine systems identified for fish Targets, mountain ranges adjacent to *bajadas* (sloping plain bordering mountain range) identified for desertscrub communities, etc.

Results of the biophysical model were overlaid on preliminary Conservation Sites to calculate the extent to which biophysical units were captured by Sites. Locations of under-represented units were highlighted for assessment and possible inclusion, or for future field inventory. A number of preliminary Conservation Site boundaries were then modified to include under-represented units.

Results of Conservation Site Identification

Two types of sites were identified, landscape-scale Conservation Sites and Special Element Sites. Most landscape-scale Conservation Sites comprise large areas—such as a series of mountain ranges and intervening valleys, a canyon complex, or riverine system—and contain multiple Conservation Targets. Special Element Sites are small, localized areas containing some of the Ecoregion's rarest Conservation Targets that could not be captured in landscape-scale Sites.

Characteristics of Landscape-scale Conservation Sites

A total of 100 landscape-scale Conservation Sites was identified: 41 in the Arizona Uplands; 35 in the Lower Colorado River Valley; 16 in the Plains of Sonora; and 8 in the Central Gulf Coast Subdivision (see **Figure 9**). In total, Conservation Sites cover approximately 26.6 million acres (10.8 million ha), or about 50% of the Ecoregion's landmass.

Conservation Sites vary in size from 403 acres to 5.7 million acres (163 ha to 2.5 million ha), with most sites falling into two size classes, 5,000 to 50,000 acres (2023 to 20,234 ha) and 100,001 to 500,000 acres (40,469 to 202,343 ha). **Figure 10** charts the size distribution for the 100 landscape-scale Conservation Sites identified. At the gross scale of this analysis the boundaries delineated for Conservation Sites are conceptual, not precise. The delineated boundaries are intended to serve as a starting point for a more detailed analysis of stresses and potential conservation management actions. However, the relative sizes and shapes of Conservation Sites are important in that they represent expert opinion on habitats and areas needed to support the Conservation Targets found within the site and represent some of the best remaining conservation opportunities in the Ecoregion.

A complete listing of Conservation Targets identified within Conservation Sites is provided in **Appendix 4.** This listing should be considered as the minimum list of

Conservation Targets for each Site. Incomplete inventory in many areas combined with the impracticality of incorporating all databases throughout the Ecoregion into the analysis undoubtedly has resulted in gaps in the Conservation Target lists for some areas. Also included in **Appendix 4** is a listing of the biophysical units associated with each Conservation Site. As described in Section III above, biophysical units represent a combination of parameters for vegetation, climate, elevation, aspect, and slope. To simplify the output only the vegetation component is listed in **Appendix 4**. Again, while each biophysical unit is not considered an actual Conservation Target, they represent a working hypothesis addressing major ecological gradients that characterize the Ecoregion. As such the biophysical modeling results serve as an indication of how well ecological gradients have been represented within Conservation Sites. They also form a basis for guiding field inventories, particularly in areas of the Ecoregion that are poorly known.

Conservation Sites vary in the number of Conservation Targets harbored as well as the number of taxonomic groups represented. For example, Sierra La Cobriza (Site 41, see **Figure 9**), was identified to conserve a population of *Brahea armata,* the blue palm (G3). Although the Site was identified based on the occurrence of one Conservation Target, the Site is actually a complex of canyons that contain multiple occurrences of blue palm. In contrast, the Pinacate/Organ Pipe/Cabeza Prieta/Goldwater Complex (Site 13) contains at least 305 occurrences of 68 Conservation Targets from seven taxonomic groups. **Table 8** provides a summary of Conservation Target data for each Conservation Site. **Figures 11** and **12** summarize the frequency distributions for the number of Conservation Targets and number of taxa, respectively, represented at Conservation Sites.

Figure 10. Frequency Distribution for the Size of Landscape-Scale Conservation Sites

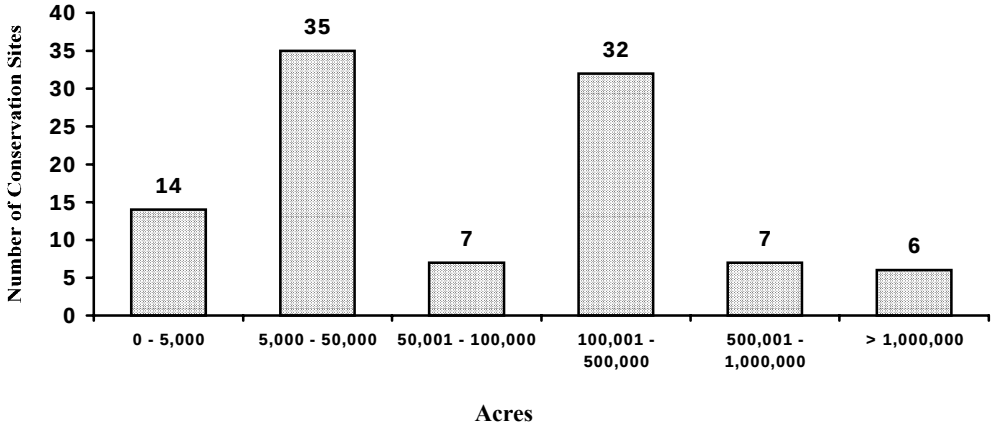

Figure 11. Frequency Distribution for Number of Conservation Targets at Conservation Sites

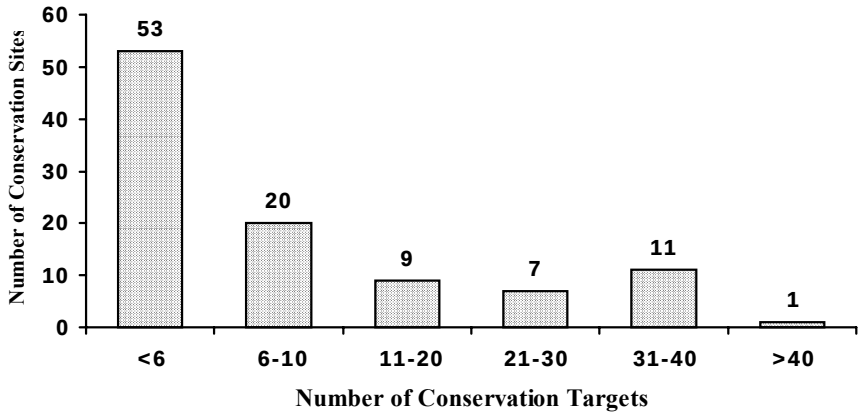

Figure 12. Frequency Distribution for Number of Taxa Represented at Conservation Sites

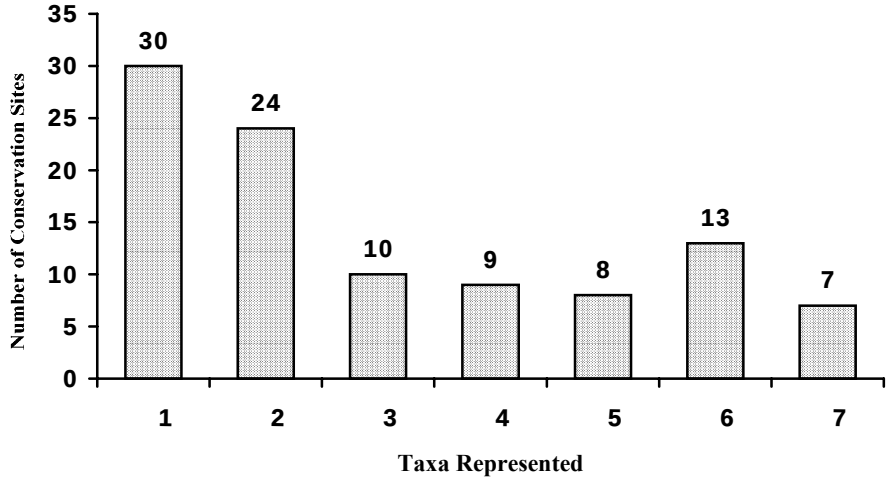

Table 8. Summary of Conservation Targets and Taxonomic Representation at Conservation Sites.

Conservation Site #	Conservation Site Name	Total Conservation Targets	Proportion of Ecoregion Targets	Total # of Taxa Represented	TOTAL CONSERVATION TARGETS						
					Bird	Community	Fish	Herpetofauna	Invertebrate	Mammal	Plant
13	Pinacate/Organ Pipe/Goldwater Complex	69	14.9%	7	2	12	2	10	1	12	30
25	Anza Borrego	41	8.9%	7	3	13	1	4	1	4	15
98	Upper Gila River	40	8.7%	7	12	3	13	3	3	2	4
99	San Pedro River/Aravaipa Creek	39	8.4%	7	9	4	9	1	4	5	7
21	Tonto Creek/Salt and Verde/Meddler Wash	39	8.4%	6	9		14	3	1	2	10
8	Cerro Borrego/San Felipe Desert	38	8.2%	5		15		7	1	1	14
82	Bill William's Complex	36	7.8%	7	8	2	9	5	1	5	6
10	Colorado River Delta	35	7.6%	7	5	9	8	4	2	1	6
72	Whitewater River	33	7.1%	6	6	8		3	10	1	5
3	Bahía de Kino/Isla Tiburón/Sierra Bacha	33	7.1%	5	5	11		2		8	7
34	Joshua Tree	32	6.9%	7	5	8	1	5	1	3	9
38	Colorado River/Río Hardy	31	6.7%	6	11	6	7		1	3	3
27	Chocolate Mountains	28	6.1%	6	4	8	1	3		3	9
1	Rancho El Único	28	6.1%	6	1	9		1	5	2	10
4	Sierra Bacha/Sierra del Viejo	27	5.8%	5	3	7			4	3	10
35	Algodones Dunes	24	5.2%	5	3	3		2	9		7
24	San Jacinto Foothills	23	5.0%	5	3	3		4		3	9
83	Agua Fria Watershed	22	4.8%	7	2	1	7	3	1	3	5
53	Atascosa Mountains	22	4.8%	6	3		1	2	3	3	10
17	Altar Valley	18	3.9%	6	2	2		2	2	8	2
23	Hassayampa River	15	3.2%	6	3		5	3	1	2	1
12	Kofa Complex	14	3.0%	4		3		3		4	4
15	Cienéga Creek	13	2.8%	6	4		2	1	2	2	2
57	Puerto Lobos	13	2.8%	4	3	6				2	2
65	Yuha Basin	13	2.8%	4	1	1		8			3
32	Sand Tanks Mountains	12	2.6%	5	2	3		2		3	2
2	San Esteban Island	12	2.6%	4		4		4		2	2
29	McCoy Mountains	11	2.4%	6	1	2		3	1	2	2
61	San Simon/Sonoyta Valley	11	2.4%	5		1	3	3	3		1
14	Arnett Creek	10	2.2%	5		1	5	2		1	1
85	Superstition Mountains	10	2.2%	4	1		2	1			6
63	Sunrise Butte/Guadalupe Canyon	10	2.2%	3		2		7	1		
93	Tucson Mountains	9	1.9%	6	1	1		2	1	2	2
16	Santa Rita	9	1.9%	4	1				2	4	2
31	Whipple Mountains	9	1.9%	3		3				4	2
43	San Pedro Nolasco Island	9	1.9%	2				4			5
70	Orococpa Valley	8	1.7%	6	1	1	1	1		2	2
37	Central Gulf Coast	8	1.7%	3		5				1	2
7	Carrizo Plains/Arroyo Bacoachito	8	1.7%	3	3	3		2			
33	Salton Sea	8	1.7%	2	7		1				
19	Sawtooth-Silverbell Mountains	8	1.7%	2						3	5
102	Harquahala Mountains	6	1.3%	4		1		2	1	2	
95	Sabino Canyon	6	1.3%	4	1		1	2			2
68	San Felipe Creek	6	1.3%	4		1	1	2			2
71	Mecca Hills/Painted Canyon	6	1.3%	4	1	1				1	3
50	Río Sonora/Río San Miguel	6	1.3%	4	1	1	3				1
22	Río Magdalena/Río Asunción	6	1.3%	3	3	1	2				
73	Danby Playa	6	1.3%	2		2		4			
81	Date Creek	6	1.3%	2			5				1

Table 8. Summary of Conservation Targets and Taxonomic Representation at Conservation Sites.

Conservation Site #	Conservation Site Name	Total Conservation Targets	Proportion of Ecoregion Targets	Total # of Taxa Represented	TOTAL CONSERVATION TARGETS						
					Bird	Community	Fish	Herpetofauna	Invertebrate	Mammal	Plant
86	Tonto National Forest	5	1.1%	3			1	3	1		
96	East Tucson Riparian Complex	5	1.1%	2		4				1	
78	Baboquivari Mountains	5	1.1%	2						3	2
67	West Mesa/Superstition Hills	5	1.1%	2				4			1
103	Trout Creek	5	1.1%	2			4	1			
11	Bouse Dunes	4	0.9%	3		1		1			2
30	Riverside Mountains	4	0.9%	3	1				1	2	
84	Dixie Mine	4	0.9%	2						3	1
18	Tortolita Mountains	4	0.9%	2	2	2					
77	Harcuvar Mountains	4	0.9%	2		1				3	
92	Old Mammon Mine	4	0.9%	2		2				2	
91	Unplowed Valley	3	0.6%	2			1				2
26	Coachella Valley	3	0.6%	2				2		1	
5	Cañones de La Pintada /Tetabejo	3	0.6%	2		1					2
20	Vekol Mountains	3	0.6%	2						2	1
42	Sierra La Jojoba	3	0.6%	2				2			1
60	Sierra Cubabi	3	0.6%	2						2	1
46	Cerro Agualurca	3	0.6%	2				2			1
39	Sierra de Lopez	3	0.6%	2		1					2
90	Picacho Peak	3	0.6%	1						3	
9	Tacna Marsh	3	0.6%	1	3						
97	San Simon Springs/Ciénega	3	0.6%	1			3				
74	Carl's Dunes	2	0.4%	2	1			1			
76	Deson Mine	2	0.4%	2			1			1	
58	Altar Valley	2	0.4%	2	1	1					
47	La Poza/Southwest Hermosillo	2	0.4%	2		1		1			
52	Cañon La Palma	2	0.4%	2		1			1		
36	Palen Dry Lake	2	0.4%	2		1		1			
6	Sierra Tordilla/Puerto el Orégano	2	0.4%	2				1			1
62	Ejido Saldala	2	0.4%	1		2					
40	Cueva del Tigre	2	0.4%	1						2	
101	Ciénega de Saracachi	2	0.4%	1		2					
44	Río Matape	2	0.4%	1			2				
45	Las Guasimas	2	0.4%	1							2
49	Sierra de Mazatan	2	0.4%	1		2					
88	Buckeye Copper Mine	2	0.4%	1						2	
80	Black Pearl	2	0.4%	1						2	
79	El Tigre Mine	2	0.4%	1						2	
89	La Ciénega	1	0.2%	1					1		
75	Yuma Proving Ground Dunes	1	0.2%	1				1			
69	Ramer Lake	1	0.2%	1	1						
64	Laguna Salada	1	0.2%	1			1				
51	El Papago	1	0.2%	1							1
56	No site name designated	1	0.2%	1							1
28	Coachella Canal	1	0.2%	1	1						
55	Sierra El Alamo	1	0.2%	1						1	
54	Tubutama	1	0.2%	1					1		
104	Cerro Prieto Ponds	1	0.2%	1			1				
48	South Ures	1	0.2%	1				1			
41	Sierra La Cobriza	1	0.2%	1							1
59	Quitovac	1	0.2%	1		1					

Integrating the concept of ecological gradients into Conservation Sites resulted in capturing complete mountain-valley-mountain complexes or shoreline to mountain complexes. For example, the Sauceda-Sand Tank-Table Top Mountain complex in Arizona (Site 32 in **Figure 9**) is an unfragmented area with substantial variation in soil/substrate types and a complex topography. The entire Site captures a high level of biodiversity with at least 11 Conservation Targets from five taxonomic groups, a Bureau of Land Management wilderness area and two BLM Areas of Critical Environmental Concern. Heritage Program and expert data identified several locations within this area that harbor rare species (**Figure 7**). Extending the Site boundaries to encompass the entire Sand Tank and Sauceda ranges and intervening valleys captured one of the Ecoregion's finest examples of the palo verde-mixed cacti matrix community type.

Characteristics of Special Element Sites

Some Conservation Targets could not be captured in landscape-scale Conservation Sites. Many of these cases included single or few occurrences of particularly rare plants, fish, amphibians, and reptiles, mostly in small, isolated areas or highly fragmented landscapes where delineating landscape-scale Conservation Sites is not currently possible. To promote the conservation of these Targets we identified small, localized areas with only one or several Conservation Targets as "Special Element Sites." Special Element Sites vary in size, but for the purpose of locating these sites on 1:1,000,000 scale maps each is depicted as a point several miles in diameter. We had sufficient information to retain these areas in the analysis, in that we believe they support potentially viable populations of Conservation Targets. However, we currently have insufficient information to delineate fully functional Conservation Sites. This delineation will require detailed assessment and was outside of the scope of this effort.

In total we identified 79 Special Element Sites: 44 in the Lower Colorado River Valley Subdivision, 32 in Arizona Uplands, and 3 in Plains of Sonora (**Figure 13**). Special Element Sites captured a total of 99 occurrences: 58 plants, 16 reptiles & amphibians, 11 fish, 5 birds, 4 invertebrates, 3 mammals, and 2 communities. Eighty-one of all occurrences (81%) were G1 and G2 targets including some of the ecoregion's rarest species. **Appendix 5** lists the 79 Special Element Sites and the Conservation Targets contained within them.

How Well Were Conservation Criteria Met?

Conservation Criteria were used as a guide in identifying a minimum number and spatial stratification of Conservation Sites. Below we summarize how well Criteria were met for both fine- and coarse-filter Conservation Targets. We also summarize results of the biophysical modeling exercise as an additional index for how well the network of

identified Conservation Sites reflects potential ecological variation in the Ecoregion as whole.

Coarse filter Conservation Targets were comprised of natural vegetation communities, which were aggregated into ecological groups. Of the 23 ecological groups identified, we met, likely met, or exceeded our Conservation Criteria for 10 groups (**Table 9**), including Palo Verde-Mixed Cacti Scrub, Creosote-Bursage, Coastal Marsh, Coastal Mangrove Swamp, Sinaloan/Foothills Thornscrub, Interior Chaparral/Encinal, and California Fan Palm Oasis. While expert-derived data indicated that numerical Criteria for Agave-Bursage Scrub, Coastal Dune, and Bedrock Shore/Sea Cave groups were not met, nearly the entire distribution of these communities was captured within Conservation Sites. Thus, it is likely that Criteria were also met for these communities. Similarly, while the areal extent of Creosote-Bursage Scrub fell short of Conservation Criteria within the Arizona Uplands Subdivision (*i.e.*, 25% rather than 30%), Ecoregion-wide Criteria were substantially exceeded. The complete summary of known occurrences of vegetation communities is provided in **Appendix 6.**

Conservation Criteria may have been met for several other ecological groups (*e.g.*, Sonora/Mojave Playa Lake, Mojave Desert Shrubland, Sonora/Mojave Bedrock Outcrop) but more complete inventory of landscape-scale Conservation Sites will be required to determine the extent to which these groups were captured. Conversely, while Conservation Criteria were met for Desert Riparian Woodland, the long-term viability of identified areas should be a top priority for site-level review. Summaries of Conservation Criteria, urgency of action, and research/inventory needs for ecological groups are found in **Appendix 11.**

For the species that make up fine filter Conservation Targets, **Table 10** summarizes (by taxonomic group) the degree to which Conservation Criteria were met. **Appendix 7** summarizes Conservation Target occurrences by Ecoregional Subdivision. In **Appendix 7** the number of sites in which each Target occurs is listed for the Ecoregion as a whole and for each Subdivision. The total number of "occurrences," as documented in regional databases, also is listed. Differences between the number of Sites and number of occurrences for a Conservation Target result from some large Conservation Sites capturing multiple occurrences of Conservation Targets.

Few Conservation Criteria were adequately met for the species that make up fine filter Conservation Targets. For some species, (*e.g.*, several bats) inventory work yielded many sites for evaluation and the network of Conservation Sites identified exceeds the Criteria used in this exercise. In other cases, adequate inventory has confirmed the species is simply limited in its distribution to one or two locations (*e.g.*, Sonoyta mud turtle). In those cases, meeting Conservation Criteria identified in this exercise may be impractical and Criteria would need to be scaled appropriately by factoring geographic extent and population demography.

Table 9. Conservation Target Summary for Natural Vegetation Communities, Summarized at the Level of Ecological Group.

Conservation Target (Ecological Groups)	Patch Type[1]	Distribu-tion[2]	Total Occur-rences	% Area of Matrix Comm.[3] Captured by Cons. Sites	Criteria
Palo Verde-Mixed Cacti	Matrix	Limited	N/A	35	Exceeded
Creosote-Bursage	Matrix	Limited	N/A	49	Exceeded
Interior Dunes & Plains	Large Patch	Limited	7	N/A	Not Met
Sonora/Mojave Bedrock Outcrop	Large Patch	Limited	0	N/A	Not Met
Semi-Desert Grassland	Large Patch	Limited	6	N/A	Not Met
Mesquite Woodland	Large Patch	Limited	13	N/A	Not Met
Agave-Bursage Scrub	Large Patch	Limited	≥ 1	N/A	Met[4]
Mojave Desert Shrubland	Large Patch	Limited	3	N/A	Not Met
Brittlebush-Ironwood	Large Patch	Limited	2	N/A	Not Met
Torchwood-Limberbush Desert Scrub	Large Patch	Limited	16	N/A	Not Met
Saltbush Desert Scrub	Large Patch	Limited	8	N/A	Not Met
Coastal Marsh	Large Patch	Widespread	12	N/A	Met
Coastal Dunes	Large Patch	Widespread	5	N/A	Met[4]
Sonora/Mojave Playa Lake	Large Patch	Widespread	4	N/A	Not Met
Coastal Mangrove Swamp	Large Patch	Peripheral	11	N/A	Exceeded
Sinaloan/Foothills Thornscrub	Large Patch	Peripheral	3	N/A	Met
Interior Chaparral/Encinal	Large Patch	Peripheral	3	N/A	Met
Interior Riparian Shrub/Woodland	Small Patch	Limited	2	N/A	Not Met
California Fan Palm Oasis	Small Patch	Limited	82	N/A	Exceeded
Streams, Springs, And Sinks	Small Patch	Limited	10	N/A	Not Met
Interior Riparian Marsh	Small Patch	Widespread	11	N/A	Not Met
Desert Riparian Woodland	Linear Patch	Limited	44	N/A	Not Met[5]
Bedrock Shore/Sea Cave	Linear Patch	Widespread	2	N/A	Met[4]

[1] See **Table 4** for patch type definitions.
[2] See **Table 2** for distribution classes.
[3] Based on percent areal extent of habitat pre-European settlement.
[4] Although numeric criteria were not met nearly all occurrences of ecological group found in Ecoregion were captured in Conservation Sites.
[5] Numerical Criteria exceeded, but viability of occurrences questionable. Site-level evaluation required.

Concern expressed by regional experts on the status of native fish populations led us to depart from the convention of using numerical Criteria for this taxon. The Criteria adopted, "maintain all viable native fish populations and the stream reaches where they occur," may appear to lack flexibility in light of the rapid pace of change occurring within the Ecoregion. However, the Sonoran Desert's riverine, aquatic, and riparian resources hold a disproportionate amount of the Ecoregion's biodiversity and have experienced the most extensive and intensive change. In this context the Criteria adopted simply reflect the precarious state of these Targets. **Table 11** summarizes the number of Conservation Sites at which fish Targets are found or have the potential to be restored.

Table 10. Conservation Target Criteria Summary by Taxonomic Group and Ecoregional Subdivision[1].

Taxonomic Group	Number of Conservation Targets for which Conservation Criteria were **N**ot Met, **M**et, or **E**xceeded												
	Arizona Uplands			Central Gulf Coast			Lower Colorado River Valley			Plains of Sonora			Total Targets
	N	M	E	N	M	E	N	M	E	N	M	E	
Bird	10	4		14			16	2		10			32
Fish[2]													25
Herpetofauna	9	2		2			11	4		3			42
Invertebrate	7	1		1			2			3			56
Mammal	7	1	1	5			7		1	3			31
Plant	27			12			50			11			173
Total	60	8	1	34			86	6	1	30			

[1] Natural vegetation community Criteria summarized in **Table 9.**
[2] Numerical Criteria were not used for fish Targets. See narrative summary below.

Although a considerable amount of biological inventory and ecological analysis has been conducted in the Sonoran Desert Ecoregion, surprisingly little of this information has made it into regional databases. We suspect that the identified network of Conservation Sites actually captures many more occurrences of Conservation Targets than is suggested by the data obtained for this analysis. There are several other likely reasons for gaps in data. Limited funding for biological inventory tends to focus work on rare species which fall under regulation by public agencies (*e.g.*, desert tortoise). Field inventory for other species has varied both spatially and temporally. In many cases, only one to several locations are actually catalogued in regional databases. The expert workshop used in this project was designed, in part, to overcome these data gaps. But even that process yielded first records for many species, mainly endemic plants for which little to no information exists in regional databases. For this reason we believe that Conservation Sites capture more Targets than our analyses indicate.

Table 11. Number of Conservation Sites at which Ecoregion's Fish Conservation Targets are Found or Have the Potential to be Restored.

Number of Conservation Sites w/ Fish Targets or with Potential for Targets to be Restored[1]	Number of Fish Conservation Targets	Conservation Targets[2]
1	3	Mexican Stoneroller, Opata Sucker, Desert Chub
2	3	Quitobaquito Pupfish, Pacific Tenpounder, Sonoran Chub
3	3	Spikedace, Woundfin, Loach Minnow
4	2	Flannelmouth Sucker, Colorado Squawfish
5	1	Bonytail
6	1	Gila Chub
7	3	Sonora Sucker, Speckled Dace, Razorback Sucker
9	1	Desert Sucker
10	1	Roundtail Chub
13	1	Gila Topminnow
14	1	Longfin Dace
18	1	Desert Pupfish

[1] See **Appendix 4** for a complete listing of Targets by Conservation Site.
[2] Total number of fish Conservation Targets is 25; two undescribed species (*Gila* sp. and *Agosia* sp.) and two subspecies are not listed in this table.

Biophysical Representation

After refinements to Conservation Sites were completed, 28 biophysical units remained under-represented among the network of Conservation Sites (**Table 12**). For example, portions of the Plains of Sonora mapped as palo verde-mixed cacti that occur at low elevations (sea level to 400 m ASL) and on gentle to flat landscapes appear to remain under-represented (**Figure 14**). The majority of potentially under-represented types were identified in north-central Sonora within the Arizona Uplands and Plains of Sonora Subdivisions, and include a series of torchwood-limberbush communities that occur on a range of elevations, slopes, and aspects. Notwithstanding these potential omissions, the biophysical analysis indicated that a substantial proportion of major environmental gradients for the Ecoregion are likely represented within the network of Conservation Sites. The complete set of biophysical classes and their distribution within the Ecoregion is summarized in **Appendix 8**.

Table 12. Biophysical Units by Ecoregional Subdivision that Remain Under-Represented in Sonoran Desert Ecoregion Conservation Sites (i.e., <10% of unit's area within Conservation Sites).

Ecological Group	Number of Biophysical Units Potentially Under-Represented[1]			
	Lower Colorado River Valley	Arizona Uplands	Central Gulf Coast	Plains of Sonora
Creosote-bursage desert scrub				1
Interior dunes and plains	6	1		
Interior chaparral/encinal				1
Interior riparian shrub/woodland		1		
Interior riparian woodland		1		
Torchwood-limberbush desert scrub		12		
Palo verde-mixed cacti desert scrub	1			1
Semi-desert grassland	1			
Sinaloan/foothills thornscrub				2
Total	8	15	0	5

[1] Total number of unique biophysical units = 248.

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Table 13. List of 100 Landscape-Scale Conservation Sites Identified in **Figure 9**.

1 Rancho El Único
2 San Esteban Island
3 Bahía de Kino/Isla Tiburón/Sierra Bacha
4 Sierra Bacha/Sierra del Viejo
5 Cañones de La Pintada /Tetabejo
6 Sierra Tordilla/Puerto el Orégano
7 Carrizo Plains/Arroyo Bacoachito
8 Cerro Borrego/San Felipe Desert
9 Tacna Marsh
10 Colorado River Delta
11 Bouse Dunes
12 Kofa Complex
13 Pinacate/Organ Pipe/Goldwater Complex
14 Arnett Creek
15 Ciénega Creek
16 Santa Rita
17 Altar Valley
18 Tortolita Mountains
19 Sawtooth-Silverbell Mountains
20 Vekol Mountains
21 Tonto Creek/Salt and Verde/Meddler Wash
22 Río Magdalena/Río Asunción
23 Hassayampa River
24 San Jacinto Foothills
25 Anza Borrego
26 Coachella Valley
27 Chocolate Mountains
28 Coachella Canal
29 McCoy Mountains
30 Riverside Mountains
31 Whipple Mountains
32 Sand Tanks/Sauceda Mountains Complex
33 Salton Sea
34 Joshua Tree
35 Algodones Dunes
36 Palen Dry Lake
37 Central Gulf Coast
38 Colorado River/Río Hardy
39 Sierra de Lopez
40 Cueva del Tigre
41 Sierra La Cobriza
42 Sierra La Jojoba
43 San Pedro Nolasco Island
44 Río Matape
45 Las Guasimas
46 Cerro Agualurca
47 La Poza/Southwest Hermosillo
48 South Ures
49 Sierra de Mazatan
50 Río Sonora/Río San Miguel
51 El Papago
52 Cañon La Palma
53 Atascosa Mountains
54 Tubutama
55 Sierra El Alamo
56 No site name designated
57 Puerto Lobos
58 Altar Valley
59 Quitovac
60 Sierra Cubabi
61 San Simon/Sonoyta Valley
62 Ejido Saldala
63 Sunrise Butte/Guadalupe Canyon
64 Laguna Salada
65 Yuha Basin
67 West Mesa/Superstition Hills
68 San Felipe Creek
69 Ramer Lake
70 Orococpa Valley
71 Mecca Hills/Painted Canyon
72 Whitewater River
73 Danby Playa
74 Carl's Dunes
75 Yuma Proving Ground Dunes
76 Deson Mine
77 Harcuvar Mountains
78 Baboquivari Mountains
79 El Tigre Mine
80 Black Pearl
81 Date Creek
82 Bill William's Complex
83 Agua Fria Watershed
84 Dixie Mine
85 Superstition Mountains
86 Tonto National Forest
88 Buckeye Copper Mine
89 La Ciénega
90 Picacho Peak
91 Unplowed Valley
92 Old Mammon Mine
93 Tucson Mountains
95 Sabino Canyon
96 East Tucson Riparian Complex
97 San Simon Springs/Ciénega
98 Upper Gila River
99 San Pedro River/Aravaipa Creek
101 Ciénega de Saracachi
102 Harquahala Mountains
103 Trout Creek
104 Cerro Prieto Ponds

No site designated for numbers 66, 87, 94, and 100

VI. CONSERVATION STATUS

What Is A Conservation Site?

At the very minimum, the aggregate of all Conservation Sites represents a hypothesis: that implementing appropriate management at each of the identified Conservation Sites would ensure the long-term persistence of most of the Ecoregion's biodiversity. "Appropriate management" does not imply any single type of management regime, nor does it imply the elimination of all activities. Appropriate management means that major stressors are identified and abated/minimized through management actions or restoration (passive or active). At the other end of the spectrum, a Conservation Site represents a focal point for developing public awareness and implementing conservation actions so that the Conservation Targets identified in this exercise, as well as all of the other species for which our selected Targets serve as a surrogate, remain viable on the landscape.

Land Management/Ownership at Landscape-Scale Conservation Sites

Table 14 summarizes the land management status for the 100 landscape-scale Conservation Sites. Reflecting the overall land management pattern in the U.S. portion of the Ecoregion, the majority of Conservation Sites identified in Arizona and California (87%) are lands managed by federal or state public agencies. A comprehensive land management cover that distinguishes among private, federal, and *Ejido* lands in Mexico had not yet been completed during this exercise. In total, 12.6 million acres (5.0 million ha) in Sonora and Baja were identified as Conservation Sites. Of this total, 2.7 million acres (1.1 million ha) lie within Biosphere Reserves; 777,491 acres (314,640 ha) are comprised of areas proposed for a State of Sonora Protected areas System (SANPES 1992). **Appendix 9** provides land management/land ownership statistics for each of the 100 Conservation Sites.

GAP Analysis of Conservation Sites

We used the GAP Analysis Land Management Status criteria (Crist *et al*. 2000) to rank and assess the level of conservation management for the Sonoran Ecoregion. GAP uses a scale of 1 through 4 to classify the relative degree of management devoted to maintenance of biodiversity for land units. A status of "1" denotes the highest, most permanent level of management, and "4" represents the minimum level of management or unknown status (**Table 15**).

Table 14. Land Management Status Summary for Conservation Sites.

Land Manager/Owner	Acres Identified within Conservation Sites	Hectares Identified within Conservation Sites	Total Number of Conservation Sites w/in Land Management Category
Mexico Private/Communal Land	9,094,931	3,680,600	40
Bureau of Land Management	3,176,553	1,285,509	50
Mexico Biosphere Reserves	2,738,253	1,108,135	5
U.S. Department of Defense	2,287,224	925,609	15
U.S. Fish & Wildlife Service	1,522,879	616,289	8
U.S. Private Land	1,157,036	468,237	57
Mexico Proposed Protected Areas	777,491	314,640	10
U.S. Tribal Land	739,772	299,376	21
U.S. State Trust Land	666,547	269,742	44
U.S. National Park Service	389,659	157,689	8
U.S. Forest Service	347,064	140,452	8
U.S. State Parks	189,385	76,641	10
The Nature Conservancy	21,312	8,624	6
Total	23,108,106	9,355,508	

GAP criteria codes were assigned to all land management units in the Ecoregion after reviewing land management plans and interviewing natural resource staff from public land management agencies, Native American Tribes, and privately-owned conservation lands. This provided an estimate of the conservation status for the Ecoregion as a whole. Overall, 11% of the Sonoran Desert Ecoregion is comprised of status 1 and 2 lands, those with the highest levels of protected status; 22% is comprised of status 3 land; and 67% of the Ecoregion is status 4 land. Conservation Sites were then superimposed over the ranked land management layer to estimate the status of those areas (**Figure 15**). Overall, 19% of the areas identified as Conservation Sites are comprised of status 1 and 2 lands; 25.6% are in status 3; and 55.4% are in status 4 land.

We also evaluated management status for the subset of 18 Conservation Sites that were identified to conserve the Ecoregion's riverine, riparian, and aquatic Conservation Targets. Nine percent of those Sites are in status 1 and 2 lands; 16.4% are in status 3; and 74.5% are in status 4 land.

Table 15. GAP Analysis Program Land Management Status Criteria[1].

Status 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.
Status 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.
Status 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.
Status 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.

[1] From Crist *et al*. (2000). www.gap.uidaho.edu/handbook/stewardship/

Ecoregion-Wide Stresses

During the May 1998 Experts Workshop participants were asked to indicate the primary stressors to the areas identified for Conservation Targets. The intent of the exercise was to understand what major stressors were common to areas throughout the Ecoregion. These data do not represent a scientific survey; they reflect the experience and perceptions of more than 100 experts as to the major stressors affecting biodiversity in the Sonoran Desert Ecoregion. As such they provide a starting point for addressing issues that cross administrative, state, and international boundaries (*e.g.*, exotic species, recreation), or re-emphasize concern over issues that have been a focal point for many years (*e.g.*, water use, livestock management). By major stressors it is meant that direct and indirect effects of various activities disrupt ecological processes needed to maintain native fauna and flora. For example, the loss of land surface area or soil integrity (due to development, compaction of soils, or erosion) may result in a decrease in infiltration of precipitation, maintenance of subsurface aquifers and riparian systems, and loss of mycorrhizal soil communities that fix nitrogen.

Table 16 summarizes expert input on Ecoregion-wide stresses as a simple count of the number of landscape-scale Conservation Sites at which a particular stress was

identified (stressors were not identified for each of the 79 special element sites). These data reflect the widespread nature of the major stressors in the Sonoran Desert Ecoregion. The spread of exotic, invasive plants and animals, recreation, residential and commercial development, and improper livestock grazing were identified as major stressors at more than half of the 100 landscape-scale Conservation Sites. These same stressors, as well as the extraction of groundwater and the diversion or impoundment of surface water, were identified as major stressors at more than two-thirds of the 18 Conservation Sites identified to conserve the Ecoregion's riverine and riparian habitats.

In the next section we point to measures that can be taken to monitor and manage major stressors and highlight programs already in place that were designed to accomplish this need. Because the threat of invasive, exotic plants and animals continues to be one of the most insidious threats to the biodiversity of the Sonoran Desert Ecoregion, we have compiled a list of exotics found throughout the Ecoregion that are known or presumed to have the greatest adverse impact on native fauna and flora (**Appendix 10**). The issue of exotic species in the Sonoran Desert is complex. The ability to minimize the adverse effects of exotics on native biodiversity will be critical to the long-term health of Sonoran Desert Ecoregion. However, not all exotic species pose the same degree of threat. The intent of the list in **Appendix 10** is to draw attention to those species believed to pose the greatest threat.

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Table 16. Major Stressors at Sonoran Ecoregion Conservation Sites as Identified by Experts[1].

Summary of major stressors identified for 100 Conservation Sites	
Stressor	Number of Sites
Introduction of exotic plants and animals	73
Recreation	72
Urban development	56
Mining	55
Improper livestock management	53
Extraction of groundwater, diversion or impoundment of surface water	40
Introduction of fire into non-fire adapted vegetation community	38
Conversion of desert to agriculture	35
Summary of major stressors at 18 riverine Conservation Sites	
Stressor	Number of Sites
Introduction of exotic plants and animals	16
Urban development	15
Improper livestock management	15
Extraction of groundwater, diversion or impoundment of surface water	14
Recreation	14
Mining	12
Introduction of fire into non-fire adapted vegetation community	10
Channelization	10
Conversion of floodplain to agriculture	10

[1] Information on major stressors gathered during two-day experts workshop held May 1998 at the University of Arizona.
[2] Eighteen riverine Sites identified include Sites: 14, 15, 21, 22, 23, 38, 44, 50, 61, 72, 81, 82, 95, 96, 97, 98, 99, 101.

VII. NEXT STEPS & RECOMMENDATIONS

During the 24 month period in which this project was completed a number recommendations and potential next steps were identified. Several of the highest priority items are discussed below.

Improve Conservation Management Status at Conservation Sites

The small proportion (19%) of identified Conservation Sites in GAP status 1 or 2 management indicates considerable work is still needed to ensure the long-term conservation of the Ecoregion's biodiversity. Given that Conservation Sites overlap lands managed by public, private, and communal entities, a variety of approaches may be needed to accomplish the overall goal of biodiversity conservation. Several potential approaches are briefly described below.

For lands already designated for conservation purposes, identify and implement programs to abate or minimize site-specific stresses. Several examples are provided below (see *Pilot Conservation Programs*) of land managers targeting major stressors with effective programs.

For lands in which conservation is one of multiple management goals, integrate Ecoregional data (*e.g.*, coarse- and fine-scale Conservation Targets) and a goals-based approach into comprehensive land management planning so that the Ecoregion's biodiversity may be adequately characterized, evaluated, accounted for, and conserved through development of appropriate management programs. Multiple-use management and other Federal statutes that require biodiveristy conservation on public lands in the U.S. portion of the Ecoregion were designed to enable such a process.

For lands in which conservation is not a current goal, identify opportunities to increase attention to conservation of biodiversity by developing collaborative programs among public and private entities (*e.g.*, U.S. Fish and Wildlife Service's Partners for Wildlife Program). In Sonora a significant conservation opportunity exists through the Unidades de Manejo Ambiental (UMA) program, which is designed to convey conservation protection to private lands in Sonora. UMAs, or designated environmental management areas, provide for wildlife management objectives on private lands and require development of a management plan. Incorporating Ecoregional data into management plans and the development of conservation programs would enhance the overall contribution of individual UMAs to biodiversity conservation in the Ecoregion. Several UMA management plans are now in place. Expansion of the program will require that several ongoing needs are met, among them is program oversight, technical assistance for management planning, the integration of biodiversity data into management plans, and a program of monitoring and evaluation.

Nexus with Regional Conservation Efforts

A significant benefit of compiling data at an Ecoregional scale is the development of a baseline from which to evaluate biological entities and trends as well as activities across the landscape. Identifying a network of Conservation Sites establishes a goal and helps frame the importance of species and vegetation community types in space and time. For example, in estimating the acreage of the creosote-bursage matrix vegetation community across the Ecoregion, and then identifying the Conservation Sites that contain extensive presumably viable populations, a common vegetation community type becomes a component of biological diversity that can be accounted for and conserved over the long-term. In this vein the Sonoran Desert Ecoregional Analysis can serve other regional and local conservation efforts (*e.g.*, Pima County Habitat Conservation Plan, Federal Land Management plan revisions, U.S. Fish & Wildlife Service's All Bird Joint Venture, *etc*.) by pointing out areas that are of particular import and by identifying a broad range of species and vegetation communities that should serve as a focus of biodiversity conservation efforts in these areas and elsewhere.

Evaluate Conservation Sites and Conservation Management Programs

The need for additional data and analyses will never diminish, but the biodiversity that still exists within the network of Conservation Sites will diminish if conservation opportunities are not acted on. One method to quickly understand opportunities and needs is to gain a more comprehensive understanding of the conservation management activities currently being implemented at Conservation Sites and to assess the degree to which major stressors are being abated and monitored. An evaluation of these elements will draw attention to needs and funding requests targeted at specific needs can be justified in terms of the overall contribution a particular Conservation Site makes to the Ecoregion. This type of evaluation should be completed for both the landscape-scale and special element Conservation Sites identified in this analysis. Moreover, identifying management activities currently being implemented across the Ecoregion would draw attention to those activities that have broader utility as well as developing an understanding of how activities currently implemented by multiple parties throughout the Ecoregion might benefit from enhanced coordination.

Implement Pilot Conservation Projects

Some land managers have already begun implementing programs to abate or minimize major stressors. Several examples are provided below. Key components to these programs include periodic evaluation of effectiveness and integration of results into land management decisions to facilitate true adaptive management.

An example of a pilot conservation project that may have broader application throughout the Ecoregion is Organ Pipe Cactus National Monument's (Site 13) program to control the spread of the exotic buffel grass (*Pennisetum ciliare*). By competing for space and changing fire frequency and intensity, buffel grass can transform diverse native desert vegetation communities into depauperate monocultures. Over a two-year period Monument staff and volunteers eradicated nearly 100 tons of this invasive plant from 25 square miles (68 km^2) near the international border. Although buffel grass is still common across the border in Mexico, and thus remains a threat, the Monument's abatement efforts have positioned the staff to perform less intensive follow-up monitoring and control efforts.

The magnitude and widespread nature of the threat posed by invasive exotics suggest another pilot conservation program that might have broad utility in the long-term conservation of the desert's biodiversity—the formation of a Sonoran Desert Exotics Council. Such councils, often referred to as "weed" councils, provide education, training, and coordination for public, private, and tribal land managers. The need and desire for such an effort was tested at a June 1999 workshop at Organ Pipe Cactus National Monument where federal, state, Tribal, and private land managers from the U.S. and Mexico gathered to review problem areas, abatement approaches, and the design of other councils in the western U.S. The positive results of that forum and other efforts around the Ecoregion point to a growing awareness of the problem and need to coordinate resources, training, experience, and experiments.

A third example of a pilot conservation project that may have broader applicability is the Bureau of Land Management's monitoring at Algodones Dunes (Site 35). A project to monitor and evaluate the effects of recreational use of the dunes on six special status plant species was initiated in April 1998, as part of a larger, long-term monitoring program for rare and endangered plants. Design and implementation of the project has been a cooperative effort among staff from the Bureau of Land Management, California Fish & Game, U.S Fish & Wildlife Service, and California Native Plant Society.

The Algodones Dunes is divided into two types of use: (1) Wilderness, which is closed to Off Highway Vehicles, and; (2) Open Areas, in which OHV use is allowed. Open Areas are further divided by the amount of use they receive from intensive to very light use. Because the distribution and abundance of dune vegetation is dependant on precipitation, which varies temporally and spatially, rainfall monitoring stations will be installed in three locations in the dunes. Thirty-four plant monitoring transects were established across the entire dune system to accurately map and compare plant distribution between the Wilderness and Open Area. In addition, a set of low-elevation photographs was taken in 1988 and 1999 to establish a baseline map of OHV use. Overlaying the special status plant distribution map on the OHV use map enables comparisons of plant distribution and density in low OHV use areas versus high use areas. This information is used to help manage recreational use of the dunes so that it is consistent with protecting the unique biodiversity of that system.

Integrate and Synthesize Existing Data at a Landscape-Scale

While the disciplines of conservation biology and natural resource management have shifted more and more to an "Ecoregional" or "Ecosystem" approach, the comprehensive data needs for such an approach remain to be filled. We believe that substantial progress would result from spending resources on integrating and synthesizing existing expert data and knowledge into new databases that combine quantitative, qualitative, and spatial data. The experts workshop conducted for this analysis revealed a vast wealth of data and knowledge that exists in published works, unpublished works, individual data bases, field notes, etc., but that remains largely unorganized for landscape-scale analyses. A key component of future landscape-scale analyses will be qualitative data that provide context and enables more ecological-based interpretation of the species or natural vegetation community data that are rendered as dots on a map. Moreover, information on the size, landscape context, and condition of ecological communities (Anderson *et al.* 1999) will be critical for assessing viability of Conservation Targets and locations identified for conservation management. New databases that integrate and synthesize quantitative, qualitative, and spatial data will provide the tools necessary to complete more refined landscape-scale analyses in the future.

Another key component of landscape-scale analyses is a coarse filter that characterizes both vegetation communities and landscape features (*e.g.*, bajadas dissected by wash complexes, shifting dunes, untilled valley bottoms, etc.). Future iterations of GAP vegetation mapping data combined with biophysical models such as the one used in this exercise or digital elevation models would provide one basis for continuing to refine a coarse filter that complements finer-scale species data. Such work should proceed in parallel in both the Mexico and U.S. portions of the Ecoregion to capitalize on the Ecoregional approach taken here and to enhance the overall conservation effort in the Ecoregion. In **Appendix 11** we provide a brief status report and priority inventory needs for the 23 ecological groups that were used as the coarse filter for this analysis.

Implement Ecosystem Monitoring Projects

Rapidly-increasing human population in the Sonoran Desert is one index of potential stress to the desert's biodiversity, but it is an indirect and imprecise index at best. Monitoring the population abundance and distribution of desert tortoise might yield data on population trend, but unless known stressors (natural and anthropogenic) were also being monitored the causes of population change would not be clear. In order to better understand the state of the desert's biodiversity, a complimentary program of ecosystem monitoring should be established. By complimentary we mean that traditional population monitoring on a range of species is accompanied by monitoring of the major stressors likely to affect a suite of species. For example, one of the major threats posed by the spread of exotic plants is type conversions of native plant communities and concomitant

habitat loss for species. The conversion of cottonwood-willow riparian forest to saltcedar and the change in bird species composition and abundance is a case in point. Some land managers have implemented programs to track major stressors such as invasive plants (Site 13), recreation pressures (Site 35), groundwater levels (Site 13), etc. A targeted evaluation of major stressors at Conservation Sites along with more widespread stress-based monitoring programs would yield data needed to assess the state of the desert's biodversity and carry out true adaptive management.

Finally, the results of this effort should not be construed as the end point of landscape-scale analyses for the Sonoran Desert Ecoregion, but rather the beginning. This first attempt at identifying conservation priorities at the Ecoregional scale would be greatly bolstered by incorporating additional data sets that refine elements of the network, such as a detailed analysis of corridors for large mammals or more in-depth investigation of the distribution of key assemblages of pollinators. We hope this effort will spur others to create the data sets and complete the analyses needed to answer some of these important biodiversity questions.

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IX APPENDICES

Appendix 1. Conservation Targets by Taxonomic Group and Global Rank.

Element Code	Scientific Name	Common Name	Global Rank	Combined Global Rank*	Distri-bution	ESA Status*	Patch Type
Bird							
ABNLC21022	*Colinus virginianus ridgwayi*	Masked bobwhite	G5T1	G1	E	LE	
ABNME03041	*Laterallus jamaicensis coturniculus*	California black rail	G4T1	G1	L	SC, AZ(T)	
ABNNM08012	*Sterna nilotica vanrossemi*	Van rossem's gull billed tern	G5T1	G1	L	SC	
ABPAE33043	*Empidonax traillii extimus*	Southwestern willow flycatcher	G5T2	G2	W	LE	
ABNNM08040	*Sterna elegans*	Elegant tern	G2	G2	L		
ABPBW01114	*Vireo bellii pusillus*	Least bell's vireo	G5T2	G2	L	CA(LE)	
ABNKC19011	*Asturina nitida maxima*	Northern gray hawk	G4G5T3	G3	L	AZ(C)	
ABNNB03031	*Charadrius alexandrinus nivosus*	Western snowy plover	G3T3	G3	L	CA(PS)	
ABNRB02022	*Coccyzus americanus occidentalis*	Western yellow-billed cuckoo	G5T3	G3	W	PE	
ABPBX03010	*Dendroica petechia*	Yellow warbler	G3	G3	W		
ABNKD06071	*Falco peregrinus anatum*	American peregrine falcon	G4T3	G3	W		
ABNSB08041	*Glaucidium brasilianum cactorum*	Cactus ferruginous pygmy-owl	G5T3	G3	E	LE	
ABPBX74050	*Pipilo aberti*	Abert's towhee	G3G4	G3	L		
ABNME0501A	*Rallus longirostris yumanensis*	Yuma clapper rail	G5T3	G3	E	LE	
ABPBK06100	*Toxostoma lecontei*	Le conte's thrasher	G3	G3	E		
ABPBX91080	*Aimophila carpalis*	Rufous-winged sparrow	G4	G4	E		
ABNSB10010	*Athene cunicularia*	Burrowing owl	G4	G4	W	SC	
ABNGA06060	*Egretta rufescens*	Reddish egret	G4	G4	W	SC	
ABNKC10010	*Haliaeetus leucocephalus*	Bald eagle	G4	G4	W	CA(PS)	
ABNME03040	*Laterallus jamaicensis*	Black rail	G4	G4	P	SC	
ABNGF02010	*Mycteria americana*	Wood stork	G4	G4	P	SN(T)	
ABPBK06050	*Toxostoma bendirei*	Bendire's thrasher	G4G5	G4	L		
ABNYF10040	*Colaptes chrysoides*	Gilded flicker	G5	G5	E		
ABNJB01010	*Dendrocygna bicolor*	Fulvous whistling-duck	G5	G5	L	AZ(C)	
BNOCODE002	*Dendroica petechia bryanti*	Mangrove yellow warbler	G5	G5	L		
ABNKD06090	*Falco mexicanus*	Prairie falcon	G5	G5	W		
ABNGA02010	*Ixobrychus exilis*	Least bittern	G5	G5	P		
ABNSB09010	*Micrathene whitneyi*	Elf owl	G5	G5	L		
ABNNM08010	*Sterna nilotica*	Gull-billed tern	G5	G5	L		
ABPBX01090	*Vermivora luciae*	Lucy's warbler	G5	G5	E		
ABNGA02012	*Ixobrychus exilis hesperis*	Western least bittern	G5TU	GU	L	AZ(C)	
BNOCOD001	*Migratory Bird Concentration Area*	Migratory bird concentration area		GU			
Community							
CNOCODE01	*Ecological gradient*	Ecological gradient					
250Ia	*Abronia villosa-mixed shrub*	Desert sand-verbena interior dune	G1	G1	L		LP
250Ib	*Eriogonum deserticola association*	Colorado desert wild buckwheat sand dune	G1	G1	L		LP
154.113	*Ambrosia dummosa-Hilaria rigida*	White bursage-big galleta grass shrubland	G2	G2	L		M
144.32	*Ayenia microphylla-Bouteloua eriopoda*	Small leaf ayenia/black grama grassland	G2	G2	P		LP
143.123	*Larrea tridentata-Hilaria mutica*	Creosotebush/tobosa grassland	G2	G2	L		LP
224.531	*Populus fremonti-Salix gooddingii*	Fremont cottonwood-Goodding's black willow riparian woodland	G2	G2	L		L
264.811	*Ruppia maritima*	Ditch-grass marsh	G1G3?	G2	W		LP
224.533	*Salix gooddingii-Fraxinus velutina*	Goodding's black willow-velvet ash woodland	G2	G2	P		L
224.511	*Washingtonia filifera association*	California fan palm oasis	G2	G2	L		SP
154.172	*Allenrolfea occidentalis*	Pickleweed shrubland	G3	G3			
224.54	*Celtis reticulata shrubland*	Netleaf hackberry/shiny hackberry	G3	G3	P		SP
154.115	*Cercidium floridum*	Blue palo verde mixed desert scrub	G3	G3	E		LP
154.127	*Cercidium floridum-Olneya tesota*	Blue palo verde-ironwood-smoke tree woodland	G3	G3	E		LP
133.34	*Cercocarpus montanus-Eriogonum*	Birchleaf mountain mahogany-California buckwheat shrubland	G3	G3	P		LP
154.131	*Encelia farinosa-Olneya tesota-Ephedra sp.*	Brittlebush-ironwood-Mormon tea shrubland	G3	G3	L		LP

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Element Code	Scientific Name	Common Name	Global Rank	Combined Global Rank*	Distri-bution	ESA Status*	Patch Type
Community							
143.124	*Hilaria rigida*	Big galleta grassland	G3	G3	L		LP
234.613	*Leguncularia racemosa*	White mangrove forest	G3	G3	P		LP
254.713	*Lepidospartum sp.*	Scalebroom shrubland	G3?	G3	P		SP
143.13	*Parkinsonia florida-Hilaria belangeri*	Blue palo verde/curley mesquite shrubland	G3	G3	L		LP
234.711	*Pluchea sericea shrubland*	Arrow weed shrubland	G3	G3	L		LP
224.532	*Populus fremonti*	Fremont cottonwood riparian woodland	G3?	G3	L		L
224.521	*Prosopis (sp. glandulosa, velutina)*	Mesquite woodland	G3?	G3	L		LP
154.114	*Prosopis glandulosa*	Honey mesquite shrubland	G3	G3	L		LP
234.612	*Rhizophora mangle*	Red mangrove (black-white mangrove) forest	G3	G3	P		LP
153.16	*Acacia greggi-Parkinsonia microphylla*	Cat claw acacia-yellow palo verde shrubland	G4	G4	L		LP
154.121	*Ambrosia deltoidea-Cercidium microphyllum-Simmondsia chinensis*	Bursage-paloverde-jojoba shrubland	G4	G4	E		M
133.32	*Arctostaphylos pungens*	Mexican manzanita shrubland	G4	G4	P		LP
154.173	*Atriplex canescens-Ehphedra viridis*	Four-wing saltbush shrubland	G4	G4	L		LP
234.611	*Avicennia germinans*	Black mangrove (red mangrove) forest	G4	G4	P		LP
254.711	*Baccharis sarothroides*	Rosinbush sonoran desert wash	G4	G4	P		SP
254.712	*Baccharis sarothroides-Cercidium*	Rosinbush-yellow paloverde shrubland	G4	G4	E		SP
154.122	*Carnegia gigantea-Prosopis velutina*	Saguaro cactus/velvet mesquite wooded shrubland	G4	G4	E		M
154.116	*Fouquieria splendens*	Ocotillo shrubland	G4	G4	W		LP
154.117	*Opuntia bigelovii*	Teddy-bear cholla shrubland	G4	G4	L		LP
223.321	*Platanus racemosa*	California sycamore riparian woodland	G4	G4	L		L
223.222	*Platanus wrightii*	Arizona sycamore riparian woodland	G4	G4	L		L
133.31	*Quercus turbinella*	Turbinella live-oak-Mexican manzanita shrubland	G4	G4	P		LP
154.123	*Simmondsia chinensis-Cercidium microphylla*	Jojoba-yellow paloverde shrubland	G4	G4	L		LP
153.15	*Yucca brevifolia*	Joshua tree woodland	G4	G4	L		LP
264.821	*Zostera maritima*	Eelgrass bed	G?	G4	W		L
254.811	*Abronia maritima-Helianthus-Jouvea*	Gulf of California coastal strand	G?	G5	W		L
154.171	*Atriplex polycarpa*	All-scale shrubland	G5	G5	L		LP
244.821	*Batis maritima*	Glasswort-saltwort flats	G5	G5	P		SP
244.81	*Distichlis spicata*	Coastal saltgrass	G5	G5	W		LP
154.126	*Encelia farinosa*	Brittlebush shrubland	G5	G5	L		M
154.111	*Larrea tridentata*	Creosotebush shrubland	G5	G5	L		M
154.112	*Larrea tridentata-Ambrosia dummosa*	Creosotebush-white bursage shrubland	G5	G5	L		M
143.122	*Prosopis sp.-Hilaria mutica*	Mesquite/tobosa grassland	G5	G5	P		LP
244.73	*Scirpus americanus*	Interior American bulrush marsh	G5	G5	W		SP
244.71	*Typha domingensis*	Interior cattail marsh	G?	G5	W		SP
250C	*Abronia-Opuntia-Coccoloba*	Coastal dune	G?	GU	L		LP
250I	*Abronium-Eriogonum (group)*	Interior dunes and plains (group)		GU			
154.119	*Acacia (sp. farnesiana, pennatula)-Prosopis*	Mixed acacia-mixed thorn shrubland	GU	GU	L		LP
154.156	*Agave sp.-Hechtia montana-Dasylirion*	Agave-Hechtia montana-sotal desert scrub	GU	GU	L		LP
154.15	*Agave-Ambrosia-Fouquieria (group)*	Agave-bursage scrub (group)	GU	GU			
154.153	*Ambrosia sp.-Pachycereus pringlei-Stenocereus thurberi*	White bursage-cardon-organ pipe cactus	GU	GU	L		LP
154.17	*Atriplex-Allenrolfea-Suaeda (group)*	Saltbush desert scrub (group)	GU	GU			
234.61	*Avicennia-Rhizophora-Lanungularia (group)*	Coastal mangrove forest (group)	GU	GU			
250	*Bedrock shore/sea cave (group)*	Rocky shore/cave (group)		GU			
254.8	*Coastal dunes (group)*	Coastal dunes (group)	G?	GU			
244.8	*Coastal marsh (group)*	Coastal marsh (group)		GU			
224.53	*Desert Riparian Woodland (group)*	Desert Riparian Woodland (group)		GU			
200S	*Desert Spring/Seep*	Desert Spring/Seep	GU	GU	L		SP
154.132	*Encelia farinosa-mixed desert scrub*	Brittlebush-mixed desert scrub	GU	GU	L		LP

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Element Code	Scientific Name	Common Name	Global Rank	Combined Global Rank*	Distri-bution	ESA Status*	Patch Type
Community							
154.13	*Encelia-Olneya (group)*	Brittlebush-ironwood (group)	GU	GU			
154.135	*Forchammeria watsoni*	Mixed short tree-thorn desert scrub	GU	GU	E		LP
154.157	*Fouquieria columnaris-Pachycormus discolor*	Boojum-elephant tree desert scrub	GU	GU	L		LP
134.31	*Fouquieria-Ipomoea-Acacia*	Sinaloan mixed thornscrub	GU	GU	P		M
154.175	*Frankenia palmeri-Atriplex sp.*	Palmer alkali heath shrubland	GU	GU			
133.3	*Interior chaparral/encinal (group)*	Interior chaparral/encinal (group)		GU			
254.7	*Interior riparian shrub/woodland (group)*	Interior riparian shrub/woodland (group)	GU	GU			
154.141	*Jatropha cinerea-Bursera microphylla*	Torchwood-limberbush-short tree scrub	GU	GU	L		LP
154.142	*Jatropha sp.-Bursera microphylla-Pachycereus pringlei*	Torchwood-limberbush-cardon association	GU	GU	L		LP
154.143	*Jatropha sp.-Fouquieria columnaris*	Torchwood-limberbush-boojum desert scrub	GU	GU	L		LP
154.14	*Jatropha-Bursera (group)*	Torchwood-limberbush (group)	GU	GU			
154.11	*Larrea tridentata (group)*	Creosotebush-bursage (group)	GU	GU	L		M
154.124	*Larrea tridentata-Canotia holocantha*	Creosote-crucifixion thorn shrubland	GU	GU	L		LP
224.52	*Mesquite woodland (group)*	Mesquite woodland (group)		GU			
153.1	*Mohave Desert shrubland (group)*	Mohave Desert shrubland (group)		GU			
154.12	*Parkinsonia-Carnegia-Opuntia (group)*	Palo verde-mixed cacti (group)	GU	GU	L		LP
200R	*Perennial/Intermittent Stream*	Perennial/intermittent stream	GU	GU	L		SP
224.515	*Phoenix dactylifera-Washingtonia filifera*	California fan palm-date palm oasis	GU	GU	L		SP
244.72	*Phragmites sp.*	Interior giant reed marsh	GU	GU	W		SP
240C	*Playa lake*	Intermittently flooded playa lake bed	GU	GU	W		LP
264.71	*Potamogeton sp.*	Pondweed marsh	GU	GU	W		SP
224.522	*Prosopis velutina-mixed short tree*	Mesquite-mixed short tree woodland	G?	GU	L		LP
244.82	*Salicornia sp.*	Glasswort sand flats	G?	GU	W		SP
244.74	*Scirpus olneyi*	Interior three-square marsh	GU	GU	W		SP
250RC	*Sea cave*	Sea cave	GU	GU	L		SP
134.3	*Sinaloan/foothills thornscrub (group)*	Sinaloan/foothills thornscrub (group)		GU			
251	*Sonora/Mohave bedrock outcrop (group)*	Sonora/Mohave bedrock outcrop (group)		GU			
240	*Sonoran/Mohave playa lake (group)*	Sonoran/Mohave playa lake (group)		GU			
250R	*Sparsely vegetated coastal rock shore*	Coastal rock shore	GU	GU	W		L
251B	*Sparsely vegetated desert outcrops*	Sparsely vegetated desert outcrops	GU	GU	L		LP
251I	*Sparsely vegetated desert pavement*	Desert pavement	GU	GU	L		LP
200	*Streams, springs and sinks (group)*	Streams, springs and sinks (group)	GU	GU			
143.1	*Tobosa-Hilaria-Aristida-Prosopis (group)*	Semi-desert grassland (group)	GU	GU			
244.7	*Typha-Phragmites-Scirpus (group)*	Interior riparian marsh (group)	GU	GU			
224.51	*Washingtonia filifera (group)*	California fan palm oasis (group)	GU	GU			
224.513	*Washingtonia filifera-Brahea armata*	California fan palm-blue palm oasis	GU	GU	L		SP
224.512	*Washingtonia filifera-Populus fremonti*	California fan palm-Fremont cottonwood woodland	GU	GU	L		SP
Fish							
AFCNB02060	*Cyprinodon macularius*	Desert pupfish	G1	G1	E	LE	
AFCNB02062	*Cyprinodon macularius eremus*	Quitobaquito desert pupfish	G1T1	G1	E	LE	
AFCNB02061	*Cyprinodon macularius macularius*	Desert pupfish	G1T1	G1	E	LE	
AFCJB13100	*Gila elegans*	Bonytail	G1	G1	L	LE	
AFCJB33010	*Plagopterus argentissimus*	Woundfin	G1	G1	L	LE	
AFCJB35020	*Ptychocheilus lucius*	Colorado squawfish	G1	G1	L	LE(CA-LE/XN	
AFCJC11010	*Xyrauchen texanus*	Razorback sucker	G1	G1	L	LE	
AFCJB13090	*Gila ditaenia*	Sonora chub	G2	G2	E	LT	
AFCJB13160	*Gila intermedia*	Gila chub	G2	G2	L	C, SN(P)	
AFCJB22010	*Meda fulgida*	Spikedace	G2	G2	L	LT	
AFCJB37140	*Tiaroga cobitis*	Loach minnow	G2	G2	L	LT	
AFCJB03030	*Campostoma ornatum*	Mexican stoneroller	G3	G3	L	SC	

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Element Code	Scientific Name	Common Name	Global Rank	Combined Global Rank*	Distri-bution	ESA Status*	Patch Type
Fish							
AFCJC02040	*Catostomus clarki*	Desert sucker	G3G4	G3	L	SC	
AFCJC02100	*Catostomus insignis*	Sonora sucker	G3	G3	L	SC	
AFCJC02110	*Catostomus latipinnis*	Flannelmouth sucker	G3G4	G3	W	SC	
AFCJB13150	*Gila robusta*	Roundtail chub	G3G4	G3	W	SC	
AFCNC05020	*Poeciliopsis occidentalis*	Sonoran topminnow	G3	G3	E	LE, MX(T)	
AFCNC05021	*Poeciliopsis occidentalis occidentalis*	Gila topminnow	G3T3	G3	E	LE, MX(T)	
AFCJB37150	*Agosia chrysogaster*	Longfin dace	G4	G4	L	SC	
AFCDA01010	*Elops affinis*	Pacific tenpounder	G5	G5	P		
AFCJB37050	*Rhinichthys osculus*	Speckled dace	G5	G5	W	SC	
ANOCODE005	*Agosia sp.*	Unidentified Agosia sp.	?	GU			
AP00000005	*Catostomus wigginsi*	Opata sucker	?	GU	P		
ANOCODE020	*Gila eremica*	Desert chub	?	GU			
ANOCODE006	*Gila sp.*	Unidentified Gila sp.	?	GU			
Herpetofauna							
AAAAD02010	*Batrachoseps aridus*	Desert slender salamander	G1	G1	E	LE	
ARACH01061	*Eumeces gilberti arizonensis*	Arizona skink	G5T1Q	G1	L	SC	
ARAAE01041	*Kinosternon sonoriense longifemorale*	Sonoyta mud turtle	G4T1	G1	E	C	
ARACF15010	*Uma inornata*	Coachella Valley fringe-toed lizard	G1Q	G1	L	LT	
AAABB01111	*Bufo microscaphus californicus*	Arroyo toad	G4T2	G2	L	LE	
ARACJ02012	*Cnemidophorus burti xanthonotus*	Redback whiptail	G4T2	G2	E	SC	
ARADB25012	*Phyllorhynchus browni lucidus*	Maricopa leafnose snake	G5T2	G2	E		
AAABH01022	*Rana aurora draytoni*	California red-legged frog	G4T2T3	G2	L	CA(LT)	
ARACF15022	*Uma notata rufopunctata*	Cowles fringe-toed lizard	G3QT2T3	G2	L	SC	
AAABB01140	*Bufo retiformis*	Sonoran green toad	G3G4	G3	E	SN(R)	
ARADA01021	*Charina trivirgata gracia*	Desert rosy boa	G5T3	G3	E	SC	
ARADA01023	*Charina trivirgata trivirgata*	Mexican rosy boa	G5T3	G3	E	SC	
ARADB05021	*Chionactis palarostris organica*	Organ Pipe shovelnose snake	G3T3	G3	E		
ARACD01040	*Coleonyx switaki*	Barefoot gecko	G3	G3	L	SC	
AAABD04171	*Eleutherodactylus augusti cactorum*	Western barking frog	G4T3	G3	E		
ARACF12040	*Phrynosoma mcallii*	Flat-tail horned lizard	G3	G3	E	SC	
AAABH01080	*Rana chiricahuensis*	Chiricahua leopard frog	G3	G3	L	C	
AAABH01210	*Rana tarahumarae*	Tarahumara frog	G3	G3	E	SC	
ARADB36061	*Thamnophis eques megalops*	Mexican garter snake	G4T3	G3	E	SC	
ARADB36160	*Thamnophis hammondii*	Two-striped garter snake	G3	G3	L	SC	
ARNOCODE02	*Uma notata notata*	Colorado desert fringe-toed lizard	G3Q	G3	E	SN(T)	
ARACF15030	*Uma scoparia*	Mojave fringe-toed lizard	G3Q	G3	L		
AAABB01112	*Bufo microscaphus microscaphus*	Arizona toad	G4T3T4	G4	L	AZ(C), SN(P)	
ARADE02091	*Crotalus exsul ruber*	Red diamond rattlesnake	G5T4	G4	L	SC	
ARAAF01010	*Gopherus agassizii*	Desert tortoise	G4	G4	L	CA(LT),AZ(C)	
ARAAE01023	*Kinosternon flavescens arizonense*	Southwestern mud turtle	G5T4	G4	E		
AAABH01250	*Rana yavapaiensis*	Lowland leopard frog	G4	G4	L	SC	
ARADB36110	*Thamnophis rufipunctatus*	Narrow-headed garter snake	G4	G4	L	SC	
ARADA01020	*Charina trivirgata*	Rosy boa	G5	G5	E	SC	
ARACJ02060	*Cnemidophorus hyperythrus*	Orangethroat whiptail	G5	G5	L		
ARACK01030	*Xantusia vigilis*	Desert night lizard	G5	G5	L	SN(T)	
LRCQ010013	*Cnemidophorus estebanensis*	San Esteban whiptail	G?	GU	E		
ANOCODE001	*Cnemidophorus nolascoensis*	San Pedro Nolasco whiptail		GU	E		
AIEPS00120	*Crotalus molossus estebanensis*	San Esteban blacktail rattlesnake	G1	GU	E	SN(P)	
AIEPS00111	*Ctenosaura hemilopha nolascoensis*	San pedro nolasco spiny-tailed iguana	G1	GU	E	SN(P)	
AIEPS00269	*Hypsiglena torquata tiburonensis*	Tiburon Island night snake	?	GU	E		
AIEPS00106	*Phyllodactylus homolepidurus nolascoensis*	San Pedro Nolasco gecko	?	GU	E	SN(R)	

Appendix 1. Conservation Targets by Taxonomic Group and Global Rank.

Element Code	Scientific Name	Common Name	Global Rank	Combined Global Rank*	Distri-bution	ESA Status*	Patch Type
Herpetofauna							
ARACD04011	*Phyllodactylus xanti estebanensis*	San Esteban leaf-toed gecko	?	GU	E	SN(R)	
ANOCODE002	*Rana yumanensis*	San Felipe leopard frog	?	GU			
LRCK045007	*Sauromalus varius*	San Esteban iguana	G?	GU	E	SN(T)	
LRCK056003	*Uta nolascensis*	San Pedro Nolasco side-blotched lizard	G?	GU	L		
LRCK056004	*Uta palmeri*	San Pedro Martir side-blotched lizard	G?	GU	L		
Invertebrate							
IILEP79080	*Atrytonopsis cestus*	Cestus skipper	G1G3	G1	P		
IMGASB9040	*Eremarionta immaculata*	White desertsnail	G1	G1	E		
IIORT22020	*Macrobaenetes valgum*	Coachella giant sand treader cricket	G1G2	G1	E		
IMGASB9102	*Micrarionta rowelli mccoiana*	California mccoy snail	G1T1	G1	E		
IMGASC9010	*Sonorella allynsmithi*	Squaw peak talussnail	G1	G1	E	SC	
IMGASC9240	*Sonorella eremita*	San xavier talussnail	G1	G1	E	PE	
IIORT26010	*Stenopelmatus cahuilaensis*	Coachella Valley Jerusalem cricket	G1G2	G1	E		
IMGASJ7160	*Tryonia gilae*	Gila tryonia	G1	G1	E	SC	
IMGASJ7130	*Tryonia quitobaquitae*	Quitobaquito tryonia	G1	G1	E	SC	
IICOL30050	*Anomala carlsoni*	Carlson's dune beetle	G2	G2	E		
IICOL30060	*Anomala hardyorum*	Hardy's dune beetle	G2	G2	E		
IINEU04010	*Oliarces clara*	Cheese-weed owlfly	G1G3	G2	E	SC	
IILEP84030	*Panoquina errans*		G2G3Q	G2	E		
IICOL37020	*Pseudocotalpa andrewsi*	Andrew's dune beetle	G2G3	G2	E		
IMGASJ0770	*Pyrgulopsis arizonae*	Bylas springsnail	G2	G2	E	SC	
IILEP59010	*Adopaeoides prittwitzi*	Sunrise skipper	G3G4	G3	L		
IILEP80090	*Amblyscirtes texanae*	Texas roadside skipper	G3G4	G3	P		
IICOL02362	*Cicindela oregona maricopa*	Maricopa tiger beetle	G5T3	G3	L	SC	
IILEP56020	*Ancyloxypha arene*	Tropical least skipper	G4	G4	L		
IILEPH2050	*Calephelis wrighti*	Wright's metalmark	G4	G4	L		
IILEP64010	*Stinga morrisoni*	Morrison's skipper	G4	G4	L		
IILEW0W010	*Eupackardia calleta*		G5	G5	?		
IILEP39030	*Heliopetes lavianus*	Laviana skipper	G5	G5	L		
IILEPF0010	*Hypostrymon critola*	Sonoran hairstreak	G5	G5	E		
INOCODE023	*Acmaeodera atactospilata*		?	GU			
INOCODE024	*Acmaeodera cribocoilis*		?	GU			
INOCODE025	*Acmaeodera curticulata*		?	GU			
INOCODE026	*Acmaeodera lanata*		?	GU			
INOCODE027	*Acmaeodera tuta*		?	GU			
INOCODE028	*Acmaeodera verityi*		?	GU			
INOCODE005	*Acmaeodera yumae*		?	GU			
INOCODE006	*Acmaeoderoides straminea*		?	GU			
IILEP80240	*Amblyscirtes elissa*	Elissa skipper	G?	GU	?		
INOCODE004	*Ascia howarthi*	Howarth's white	?	GU			
INOCODE035	*Bee Biodiversity Area*	Bee Biodiversity Area		GU			
INOCODE003	*Centris caesalpiniae*		?	GU			
INOCODE032	*Centris eisenii*			GU			
INOCODE001	*Chioides catillus albofasciatus*	Silver-banded skipper	?	GU			
INOCODE002	*Chrysobothris platti*		?	GU			
INOCODE036	*Concentration of aquatic invertebrates*	Concentration of aquatic invertebrates		GU			
INOCODE012	*Euchloe guaymasensis*	Guaymas marble	?	GU			
INOCODE007	*Hippomelas imperialis*	Large buprestid beetle	?	GU			
INOCODE008	*Lepismaedora algodonnes*		?	GU			
INOCODE009	*Monachister californicus*	Sand burrowing beetle	?	GU			
INOCODE031	*Neopachylopus sp.*			GU			

Appendix 1. Conservation Targets by Taxonomic Group and Global Rank.

Element Code	Scientific Name	Common Name	Global Rank	Combined Global Rank*	Distri-bution	ESA Status*	Patch Type
Invertebrate							
INOCODE011	*Opsiphanes boisduralii*		?	GU			
INOCODE017	*Paracotalpa deserta*		?	GU			
INOCODE022	*Perdita veris*		?	GU			
INOCODE010	*Philoxenus desertorum*			GU			
INOCODE015	*Pogonomyrmex anzensis*		?	GU			
INOCODE014	*Polites norae*		?	GU			
INOCODE018	*Sonorella burgesi*		?	GU			
INOCODE019	*Sonorella pratti*		?	GU			
INOCODE021	*Sonorella rothi*		?	GU			
INOCODE020	*Sonorella seri*		?	GU			
INOCODE029	*Squamodera ephedrae*		?	GU			
INOCODE030	*Tryonia sp.*	Aquatic invertebrate		GU			
Mammal							
AMALD01012	*Antilocapra americana sonoriensis*	Sonoran pronghorn	G5T1	G1	E	LE	
APOET00077	*Lepus alleni tiburonensis*	Tiburon antelope jackrabbit	G1	G1			
AMALE04012	*Ovis canadensis cremnobates*	Peninsular bighorn	G4G5T1	G1	E	CA(LE)	
APOET00014	*Odocoileus hemionus sheldoni*	Tiburon mule deer	G2G3	G2			
AMAFF03011	*Peromyscus eremicus papagensis*	Pinacate cactus mouse	G5T1T2	G2	E	C	
AMAFB05161	*Spermophilus tereticaudus chlorus*	Coachella round-tailed ground squirrel	G5T1T2	G2	E	SC	
AMAJH02010	*Felis onca*	Jaguar	G3	G3	L	LE	
LMGQ020850	*Myotis vivesi*	Fishing bat	G3	G3	L		
AMAFF07013	*Sigmodon hispidus eremicus*	Yuma cotton rat	G5T2T3	G3	E	SC	
AMACB02010	*Choeronycteris mexicana*	Mexican long-tongued bat	G4	G4	L	SC	
AMACD02020	*Eumops underwoodi*	Underwood's mastiff bat	G4	G4	E	SC	
AMACC09010	*Idionycteris phyllotis*	Allen's big-eared bat	G4	G4	L	SC	
AMACB03021	*Leptonycteris curasoae yerbabuenae*	Lesser long-nosed bat	G4T3T4	G4	L	LE	
AMACB01010	*Macrotus californicus*	California leaf-nosed bat	G4	G4	L	SC	
AMACD04010	*Nyctinomops femorosaccus*	Pocketed free-tailed bat	G4	G4	L		
AMALE04014	*Ovis canadensis mexicana*	Desert bighorn sheep	G4G5T3	G4	P		
AMALE04013	*Ovis canadensis nelsoni*	Desert bighorn sheep	G4G5T4	G4	P		
AMACC05070	*Lasiurus xanthinus*	Western yellow bat	G5	G5	L		
AMACC01050	*Myotis velifer*	Cave myotis	G5	G5	W	SC	
AMAFF03020	*Peromyscus merriami*	Mesquite mouse	G5	G5	E		
APOET00022	*Castor canadensis frondator*	Beaver	G?	GU			
LMUA065190	*Neotoma varia*	Woodrat	G?	GU	E		
APOET00238	*Perognathus baileyi insularis*	Pocket mouse		GU			
APOET00240	*Perognathus intermedius pinacate*	Rock pocket mouse		GU	E		
AMAFD01040	*Perognathus longimembris kinoensis*	Pocket mouse	G5T1?	GU	L		
APOET00112	*Peromyscus crinitus delgadilli*	Delgadillo's canyon mouse	?	GU			
APOET00103	*Peromyscus eremicus tiburonensis*	Tiburon cactus mouse	?	GU			
LMUA083340	*Peromyscus pembertoni*	San Pedro Nolasco deer mouse	G?	GU	E		
LMUA083440	*Peromyscus stephani*	San Esteban deer mouse	G?	GU	E		
APOET00312	*Spermophilus variegatus tiburonensis*	Tiburon rock squirrel		GU			
APOET00177	*Tamias dorsalis sonoriensis*	Chichimoco	?	GU			
Plant							
PMAGA01030	*Agave arizonica*	Arizona agave	G1Q	G1		LE	
PMAGA010W0	*Agave delamateri*	Tonto basin agave	G1	G1	E	SC	
PM01002090	*Agave pelona*		G1	G1	E		
PMAGA010N2	*Agave schottii var treleasei*	Trelease agave	G5T1Q	G1	E	SC	
PM01002120	*Agave subsimplex*		G1	G1	E		

Appendix 1. Conservation Targets by Taxonomic Group and Global Rank.

Element Code	Scientific Name	Common Name	Global Rank	Combined Global Rank*	Distri-bution	ESA Status*	Patch Type
Plant							
PDAPO030M0	*Amsonia kearneyana*	Kearney's blue star	G1	G1	E	LE, AZ(C)	
PDFAB0F920	*Astragalus tricarinatus*	Triple-rib milkvetch	G1	G1	E	CA(LE)	
PDCHE041D0	*Atriplex parishii*	Parish's saltbush	G1	G1	E		
PDAST20042	*Chaenactis carphoclinia var peirsonii*	Peirson's pincushion	G5T1	G1	E		
PDAST2E370	*Cirsium wrightii*	Wright's marsh thistle	G1G2	G1	E		
PIEPS01238	*Coreocarpus sanpedroensis*		G1	G1	U		
PDFAB1A1K0	*Dalea tentaculoides*	Gentry indigo bush	G1	G1	E	C	
PIEPS03841	*Echinocereus grandis*		G1	G1	L		
PDCAC0J0E1	*Echinomastus erectocentrus var acunensis*	Acuna cactus	G3T1Q	G1	E	C	
PDAST3M4X0	*Erigeron piscaticus*	Fish creek fleabane	G1	G1	E	SC	
PDPGN080D0	*Eriogonum apachense*	Apache wild-buckwheat	G1	G1	E	AZ(C)	
PDPLM041Y0	*Gilia maculata*	Little San Bernardino Mountains gilia	G1	G1	L		
PDAST4H070	*Hazardia orcuttii*		G1G2	G1	E		
PDBRA1M0B1	*Lepidium flavum var felipense*	Borrego Valley pepper-grass	G5T1	G1	E		
PDPLM090J3	*Linanthus floribundus ssp. hallii*	Santa Rosa Mountains linanthus	G4T1	G1	E		
PDFAB2C021	*Lysiloma microphylla var thornberi*	Feather bush	G5T1Q	G1	E		
PDFAB330L0	*Macroptilium supinum*	Supine bean	G1G2	G1	L		
PMAGA08070	*Nolina interrata*		G1	G1	E		
PDCAC0D0V0	*Opuntia munzii*	Munz cholla	G1Q	G1	E		
PDSCR1L210	*Penstemon discolor*	Catalina beardtongue	G1	G1	E		
PDAST700Y0	*Perityle ajoensis*	Ajo rock daisy	G1G2	G1	E		
PDHYD0D011	*Pholistoma auritum var arizonicum*	Arizona pholistoma	G5T2T3	G1	L		
PDROS1E080	*Purshia subintegra*	Arizona cliff rose	G1Q	G1	E	LE	
PDLAM1S020	*Salvia amissa*	Aravaipa sage	G1G2	G1	L		
PD01524000	*Schoepfia shreveana*		G1	G1	E		
PD01060070	*Senecio pinacatensis*		G1	G1	E		
PDMAL020E0	*Abutilon parishii*	Pima indian mallow	G2	G2	E		
PDMAL020P0	*Abutilon thurberi*	Thurber indian mallow	G2?	G2	E	SC	
PNOCODE001	*Acacia goldmanii*		G2	G2	L		
PM01002050	*Agave chrysoglossa*		G2	G2	E		
PNOCODE003	*Agave moranii*		G2	G2	L		
PMAGA010F0	*Agave murpheyi*	Hohokam agave	G2	G2	E	SC	
PDEUP08050	*Argythamnia californica*	California ditaxis	G2	G2	E		
PDFAB0FB97	*Astragalus lentiginosus var coachellae*	Coachella valley milkvetch	G5T2	G2	E	CA(LE)	
PDFAB0F532	*Astragalus magdalenae var peirsonii*	Peirson's milkvetch	G3G4T2	G2	E	PE, CA(LT)	
PDFAB0F5Y5	*Astragalus newberryi var aquarii*	Newberry milkvetch	G5T2	G2	E		
PDBER02030	*Berberis harrisoniana*	Kofa barberry	G2	G2	E		
PNOCODE52	*Brahea brandegeei*	Brandegee palm	G2	G2	L		
PDONA030X0	*Camissonia lewisii*		G2?	G2	E		
PDPGN040J2	*Chorizanthe parryi var parryi*	Parry's Spineflower	G2T2	G2	L		
PDAST2E1T0	*Cirsium mohavense*		G2G3	G2	L		
PDEUP0H140	*Croton wigginsii*	Wiggin's croton	G2G3	G2	L		
PDBOR0A120	*Cryptantha ganderi*	Gander's cryptantha	G2	G2	E	SC	
PDCAC05022	*Echinocactus horizonthalonius var nicholii*	Nichol turk's head cactus	G4T2	G2	E	LE	
PDAST3M580	*Erigeron anchana*	Mogollon fleabane	G2	G2	L	SC	
PDPGN08520	*Eriogonum ripleyi*	Ripley wild-buckwheat	G2	G2	L	SC	
PDCAC0X060	*Escobaria sp.*		G2	G2	E		
PDCAC08071	*Ferocactus wislizeni var tiburonensis*	Tiburon barrel cactus	G4T2	G2	E		
PDRUB0N042	*Galium angustifolium ssp. borregoense*	Borrego bedstraw	G5T2	G2	E	SC, Rare	
PDAST4N0Z2	*Helianthus niveus ssp. tephrodes*	Algodones dunes sunflower	G4T3	G2	E	SC, CA(LE)	
PDMAL0J030	*Horsfordia exalata*		G2G3	G2	E		

Appendix 1. Conservation Targets by Taxonomic Group and Global Rank.

Element Code	Scientific Name	Common Name	Global Rank	Combined Global Rank*	Distri-bution	ESA Status*	Patch Type
Plant							
PDAST4Z030	*Hulsea californica*	San Diego hulsea	G2	G2	L		
PDASTDL020	*Laennecia eriophylla*	Woolly fleabane	G2G3	G2	L		
PDFAB2F031	*Marina orcuttii var orcuttii*	California marina	G2G4T1T	G2	E	SC	
PMPOA480G0	*Muhlenbergia dubioides*	Box canyon muhly	G2	G2	E		
PDSCR1L070	*Penstemon albomarginatus*	White-margin beardtongue	G2	G2	L	SC	
PDAST700P0	*Perityle saxicola*	Fish creek rock daisy	G2	G2	E	SC	
PDHYD0C3G0	*Phacelia parishii*		G2G3	G2	L		
PMPOA530T0	*Puccinellia parishii*	Parish alkali grass	G2	G2	L	PE	
PDLAM1S0E0	*Salvia davidsonii*	Davidson sage	G2?	G2	L		
PDLAM1S0P0	*Salvia greatae*	Orocopia sage	G2	G2	E	SC	
PDSOL0Z220	*Solanum tenuilobatum*		G2G3	G2	E		
PDAST8U0D0	*Stephanomeria schottii*	Schott's wire lettuce	G2	G2	E		
PDBRA2G0B0	*Streptanthus campestris*	Southern jewelflower	G2	G2	E		
PMARE0G010	*Washingtonia filifera*	California fan palm	G2G3	G2	L		
PDASTA1010	*Xylorhiza cognata*	Mecca aster	G2	G2	E	SC	
PDEUP01040	*Acalypha californica*		G3G4	G3	E		
PM01002060	*Agave felgeri*	Mescalito	G3	G3	E		
PMLIL021N0	*Allium parishii*	Parish onion	G3?	G3	E		
PDAPI05020	*Ammoselinum giganteum*	Western sand-parsley	G2G4	G3	E		
PNOCODE005	*Argemone subintegrifolia*		G3	G3	L		
PPASP020A0	*Asplenium dalhousiae*	Dalhouse spleenwort	G3?	G3	E		
PDFAB0F491	*Astragalus insularis var harwoodii*	Harwood milkvetch	G5T3	G3	E		
PNOCODE006	*Brahea armata*		G3	G3	L		
PNOCODE008	*Brickellia vollmeri*		G3	G3	E		
PD01537200	*Carlowrightia pectinata*		G3	G3	E		
PDEUP0D1X0	*Chamaesyce platysperma*	Flatseed spurge	G3?	G3	E	SC	
PDCAC040C1	*Coryphantha scheeri var robustispina*	Pima pineapple cactus	G4T3	G3	L	LE	
PDCAC0X0G3	*Coryphantha vivipara var buoflama*	Yavapai beehive	G3T3Q	G3			
PNOCODE013	*Dalea juncea*		G3	G3	E		
PNOCODE014	*Dalea orcuttii*		G3	G3	E		
PDCAR09090	*Drymaria viscosa*		G3?	G3	E		
PDCAC0J0E2	*Echinomastus erectocentrus var erectocentrus*	Needle-spined pineapple cactus	G3T3Q	G3		SC	
PNOCODE015	*Encelia ravenii*		G3	G3	L		
PGEPH01022	*Ephedra funerea*	Death valley mormon tea	G3Q	G3	L		
PDPGN081Q0	*Eriogonum deserticola*	Desert wild-buckwheat	G3	G3	E		
PNOCODE016	*Eriogonum galioides*		G3	G3	L		
PDLOA02020	*Eucnide rupestris*	Rock stingbush	G3	G3	E		
PIEPS01101	*Euphorbia xantii*		G3	G3	L		
PDOLE04080	*Fraxinus gooddingii*	Goodding ash	G3	G3	L		
PDCRA06010	*Graptopetalum bartramii*	Bartram stonecrop	G3G4	G3	E	SC	
PDSTE06010	*Hermannia pauciflora*	Sparseleaf hermannia	G3?	G3	E		
PDSAX0E0B0	*Heuchera eastwoodiae*	Eastwood alum root	G3	G3	L		
PDPLM060U0	*Ipomopsis effusa*	Baja California Ipomopsis	G3	G3	E		
PDFAB2A020	*Lotus alamosanus*	Alamos beer vetch	G3?	G3	L		
PDFAB2A0Q1	*Lotus mearnsii var equisolensis*		G2G4T?	G3	E		
PDSCR2L010	*Mabrya acerifolia*	Mapleleaf false snapdragon	G3?	G3	E		
PDAST64040	*Machaeranthera arida*	Arid tansy-aster	G3G4	G3			
PD01071980	*Mammillaria boolii*		G3	G3	L		
PNOCODE019	*Mammillaria estebanensis*		G3	G3	L		
PIEPS03541	*Mammillaria tayloriorum*		G3	G3	L		
PIEPS01464	*Mammillaria yaquensis*		G3	G3	L		

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Element Code	Scientific Name	Common Name	Global Rank	Combined Global Rank*	Distri-bution	ESA Status*	Patch Type
Plant							
PDLOA030K0	*Mentzelia hirsutissima*	California stick-leaf	G3?	G3	E		
PDASC050P0	*Metastelma mexicanum*	Wiggins milkweed vine	G3?	G3			
PMPOA480V0	*Muhlenbergia gooddingii*		G3?Q	G3	E		
PDPGN0G012	*Nemacaulis denudata var gracilis*	Slender woolly-heads	G4T3?	G3	E		
PDCAC0D0E0	*Opuntia echinocarpa*		G3?	G3	L		
PDCAC0D224	*Opuntia engelmannii var flavispina*		G5T3?	G3	E		
PDCAC0D1P0	*Opuntia wigginsii*	Wiggins cholla	G3Q	G3	L		
PDAST6T012	*Palafoxia arida var gigantea*	Giant spanishneedle	G5T3	G3	E	SC	
PMPOA4P1L0	*Paspalum virletii*	Virlet paspalum	G3?	G3	U		
PDAST6W0A0	*Pectis imberbis*	Beardless chinch weed	G3	G3	L	SC	
PDAST700D1	*Perityle gilensis var gilensis*	Gila rock daisy	G4?T3	G3	E		
PDLNN02010	*Pholisma arenarium*	Scaly sandplant	G3	G3	E		
PDLNN02020	*Pholisma sonorae*	Sand food	G3	G3	E	SC	
PDSCR2R010	*Pseudorontium cyathiferum*	Deep canyon snapdragon	G3G4	G3	E		
PD01523980	*Schoepfia californica*		G3	G3	E		
PDAST8H3W1	*Senecio carlomasonii*		G3?	G3	E		
PDAST8H3W0	*Senecio hartwegii*	Seemann groundsel	G3?	G3	L		
PNOCODE027	*Sibara angelorum*		G3	G3	L		
PIEPS03194	*Sibara pectinata*		G3	G3	L		
PPTHE05192	*Thelypteris puberula var sonorensis*	Aravaipa wood fern	G5T3	G3	E		
PDASTA1040	*Xylorhiza orcuttii*	Orcutt's woody aster	G3?	G3	E	SC	
PMAGA01060	*Agave deserti*	Desert agave	G4	G4	E		
PDCPP01010	*Atamisquea emarginata*	Desert tree caper	G4	G4	E		
PDBUR01020	*Bursera microphylla*	Elephant-tree	G4	G4	E		
PNOCODE010	*Capsicum annuum var aviculare*	Chiltepin	G4?	G4	P		
PDSIM03030	*Castela emoryi*	Crucifixion thorn	G4	G4	E		
PDAST3L030	*Ericameria brachylepis*	Rayless turpentine bush	G4	G4	E		
PDAST4N0Z0	*Helianthus niveus*	Dune sunflower	G4	G4	L		
PDACA0E0L0	*Justicia candicans*	Hierba azul	G4	G4	E		
PIEPS03078	*Lysiloma candida*	Palo blanco	G4	G4	L		
PDLOA04010	*Petalonyx linearis*	Longleaf sandpaper plant	G4	G4	E		
PDANA08050	*Rhus kearneyi*	Kearney sumac	G4	G4	E		
PDAST8Y060	*Stylocline sonorensis*	Mesquite neststraw	G3G5	G4	E		
PDAST9A030	*Tithonia thurberi*	Thurber tithonia	G4	G4	E		
PMLIL22010	*Triteleiopsis palmeri*	Blue sand lily	G4	G4	E		
PMAGA0B0X0	*Yucca whipplei*	Lechuguilla	G4	G4	E		
PDSOL06010	*Capsicum annuum*	Chiltepin	G5	G5	W		
PDCAC12010	*Carnegiea gigantea*	Saguaro cactus	G5	G5	L		
PDAPI0Z0L0	*Eryngium nasturtiifolium*	Hierba del sapo	G5	G5	L		
PDCAC0X0G0	*Escobaria vivipara*		G5T?Q	G5	E		
PDEUP0Q1B0	*Euphorbia misera*	Cliff spurge	G5	G5	E		
PD00060100	*Acacia crinita*		G?	GU	E		
PD00060140	*Acacia occidentalis*	Tree catclaw	G?	GU	E		
PD00060160	*Acacia willardiana*	Palo liso	G?	GU	E		
PD01060130	*Adelia obovata*		G?	GU	E		
PD00060250	*Adelia virgata*		G?	GU	E		
PD00060270	*Aeschynomene fascicularis*	Joint vetch	G?	GU	E		
PM01060110	*Agave colorata*	Mezcal ceniza	G?	GU	E		
PM01002070	*Agave fortiflora*		G?	GU	E		
PM01060100	*Agave jaiboli*		G?	GU			
PM01002130	*Agave zebra*		G?	GU	E		

Appendix 1. Conservation Targets by Taxonomic Group and Global Rank.

Element Code	Scientific Name	Common Name	Global Rank	Combined Global Rank*	Distri-bution	ESA Status*	Patch Type
Plant							
PMLIL02130	*Allium haematochiton*		G4	GU	E		
PD00061830	*Brongniartia alamosana*	Palo piojo	G?	GU	E		
PD00061850	*Brongniartia nudiflora*		G?	GU	E		
PD01060120	*Brongniartia shrevei*		G?	GU	E		
PD00062020	*Bursera hindsiana*	Red elephant tree	G?	GU	E		
PD00062310	*Castela polyandra*		G?	GU	E		
PD00064790	*Euphorbia magdalenae*		G?	GU	E		
PD01002240	*Fouquieria columnaris*	Boojum tree	G?	GU	E		
PD00067130	*Mammillaria johnstonii*		G?	GU	E		
PD00067150	*Mammillaria multidigitata*		G?	GU	E		
PD00068070	*Opuntia reflexispina*		G?	GU	E		
PD00068890	*Pithecellobium confine*		G?	GU	E		
PD00070490	*Stegnosperma halimifolium*		G?	GU	E		
PD01060550	*Suaeda puertopenascoa*		G?	GU	E		
PD01060160	*Vallesia baileyana*		G?	GU	E		

Appendix 2. Heritage Program Global Ranking Definitions, Endangered Species Act Status Definitions and Criteria for Combined Global Ranks.

Global Priority Ranking Definitions

Priority ranking (1 to 5) based on the number of occurrences throughout the entire range of the element (from Arizona Game and Fish Depratment Heritage Data Management System, 1/12/94).

Global Rank	State Rank	
G1	**S1**	Very Rare: 1 to 5 occurrences or very few individuals or acres.
G2	**S2**	Rare: 6 to 20 occurrences or few individuals or acres
G3	**S3**	Uncommon or Restricted: 21 to 100 occurrences, rather rare throughout a fairly wide range, or fairly common in a rather restricted range.
	S3S4	Fairly Common: 51 to 100 occurrences and found over a rather wide range within the State.
G4	**S4**	Apparently Secure: more than 100 occurrences, though it could be quite rare in some parts of its range.
G5	**S5**	Demonstrably Secure: more than 100 occurrences.
GU		Unranked.

Endangered Species Status Definitions

Federal U.S. Status under Endangered Species Act of 1973 (as amended) US Department of Interior, Fish and Wildlife Service (from Arizona Game and Fish Department Heritage Data Management System, 7/23/99).

Listed Species

LE	Listed Endangered: imminent jeopardy of extinction.
LT	Listed Threatened: imminent jeopardy of becoming Endangered.
XN	Experimental Nonessential population.

Species Proposed for Listing

PE	Proposed Endangered.
PT	Proposed Threatened.

Candidates for Listing (Federal Notice of Review: 1996)

C	Candidate. Species for which USFWS has sufficient information on biological vulnerability and threats to support proposals to list as Endangered or Threatened under ESA. However, proposed rules have not yet been issued because such actions are precluded at present by other listing activity.
SC	Species of Concern. The terms "Species of Concern" or "Species at Risk" should be considered as terms-of-art that describe the entire realm of taxa whose conservation status may be of concern to the US Fish and Wildlife Service, but neither term has official status (former C2 species).

Status In Mexico

MEX	**Mexican Federal Endangered Species List** (May 16, 1994) Secretaría de Desarollo Social, NORMA Oficial Mexicana NOM-059-ECOL-1994
SN(T)	Determined Threatened in Sonora: could become endangered if factors causing habitat deterioration or population decline continue.

Criteria for Converting Global Ranks to Combined Global Ranks

Combined global ranks were determined from the following global rank designations:

G1= G1, G1Q, G1T1, G4T1, G3T1Q, G5T1Q, G4G5T1, G5T1 (Those G_T1Q's need case by case review), G1G2

G2= G2, G2?, G3T2, G1G3, G2G3, G3T2, G3G4T2, G2G4T1T2Q, G4T1T2, G4T2, G4?T2?, G5T2, G5T1T2, G5T1T2Q (again, those G_T2Q's need case by case review)

G3= G3, G3?, G3Q, G3?Q, G2G3Q, G2G4, G2G4T?, G3G4T3, G3G4, G3QT2T3, G3T3Q, G4T2T3, G4T3, G4T3?, G4?T3, G4?T3, G5T2T3, G5T3, G5T3?, G5T2T3Q

G4= G4, G4?, G?, G4T4, G3G5, G4T3T4, G5T4, G5T3T4, G4G5T3T4, G4G5T4, G4G5

G5= G5, G5?, G5T, G5T?

G? are probably endemics in Sonora and are treated as such with respect to Conservation Criteria (*e.g.* G?=G4?)

Appendix 3. Coding System for the Sonoran Ecoregion Biophysical Model.

CODE	Ecological Subdivision (4 types: coded 100000 to 400000)
100000	Arizona Uplands
200000	Central Gulf Coast
300000	Lower Colorado River Valley
400000	Plains of Sonora
CODE	**Land Cover Classification (& Ecological Groups) 19 types: (01000 to 19000)**
01000	Agave-Bursage Scrub
02000	Agriculture-Urban*
03000	Creosotebush-Bursage Scrub
04000	Coastal/Interior Dunes & Plains
05000	Sonora/Mojave Playa Lake
06000	Interior Chaparral/Encinal
07000	Industrial-Urban*
08000	Desert Riparian Woodland
09000	Interior Riparian Shrub/Woodland
10000	Interior Riparian Woodlands
11000	Torchwood-Limberbush Scrub
12000	Coastal Mangrove Forest
13000	Mesquite Woodland (riparian and microphyll woodland combined)
14000	Baja state boundary (minor cover map artifact)*
15000	Palo verde-Mixed Cacti
16000	Saltbush-Saltmarsh
17000	Semi-Desert Grassland
18000	Sinaloan/foothills Thornscrub
19000	Water
CODE	**Elevation Classification (5 types: coded 000 to 400)**
100	Low: -75 to 400 meters ASL
200	Low-mid: 400 to 800 meters ASL
300	Mid-high: 800 to 1075 meters ASL
400	High: 1075 meters or more ASL
CODE	**Slope Categories (3 types: coded 10 to 30)**
10	Flat-gentle slope: 0 - 6 degrees
20	Moderate - Steep: 7 - 35 degrees
30	Steep - Cliff: > 35 degrees
CODE	**Aspect Categories (3 types: coded 1 to 3)**
1	Flat-gentle slope -aspect insignificant
2	South-southwest: 91 - 314
3	North-northeast: 315 - 90

* not used for analysis of biophysical representation.

Appendix 4. Conservation Targets Identified within Conservation Sites.

Conservation Site #: **1 Rancho El Único** Total Conservation Targets* **28**
(Excluding Biophysical Units)

Site Size acres: **354,759** Hectares: **143,569** Ecoregional Subdivision: **Central Gulf Coast**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Abronia maritima-Helianthus-Jouvea*	Gulf of California coastal strand	G5	
	Distichlis spicata	Coastal saltgrass	G5	
	Avicennia-Rhizophora-Lanungularia (group)	Coastal mangrove forest (group)	GU	
	Rhizophora mangle	Red mangrove (black-white mangrove) forest	G3	
	Leguncularia racemosa	White mangrove forest	G3	
	Washingtonia filifera association	California fan palm oasis	G2	
	Desert Spring/Seep	Desert Spring/Seep	GU	
	Jatropha-Bursera (group)	Torchwood-limberbush (group)	GU	
	Fouquieria-Ipomoea-Acacia	Sinaloan mixed thornscrub	GU	
Bird	*Migratory Bird Concentration Area*	Migratory Bird Concentration Area	GU	
Herpetofauna	*Gopherus agassizii*	Desert Tortoise	G4	CA(LT),AZ(C)
Invertebrate	*Ascia howarthi*	Howarth's white	GU	
	Euchloe guaymasensis	Guaymas marble	GU	
	Hypostrymon critola	Sonoran hairstreak	G5	
	Panoquina errans		G2	
	Polites norae		GU	
Mammal	*Myotis vivesi*	Fishing Bat	G3	
	Tamias dorsalis sonoriensis	Chichimoco	GU	
Plant	*Agave chrysoglossa*		G2	
	Agave colorata		GU	
	Agave felgeri		G3	
	Agave fortiflora		GU	
	Euphorbia xantii		G3	
	Lysiloma candida	Palo Blanco	G4	
	Mammillaria boolii	Viejito	G3	
	Mammillaria johnstonii		GU	
	Schoepfia shreveana		G1	
	Vallesia baileyana		GU	
Biophysical Unit	*Abronium-Eriogonum (group)*	Interior dunes and plains (group)	GU	
	Agave-Ambrosia-Fouquieria (group)	Agave-bursage scrub (group)	GU	
	Atriplex-Allenrolfea-Suaeda (group)	Saltbush desert scrub (group)	GU	
	Avicennia-Rhizophora-Lanungularia (group)	Coastal mangrove forest (group)	GU	
	Jatropha-Bursera (group)	Torchwood-limberbush (group)	GU	
	Larrea tridentata (group)	Creosotebush-bursage (group)	GU	
	Mesquite woodland (group)	Mesquite woodland (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	

Appendix 4. Conservation Targets Identified within Conservation Sites.

Conservation Site #: **2 San Esteban Island** Total Conservation Targets* **12** *(Excluding Biophysical Units)*

Site Size acres: **10,334** Hectares: **4,182** Ecoregional Subdivision: **Central Gulf Coast**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Abronia-Opuntia-Coccoloba*	Coastal dune	GU	
	Zostera maritima	Eelgrass bed	G4	
	Avicennia-Rhizophora-Lanungularia (group)	Coastal mangrove forest (group)	GU	
	Fouquieria-Ipomoea-Acacia	Sinaloan mixed thornscrub	GU	
Herpetofauna	*Cnemidophorus estebanensis*	San Esteban Whiptail	GU	
	Crotalus molossus estebanensis	San Esteban Blacktail Rattlesnake	GU	SN(P)
	Phyllodactylus xanti estebanensis	San Esteban Leaf-toed Gecko	GU	SN(R)
	Sauromalus varius	Chuckwalla	GU	SN(T)
Mammal	*Neotoma varia*		GU	
	Peromyscus pembertoni	San Pedro Nolasco Deer Mouse	GU	
Plant	*Echinocereus grandis*		G1	
	Mammillaria estebanensis		G3	
Biophysical Unit	*Jatropha-Bursera (group)*	Torchwood-limberbush (group)	GU	
	Mesquite woodland (group)	Mesquite woodland (group)	GU	

Conservation Site #: **3 Bahía de Kino / Isla Tiburón / Sierra Bacha** Total Conservation Targets* **33** *(Excluding Biophysical Units)*

Site Size acres: **698,810** Hectares: **282,805** Ecoregional Subdivision: **Central Gulf Coast**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Abronia-Opuntia-Coccoloba*	Coastal dune	GU	
	Abronia maritima-Helianthus-Jouvea	Gulf of California coastal strand	G5	
	Distichlis spicata	Coastal saltgrass	G5	
	Zostera maritima	Eelgrass bed	G4	
	Avicennia-Rhizophora-Lanungularia (group)	Coastal mangrove forest (group)	GU	
	Rhizophora mangle	Red mangrove (black-white mangrove) forest	G3	
	Prosopis (sp. glandulosa, velutina)	Mesquite woodland	G3	
	Washingtonia filifera association	California fan palm oasis	G2	
	Cercidium floridum	Blue palo verde mixed desert scrub	G3	
	Jatropha sp.-Bursera microphylla-Pachycereus pringlei	Torchwood-limberbush-cardon association	GU	
	Fouquieria-Ipomoea-Acacia	Sinaloan mixed thornscrub	GU	
Bird	*Dendroica petechia bryanti*	Mangrove yellow warbler	G5	
	Ixobrychus exilis	Least Bittern	G5	
	Migratory Bird Concentration Area	Migratory Bird Concentration Area	GU	
	Rallus longirostris yumanensis	Yuma Clapper Rail	G3	LE
	Toxostoma lecontei	Le Conte's Thrasher	G3	
Herpetofauna	*Gopherus agassizii*	Desert Tortoise	G4	CA(LT),AZ(C)
	Hypsiglena torquata tiburonensis	Tiburon Island Night Snake	GU	
Mammal	*Lepus alleni tiburonensis*	Tiburon Antelope Jackrabbit	G1	
	Myotis vivesi	Fishing Bat	G3	

Appendix 4. Conservation Targets Identified within Conservation Sites.

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Mammal	*Odocoileus hemionus sheldoni*	Tiburon Mule Deer	G2	
	Ovis canadensis mexicana	Desert Bighorn Sheep	G4	
	Perognathus baileyi insularis	Pocket Mouse	GU	
	Peromyscus eremicus tiburonensis	Tiburon Cactus Mouse	GU	
	Peromyscus stephani	San Esteban Deer Mouse	GU	
	Spermophilus variegatus tiburonensis	Tiburon Rock Squirrel	GU	
Plant	*Agave chrysoglossa*		G2	
	Agave pelona	Mescal Pelon	G1	
	Agave subsimplex		G1	
	Castela polyandra		GU	
	Euphorbia xantii		G3	
	Ferocactus wislizeni var tiburonensis		G2	
	Pithecellobium confine		GU	
Biophysical Unit	*Abronium-Eriogonum (group)*	Interior dunes and plains (group)	GU	
	Agave-Ambrosia-Fouquieria (group)	Agave-bursage scrub (group)	GU	
	Atriplex-Allenrolfea-Suaeda (group)	Saltbush desert scrub (group)	GU	
	Avicennia-Rhizophora-Lanungularia (group)	Coastal mangrove forest (group)	GU	
	Jatropha-Bursera (group)	Torchwood-limberbush (group)	GU	
	Larrea tridentata (group)	Creosotebush-bursage (group)	GU	
	Mesquite woodland (group)	Mesquite woodland (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	

Conservation Site #: **4 Sierra Bacha/Sierra del Viejo** Total Conservation Targets* **27**
(Excluding Biophysical Units)

Site Size acres: **1,351,652** Hectares: **547,006** Ecoregional Subdivision: **Central Gulf Coast**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Abronia maritima-Helianthus-Jouvea*	Gulf of California coastal strand	G5	
	Sparsely vegetated coastal rock shore	Coastal rock shore	GU	
	Avicennia-Rhizophora-Lanungularia (group)	Coastal mangrove forest (group)	GU	
	Washingtonia filifera association	California fan palm oasis	G2	
	Desert Spring/Seep	Desert Spring/Seep	GU	
	Encelia-Olneya (group)	Brittlebush-ironwood "Plains Of Sonora" (group)	GU	
	Jatropha-Bursera (group)	Torchwood-limberbush (group)	GU	
Bird	*Migratory Bird Concentration Area*	Migratory Bird Concentration Area	GU	
	Sterna elegans	Elegant Tern	G2	
	Toxostoma lecontei	Le Conte's Thrasher	G3	
Invertebrate	*Sonorella burgesi*	talussnail	GU	
	Sonorella pratti	talussnail	GU	
	Sonorella rothi	talussnail	GU	
	Sonorella seri	talussnail	GU	
Mammal	*Macrotus californicus*	California Leaf-nosed Bat	G4	SC
	Myotis vivesi	Fishing Bat	G3	
	Ovis canadensis mexicana	Desert Bighorn Sheep	G4	
Plant	*Agave pelona*	Mescal Pelon	G1	
	Agave subsimplex		G1	
	Agave zebra		GU	

Appendix 4. Conservation Targets Identified within Conservation Sites.

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Plant	*Allium haematochiton*	Red Skin Onion	GU	
	Echinocactus horizonthalonius var nicholii	Nichol Turk's Head Cactus	G2	LE
	Euphorbia misera	Cliff Spurge	G5	
	Euphorbia xantii		G3	
	Fouquieria columnaris	Boojum Tree	GU	
	Rhus kearneyi	Kearney Sumac	G4	
	Sibara pectinata		G3	
Biophysical Unit	*Abronium-Eriogonum (group)*	Interior dunes and plains (group)	GU	
	Atriplex-Allenrolfea-Suaeda (group)	Saltbush desert scrub (group)	GU	
	Jatropha-Bursera (group)	Torchwood-limberbush (group)	GU	
	Larrea tridentata (group)	Creosotebush-bursage (group)	GU	
	Mesquite woodland (group)	Mesquite woodland (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	

Conservation Site #: **5 Cañones de La Pintada /Tetabejo** Total Conservation Targets* **3**
(Excluding Biophysical Units)

Site Size acres: **739,164** Hectares: **299,135** Ecoregional Subdivision: **Plains of Sonora**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Washingtonia filifera-Brahea armata*	California fan palm-blue palm oasis	GU	
Plant	*Agave jaiboli*		GU	
	Brahea armata		G3	
Biophysical Unit	*Jatropha-Bursera (group)*	Torchwood-limberbush (group)	GU	
	Larrea tridentata (group)	Creosotebush-bursage (group)	GU	
	Mesquite woodland (group)	Mesquite woodland (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	
	Sinaloan/foothills thornscrub (group)	Sinaloan/foothills thornscrub (group)	GU	

Conservation Site #: **6 Sierra Tordilla/Puerto el Orégano** Total Conservation Targets* **2**
(Excluding Biophysical Units)

Site Size acres: **18,642** Hectares: **7,544** Ecoregional Subdivision: **Plains of Sonora**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Herpetofauna	*Gopherus agassizii*	Desert Tortoise	G4	CA(LT),AZ(C)
Plant	*Brongniartia shrevei*		GU	
Biophysical Unit	*Jatropha-Bursera (group)*	Torchwood-limberbush (group)	GU	
	Larrea tridentata (group)	Creosotebush-bursage (group)	GU	
	Mesquite woodland (group)	Mesquite woodland (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	
	Sinaloan/foothills thornscrub (group)	Sinaloan/foothills thornscrub (group)	GU	

Appendix 4. Conservation Targets Identified within Conservation Sites.

Conservation Site #: **7 Carrizo Plains/Arroyo Bacoachito** Total Conservation Targets* **8** *(Excluding Biophysical Units)*

Site Size acres: **667,927** Hectares: **270,307** Ecoregional Subdivision: **Plains of Sonora**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Tobosa-Hilaria-Aristida-Prosopis (group)*	Semi-desert grassland (group)	GU	
	Jatropha-Bursera (group)	Torchwood-limberbush (group)	GU	
	Ecological gradient	Ecological gradient		
Bird	*Colinus virginianus ridgwayi*	Masked Bobwhite	G1	LE
	Dendroica petechia	Yellow Warbler	G3	
	Migratory Bird Concentration Area	Migratory Bird Concentration Area	GU	
Herpetofauna	*Charina trivirgata trivirgata*	Mexican Rosy Boa	G3	SC
	Gopherus agassizii	Desert Tortoise	G4	CA(LT),AZ(C)
Biophysical Unit	*Interior chaparral/encinal (group)*	Interior chaparral/encinal (group)	GU	
	Jatropha-Bursera (group)	Torchwood-limberbush (group)	GU	
	Larrea tridentata (group)	Creosotebush-bursage (group)	GU	
	Mesquite woodland (group)	Mesquite woodland (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	
	Tobosa-Hilaria-Aristida-Prosopis (group)	Semi-desert grassland (group)	GU	

Conservation Site #: **8 Cerro Borrego/San Felipe Desert** Total Conservation Targets* **38** *(Excluding Biophysical Units)*

Site Size acres: **2,253,757** Hectares: **971,488** Ecoregional Subdivision: **Lower Colorado River Valley**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Eriogonum deserticola association*	Colorado desert wild buckwheat sand dune	G1	
	Hilaria rigida	Big galleta grassland	G3	
	Distichlis spicata	Coastal saltgrass	G5	
	Zostera maritima	Eelgrass bed	G4	
	Avicennia-Rhizophora-Lanungularia (group)	Coastal mangrove forest (group)	GU	
	Washingtonia filifera-Brahea armata	California fan palm-blue palm oasis	GU	
	Larrea tridentata (group)	Creosotebush-bursage (group)	GU	
	Prosopis glandulosa	Honey mesquite shrubland	G3	
	Cercidium floridum	Blue palo verde mixed desert scrub	G3	
	Fouquieria splendens	Ocotillo shrubland	G4	
	Jatropha-Bursera (group)	Torchwood-limberbush (group)	GU	
	Jatropha cinerea-Bursera microphylla	Torchwood-limberbush-short tree scrub	GU	
	Jatropha sp.-Bursera microphylla-Pachycereus pringlei	Torchwood-limberbush-cardon association	GU	
	Atriplex-Allenrolfea-Suaeda (group)	Saltbush scrub (group)	GU	
	Allenrolfea occidentalis	Pickleweed shrubland	G3	
Herpetofauna	*Bufo microscaphus californicus*	Arroyo toad	G2	LE
	Charina trivirgata gracia	Desert Rosy Boa	G3	SC

Appendix 4. Conservation Targets Identified within Conservation Sites.

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Herpetofauna	*Coleonyx switaki*	Barefoot Banded Gecko	G3	SC
	Crotalus exsul ruber	Red Diamond Rattlesnake	G4	SC
	Phrynosoma mcallii	Flat-tailed Horned Lizard	G3	SC
	Thamnophis hammondii	Two-striped Garter Snake	G3	SC
	Xantusia vigilis	Desert Night Lizard	G5	SN(T)
Invertebrate	*Neopachylopus sp.*		GU	
Mammal	*Ovis canadensis cremnobates*	Peninsular Bighorn Sheep	G1	CA(LE)
Plant	*Agave moranii*		G2	
	Argemone subintegrifolia		G3	
	Brahea armata		G3	
	Brickellia vollmeri		G3	
	Bursera hindsiana	Red Elephant Tree	GU	
	Bursera microphylla	Elephant Tree	G4	
	Dalea juncea		G3	
	Dalea orcuttii		G3	
	Encelia ravenii		G3	
	Eriogonum galioides		G3	
	Eucnide rupestris	Rock Stingbush	G3	
	Marina orcuttii var orcuttii	California Marina	G2	SC
	Sibara angelorum		G3	
	Washingtonia filifera	California Fan Palm	G2	
Biophysical Unit	*Abronium-Eriogonum (group)*	Interior dunes and plains (group)	GU	
	Atriplex-Allenrolfea-Suaeda (group)	Saltbush desert scrub (group)	GU	
	Interior chaparral/encinal (group)	Interior chaparral/encinal (group)	GU	
	Jatropha-Bursera (group)	Torchwood-limberbush (group)	GU	
	Larrea tridentata (group)	Creosotebush-bursage (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	

Conservation Site #: **9 Tacna Marsh** Total Conservation Targets* **3**
(Excluding Biophysical Units)

Site Size acres: **2,417** Hectares: **978** Ecoregional Subdivision: **Lower Colorado River Valley**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Bird	*Ixobrychus exilis hesperis*	Western Least Bittern	GU	AZ(C)
	Pipilo aberti	Abert's Towhee	G3	
	Rallus longirostris yumanensis	Yuma Clapper Rail	G3	LE
Biophysical Unit	*Interior riparian shrub/woodland (group)*	Interior riparian shrub/woodland (group)	GU	
	Larrea tridentata (group)	Creosotebush-bursage (group)	GU	

Appendix 4. Conservation Targets Identified within Conservation Sites.

Conservation Site #: **10 Colorado River Delta** Total Conservation Targets* **35** *(Excluding Biophysical Units)*

Site Size acres: **1,038,194** Hectares: **420,168** Ecoregional Subdivision: **Lower Colorado River Valley**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Abronia villosa-mixed shrub*	Desert sand-verbena interior dune	G1	
	Distichlis spicata	Coastal saltgrass	G5	
	Typha domingensis	Interior cattail marsh	G5	
	Phragmites sp.	Interior giant reed marsh	GU	
	Platanus wrightii	Arizona sycamore riparian woodland	G4	
	Populus fremonti-Salix gooddingii	Fremont cottonwood-Goodding's black willow riparian woodland	G2	
	Desert Spring/Seep	Desert Spring/Seep	GU	
	Atriplex-Allenrolfea-Suaeda (group)	Saltbush scrub (group)	GU	
	Allenrolfea occidentalis	Pickleweed shrubland	G3	
Bird	*Ixobrychus exilis hesperis*	Western Least Bittern	GU	AZ(C)
	Laterallus jamaicensis coturniculus	California Black Rail	G1	SC, AZ(T)
	Migratory Bird Concentration Area	Migratory Bird Concentration Area	GU	
	Rallus longirostris yumanensis	Yuma Clapper Rail	G3	LE
	Sterna nilotica vanrossemi	Van Rossem's Gull-billed Tern	G1	SC
Fish	*Catostomus latipinnis*	Flannelmouth Sucker	G3	SC
	Cyprinodon macularius macularius	Desert Pupfish	G1	LE
	Elops affinis	Pacific Tenpounder	G5	
	Gila elegans	Bonytail	G1	LE
	Gila robusta	Roundtail Chub	G3	SC
	Plagopterus argentissimus	Woundfin	G1	LE
	Ptychocheilus lucius	Colorado Squawfish	G1	LE(CA-LE/XN)
	Xyrauchen texanus	Razorback Sucker	G1	LE
Herpetofauna	*Charina trivirgata trivirgata*	Mexican Rosy Boa	G3	SC
	Gopherus agassizii	Desert Tortoise	G4	CA(LT),AZ(C)
	Phrynosoma mcallii	Flat-tailed Horned Lizard	G3	SC
	Uma notata rufopunctata	Cowles Fringe-toed Lizard	G2	SC
Invertebrate	*Neopachylopus sp.*		GU	
	Tryonia sp.	Aquatic invertebrate	GU	
Mammal	*Castor canadensis frondator*	Beaver	GU	
Plant	*Argemone subintegrifolia*		G3	
	Brickellia vollmeri		G3	
	Dalea juncea		G3	
	Dalea orcuttii		G3	
	Sibara angelorum		G3	
	Suaeda puertopenascoa		GU	
Biophysical Unit	*Abronium-Eriogonum (group)*	Interior dunes and plains (group)	GU	
	Atriplex-Allenrolfea-Suaeda (group)	Saltbush desert scrub (group)	GU	
	Larrea tridentata (group)	Creosotebush-bursage (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	

Appendix 4. Conservation Targets Identified within Conservation Sites.

Conservation Site #: **11 Bouse Dunes** Total Conservation Targets* **4**
(Excluding Biophysical Units)

Site Size acres: **118,280** Hectares: **47,867** Ecoregional Subdivision: **Lower Colorado River Valley**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Parkinsonia-Carnegia-Opuntia (group)*	Palo verde-mixed cacti (group)	GU	
Herpetofauna	*Uma scoparia*	Mojave Fringe-toed Lizard	G3	
Plant	*Ephedra funerea*	Death Valley Mormon Tea	G3	
	Pholisma arenarium	Scaly Sandplant	G3	
Biophysical Unit	*Abronium-Eriogonum (group)*	Interior dunes and plains (group)	GU	
	Larrea tridentata (group)	Creosotebush-bursage (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	

Conservation Site #: **12 Kofa Complex** Total Conservation Targets* **14**
(Excluding Biophysical Units)

Site Size acres: **1,434,006** Hectares: **580,334** Ecoregional Subdivision: **Arizona Uplands**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Washingtonia filifera association*	California fan palm oasis	G2	
	Washingtonia filifera-Brahea armata	California fan palm-blue palm oasis	GU	
	Ecological gradient	Ecological gradient		
Herpetofauna	*Charina trivirgata gracia*	Desert Rosy Boa	G3	SC
	Gopherus agassizii	Desert Tortoise	G4	CA(LT),AZ(C)
	Xantusia vigilis	Desert Night Lizard	G5	SN(T)
Mammal	*Macrotus californicus*	California Leaf-nosed Bat	G4	SC
	Myotis velifer	Cave Myotis	G5	SC
	Nyctinomops femorosaccus	Pocketed Free-tailed Bat	G4	
	Ovis canadensis mexicana	Desert Bighorn Sheep	G4	
Plant	*Allium parishii*	Parish Onion	G3	
	Berberis harrisoniana	Kofa Barberry	G2	
	Opuntia wigginsii	Wiggin's Cholla	G3	
	Washingtonia filifera	California Fan Palm	G2	
Biophysical Unit	*Larrea tridentata (group)*	Creosotebush-bursage (group)	GU	
	Mesquite woodland (group)	Mesquite woodland (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	

Appendix 4. Conservation Targets Identified within Conservation Sites.

Conservation Site #: **13 Pinacate/Organ Pipe/Goldwater Complex** Total Conservation Targets* **69**
(Excluding Biophysical Units)

Site Size acres: **5,748,909** Hectares: **2,487,667** Ecoregional Subdivision: **Lower Colorado River Valley**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Abronia villosa-mixed shrub*	Desert sand-verbena interior dune	G1	
	Playa lake	Intermittently flooded playa lake bed	GU	
	Distichlis spicata	Coastal saltgrass	G5	
	Salicornia sp.	Glasswort sand flats	GU	
	Batis maritima	Glasswort-saltwort flats	G5	
	Prosopis (sp. glandulosa, velutina)	Mesquite woodland	G3	
	Washingtonia filifera association	California fan palm oasis	G2	
	Larrea tridentata (group)	Creosotebush-bursage (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mixed cacti (group)	GU	
	Cercidium floridum-Olneya tesota	Blue palo verde-ironwood-smoke tree woodland	G3	
	Allenrolfea occidentalis	Pickleweed shrubland	G3	
	Ecological gradient	Ecological gradient		
Bird	*Colaptes chrysoides*	Gilded Flicker	G5	
	Glaucidium brasilianum cactorum	Cactus Ferruginous Pygmy-owl	G3	LE
Fish	*Cyprinodon macularius*	Desert Pupfish	G1	LE
	Cyprinodon macularius eremus	Quitobaquito Desert Pupfish	G1	LE
Herpetofauna	*Bufo retiformis*	Sonoran green toad	G3	SN(R)
	Charina trivirgata gracia	Desert Rosy Boa	G3	SC
	Charina trivirgata trivirgata	Mexican Rosy Boa	G3	SC
	Chionactis palarostris organica	Organ Pipe Shovelnose Snake	G3	
	Cnemidophorus burti xanthonotus	Redback Whiptail	G2	SC
	Gopherus agassizii	Desert Tortoise	G4	CA(LT),AZ(C)
	Kinosternon sonoriense longifemorale	Sonoyta Mud Turtle	G1	C
	Phrynosoma mcallii	Flat-tailed Horned Lizard	G3	SC
	Phyllorhynchus browni lucidus	Maricopa Leafnose Snake	G2	
	Uma notata rufopunctata	Cowles Fringe-toed Lizard	G2	SC
Invertebrate	*Tryonia quitobaquitae*	Quitobaquito tryonia	G1	SC
Mammal	*Antilocapra americana sonoriensis*	Sonoran Pronghorn	G1	LE
	Choeronycteris mexicana	Mexican Long-tongued Bat	G4	SC
	Eumops underwoodi	Underwood's Mastiff Bat	G4	SC
	Leptonycteris curasoae yerbabuenae	Lesser Long-nosed Bat	G4	LE
	Macrotus californicus	California Leaf-nosed Bat	G4	SC
	Myotis velifer	Cave Myotis	G5	SC
	Nyctinomops femorosaccus	Pocketed Free-tailed Bat	G4	
	Ovis canadensis mexicana	Desert Bighorn Sheep	G4	
	Perognathus intermedius pinacate	Rock Pocket Mouse	GU	
	Peromyscus crinitus delgadilli	Delgadillo's Canyon Mouse	GU	
	Peromyscus eremicus papagensis	Pinacate Cactus Mouse	G2	C
	Peromyscus merriami	Mesquite Mouse	G5	
Plant	*Acalypha californica*		G3	
	Agave schottii var treleasei	Trelease Agave	G1	SC
	Astragalus magdalenae var peirsonii	Peirson's Milkvetch	G2	PE, CA(LT)
	Atamisquea emarginata	Desert Tree Caper	G4	
	Berberis harrisoniana	Kofa Barberry	G2	
	Capsicum annuum var aviculare	Chiltepin	G4	
	Chamaesyce platysperma	Flatseed Spurge	G3	SC
	Croton wigginsii	Dune Croton	G2	

Appendix 4. Conservation Targets Identified within Conservation Sites.

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Plant	*Cryptantha ganderi*	Gander's Cryptantha	G2	SC
	Drymaria viscosa		G3	
	Echinomastus erectocentrus var acunensis	Acuna Cactus	G1	C
	Eriogonum deserticola	Desert Wild-buckwheat	G3	
	Eryngium nasturtiifolium	Hierba Del Sapo	G5	
	Eucnide rupestris	Rock Stingbush	G3	
	Helianthus niveus	Dune Sunflower	G4	
	Helianthus niveus ssp. tephrodes	Algodones Dunes Sunflower	G2	SC, CA(LE)
	Justicia candicans	Hierba Azul	G4	
	Machaeranthera arida	Arid Tansy-aster	G3	
	Muhlenbergia gooddingii		G3	
	Palafoxia arida var gigantea	Giant Spanish Needle	G3	SC
	Perityle ajoensis	Ajo Rock Daisy	G1	
	Petalonyx linearis	Longleaf Sandpaper Plant	G4	
	Pholisma sonorae	Sand Food	G3	SC
	Rhus kearneyi	Kearney Sumac	G4	
	Senecio pinacatensis		G1	
	Stegnosperma halimifolium	Amole	GU	
	Stephanomeria schottii	Schott's Wire-lettuce	G2	
	Suaeda puertopenascoa		GU	
	Triteleiopsis palmeri	Blue Sand Lily	G4	
	Yucca whipplei	Whippley's Yucca	G4	
Biophysical Unit	*Abronium-Eriogonum (group)*	Interior dunes and plains (group)	GU	
	Atriplex-Allenrolfea-Suaeda (group)	Saltbush desert scrub (group)	GU	
	Desert Riparian Woodland (group)	Desert Riparian Woodland (group)	GU	
	Interior chaparral/encinal (group)	Interior chaparral/encinal (group)	GU	
	Interior riparian shrub/woodland (group)	Interior riparian shrub/woodland (group)	GU	
	Jatropha-Bursera (group)	Torchwood-limberbush (group)	GU	
	Larrea tridentata (group)	Creosotebush-bursage (group)	GU	
	Mesquite woodland (group)	Mesquite woodland (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	
	Sonoran/Mohave playa lake (group)	Sonoran/Mohave playa lake (group)	GU	
	Tobosa-Hilaria-Aristida-Prosopis (group)	Semi-desert grassland (group)	GU	
	Typha-Phragmites-Scirpus (group)	Interior riparian marsh (group)	GU	

Conservation Site #: **14 Arnett Creek** Total Conservation Targets* **10**
(Excluding Biophysical Units)

Site Size acres: **18,698** Hectares: **7,567** Ecoregional Subdivision: **Arizona Uplands**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Desert Spring/Seep*	Desert Spring/Seep	GU	
Fish	*Agosia chrysogaster*	Longfin Dace	G4	SC
	Catostomus clarki	Desert Sucker	G3	SC
	Catostomus latipinnis	Flannelmouth Sucker	G3	SC
	Cyprinodon macularius macularius	Desert Pupfish	G1	LE
	Poeciliopsis occidentalis occidentalis	Gila Topminnow	G3	LE, MX(T)
Herpetofauna	*Phyllorhynchus browni lucidus*	Maricopa Leafnose Snake	G2	

Appendix 4. Conservation Targets Identified within Conservation Sites.

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Herpetofauna	*Rana yavapaiensis*	Lowland Leopard Frog	G4	SC
Mammal	*Nyctinomops femorosaccus*	Pocketed Free-tailed Bat	G4	
Plant	*Agave murpheyi*	Hohokam Agave	G2	SC
Biophysical Unit	*Desert Riparian Woodland (group)*	Desert Riparian Woodland (group)	GU	
	Interior chaparral/encinal (group)	Interior chaparral/encinal (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	

Conservation Site #: **15 Cienéga Creek** Total Conservation Targets* **13**
(Excluding Biophysical Units)

Site Size acres: **130,708** Hectares: **52,897** Ecoregional Subdivision: **Arizona Uplands**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Bird	*Aimophila carpalis*	Rufous-winged Sparrow	G4	
	Asturina nitida maxima	Northern Gray Hawk	G3	AZ(C)
	Colaptes chrysoides	Gilded Flicker	G5	
	Pipilo aberti	Abert's Towhee	G3	
Fish	*Agosia chrysogaster*	Longfin Dace	G4	SC
	Cyprinodon macularius macularius	Desert Pupfish	G1	LE
Herpetofauna	*Rana yavapaiensis*	Lowland Leopard Frog	G4	SC
Invertebrate	*Adopaeoides prittwitzi*	Sunrise skipper	G3	
	Ancyloxypha arene	Tropical least skipper	G4	
Mammal	*Choeronycteris mexicana*	Mexican Long-tongued Bat	G4	SC
	Peromyscus merriami	Mesquite Mouse	G5	
Plant	*Coryphantha scheeri var robustispina*	Pima Pineapple Cactus	G3	LE
	Echinomastus erectocentrus var erectocentrus	Needle-spined Pineapple Cactus	G3	SC
Biophysical Unit	*Larrea tridentata (group)*	Creosotebush-bursage (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	
	Tobosa-Hilaria-Aristida-Prosopis (group)	Semi-desert grassland (group)	GU	

Conservation Site #: **16 Santa Rita** Total Conservation Targets* **9**
(Excluding Biophysical Units)

Site Size acres: **253,872** Hectares: **104,205** Ecoregional Subdivision: **Arizona Uplands**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Bird	*Aimophila carpalis*	Rufous-winged Sparrow	G4	
Invertebrate	*Centris caesalpiniae*		GU	
	Sonorella eremita	San Xavier talussnail	G1	PE
Mammal	*Choeronycteris mexicana*	Mexican Long-tongued Bat	G4	SC
	Macrotus californicus	California Leaf-nosed Bat	G4	SC
	Myotis velifer	Cave Myotis	G5	SC
	Peromyscus merriami	Mesquite Mouse	G5	

Appendix 4. Conservation Targets Identified within Conservation Sites.

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Plant	*Coryphantha scheeri var robustispina*	Pima Pineapple Cactus	G3	LE
	Tithonia thurberi	Thurber Tithonia	G4	
Biophysical Unit	*Interior riparian shrub/woodland (group)*	Interior riparian shrub/woodland (group)	GU	
	Larrea tridentata (group)	Creosotebush-bursage (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	
	Tobosa-Hilaria-Aristida-Prosopis (group)	Semi-desert grassland (group)	GU	

Conservation Site #: **17 Altar Valley** Total Conservation Targets* **18**
(Excluding Biophysical Units)

Site Size acres: **323,176** Hectares: **130,788** Ecoregional Subdivision: **Arizona Uplands**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Tobosa-Hilaria-Aristida-Prosopis (group)*	Semi-desert grassland (group)	GU	
	Larrea tridentata-Hilaria mutica	Creosotebush/tobosa grassland	G2	
Bird	*Aimophila carpalis*	Rufous-winged Sparrow	G4	
	Colinus virginianus ridgwayi	Masked Bobwhite	G1	LE
Herpetofauna	*Bufo retiformis*	Sonoran green toad	G3	SN(R)
	Kinosternon flavescens arizonense	Southwestern Mud Turtle	G4	
Invertebrate	*Atrytonopsis cestus*	Cestus skipper	G1	
	Stinga morrisoni	Morrison's skipper	G4	
Mammal	*Eumops underwoodi*	Underwood's Mastiff Bat	G4	SC
	Felis onca	Jaguar	G3	LE
	Lasiurus xanthinus	Western Yellow Bat	G5	
	Macrotus californicus	California Leaf-nosed Bat	G4	SC
	Myotis velifer	Cave Myotis	G5	SC
	Nyctinomops femorosaccus	Pocketed Free-tailed Bat	G4	
	Perognathus intermedius pinacate	Rock Pocket Mouse	GU	
	Peromyscus eremicus papagensis	Pinacate Cactus Mouse	G2	C
Plant	*Abutilon parishii*	Pima Indian Mallow	G2	
	Coryphantha scheeri var robustispina	Pima Pineapple Cactus	G3	LE
Biophysical Unit	*Larrea tridentata (group)*	Creosotebush-bursage (group)	GU	
	Mesquite woodland (group)	Mesquite woodland (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	
	Tobosa-Hilaria-Aristida-Prosopis (group)	Semi-desert grassland (group)	GU	

Conservation Site #: **18 Tortolita Mountains** Total Conservation Targets* **4**
(Excluding Biophysical Units)

Site Size acres: **76,702** Hectares: **31,041** Ecoregional Subdivision: **Arizona Uplands**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Parkinsonia-Carnegia-Opuntia (group)*	Palo verde-mixed cacti (group)	GU	

Appendix 4. Conservation Targets Identified within Conservation Sites.

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Carnegia gigantea-Prosopis velutina*	Saguaro cactus/velvet mesquite wooded shrubland	G4	
Bird	*Colaptes chrysoides*	Gilded Flicker	G5	
	Glaucidium brasilianum cactorum	Cactus Ferruginous Pygmy-owl	G3	LE
Biophysical Unit	*Larrea tridentata (group)*	Creosotebush-bursage (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	
	Tobosa-Hilaria-Aristida-Prosopis (group)	Semi-desert grassland (group)	GU	

Conservation Site #: **19 Sawtooth-Silverbell Mountains** Total Conservation Targets* *(Excluding Biophysical Units)* **8**

Site Size acres: **110,577** Hectares: **44,750** Ecoregional Subdivision: **Arizona Uplands**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Mammal	*Macrotus californicus*	California Leaf-nosed Bat	G4	SC
	Myotis velifer	Cave Myotis	G5	SC
	Ovis canadensis mexicana	Desert Bighorn Sheep	G4	
Plant	*Abutilon parishii*	Pima Indian Mallow	G2	
	Agave deserti		G4	
	Bursera microphylla	Elephant Tree	G4	
	Coryphantha scheeri var robustispina	Pima Pineapple Cactus	G3	LE
	Echinocactus horizonthalonius var nicholii	Nichol Turk's Head Cactus	G2	LE
Biophysical Unit	*Larrea tridentata (group)*	Creosotebush-bursage (group)	GU	
	Mesquite woodland (group)	Mesquite woodland (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	
	Tobosa-Hilaria-Aristida-Prosopis (group)	Semi-desert grassland (group)	GU	

Conservation Site #: **20 Vekol Mountains** Total Conservation Targets* *(Excluding Biophysical Units)* **3**

Site Size acres: **21,950** Hectares: **8,883** Ecoregional Subdivision: **Arizona Uplands**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Mammal	*Macrotus californicus*	California Leaf-nosed Bat	G4	SC
	Myotis velifer	Cave Myotis	G5	SC
Plant	*Echinocactus horizonthalonius var nicholii*	Nichol Turk's Head Cactus	G2	LE
Biophysical Unit	*Larrea tridentata (group)*	Creosotebush-bursage (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	

Appendix 4. Conservation Targets Identified within Conservation Sites.

Conservation Site #: **21 Tonto Creek/Salt and Verde/Meddler Wash** Total Conservation Targets* **39**
(Excluding Biophysical Units)

Site Size acres: **235,664** Hectares: **95,372** Ecoregional Subdivision: **Arizona Uplands**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Bird	*Coccyzus americanus occidentalis*	Western Yellow-billed Cuckoo	G3	PE
	Colaptes chrysoides	Gilded Flicker	G5	
	Dendroica petechia	Yellow Warbler	G3	
	Empidonax traillii extimus	Southwestern Willow Flycatcher	G2	LE
	Falco peregrinus anatum	American Peregrine Falcon	G3	
	Glaucidium brasilianum cactorum	Cactus Ferruginous Pygmy-owl	G3	LE
	Haliaeetus leucocephalus	Bald Eagle	G4	CA(PS)
	Pipilo aberti	Abert's Towhee	G3	
	Rallus longirostris yumanensis	Yuma Clapper Rail	G3	LE
Fish	*Agosia chrysogaster*	Longfin Dace	G4	SC
	Catostomus clarki	Desert Sucker	G3	SC
	Catostomus insignis	Sonora Sucker	G3	SC
	Cyprinodon macularius macularius	Desert Pupfish	G1	LE
	Gila elegans	Bonytail	G1	LE
	Gila intermedia	Gila Chub	G2	C, SN(P)
	Gila robusta	Roundtail Chub	G3	SC
	Meda fulgida	Spikedace	G2	LT
	Plagopterus argentissimus	Woundfin	G1	LE
	Poeciliopsis occidentalis occidentalis	Gila Topminnow	G3	LE, MX(T)
	Ptychocheilus lucius	Colorado Squawfish	G1	LE(CA-LE/XN)
	Rhinichthys osculus	Speckled Dace	G5	SC
	Tiaroga cobitis	Loach Minnow	G2	LT
	Xyrauchen texanus	Razorback Sucker	G1	LE
Herpetofauna	*Phyllorhynchus browni lucidus*	Maricopa Leafnose Snake	G2	
	Rana yavapaiensis	Lowland Leopard Frog	G4	SC
	Thamnophis rufipunctatus	Narrow-headed Garter Snake	G4	SC
Invertebrate	*Cicindela oregona maricopa*	Maricopa tiger beetle	G3	SC
Mammal	*Macrotus californicus*	California Leaf-nosed Bat	G4	SC
	Myotis velifer	Cave Myotis	G5	SC
Plant	*Agave delamateri*	Tonto Basin Agave	G1	SC
	Agave murpheyi	Hohokam Agave	G2	SC
	Ericameria brachylepis	Rayless Turpentine Bush	G4	
	Eriogonum ripleyi	Ripley Wild-buckwheat	G2	SC
	Justicia candicans	Hierba Azul	G4	
	Lotus mearnsii var equisolensis		G3	
	Mabrya acerifolia	Mapleleaf False Snapdragon	G3	
	Perityle saxicola	Fish Creek Rock Daisy	G2	SC
	Purshia subintegra	Arizona Cliffrose	G1	LE
	Salvia davidsonii	Davidson Sage	G2	
Biophysical Unit	*Desert Riparian Woodland (group)*	Desert Riparian Woodland (group)	GU	
	Interior chaparral/encinal (group)	Interior chaparral/encinal (group)	GU	
	Interior riparian shrub/woodland (group)	Interior riparian shrub/woodland (group)	GU	
	Larrea tridentata (group)	Creosotebush-bursage (group)	GU	
	Mesquite woodland (group)	Mesquite woodland (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	
	Sonoran/Mohave playa lake (group)	Sonoran/Mohave playa lake (group)	GU	
	Tobosa-Hilaria-Aristida-Prosopis (group)	Semi-desert grassland (group)	GU	

Appendix 4. Conservation Targets Identified within Conservation Sites.

Conservation Site #: **22 Río Magdalena/Río Asunción** Total Conservation Targets* **6**
(Excluding Biophysical Units)

Site Size acres: **325,154** Hectares: **131,588** Ecoregional Subdivision: **Arizona Uplands**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Populus fremonti-Salix gooddingii*	Fremont cottonwood-Goodding's black willow riparian woodland	G2	
Bird	*Asturina nitida maxima*	Northern Gray Hawk	G3	AZ(C)
	Coccyzus americanus occidentalis	Western Yellow-billed Cuckoo	G3	PE
	Dendroica petechia	Yellow Warbler	G3	
Fish	*Gila ditaenia*	Sonora Chub	G2	LT
	Poeciliopsis occidentalis occidentalis	Gila Topminnow	G3	LE, MX(T)
Biophysical Unit	*Desert Riparian Woodland (group)*	Desert Riparian Woodland (group)	GU	
	Interior chaparral/encinal (group)	Interior chaparral/encinal (group)	GU	
	Jatropha-Bursera (group)	Torchwood-limberbush (group)	GU	
	Larrea tridentata (group)	Creosotebush-bursage (group)	GU	
	Mesquite woodland (group)	Mesquite woodland (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	
	Tobosa-Hilaria-Aristida-Prosopis (group)	Semi-desert grassland (group)	GU	

Conservation Site #: **23 Hassayampa River** Total Conservation Targets* **15**
(Excluding Biophysical Units)

Site Size acres: **40,937** Hectares: **16,567** Ecoregional Subdivision: **Arizona Uplands**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Bird	*Coccyzus americanus occidentalis*	Western Yellow-billed Cuckoo	G3	PE
	Dendroica petechia	Yellow Warbler	G3	
	Empidonax traillii extimus	Southwestern Willow Flycatcher	G2	LE
Fish	*Agosia chrysogaster*	Longfin Dace	G4	SC
	Cyprinodon macularius macularius	Desert Pupfish	G1	LE
	Gila elegans	Bonytail	G1	LE
	Poeciliopsis occidentalis occidentalis	Gila Topminnow	G3	LE, MX(T)
	Xyrauchen texanus	Razorback Sucker	G1	LE
Herpetofauna	*Bufo microscaphus microscaphus*	Arizona toad	G4	AZ(C), SN(P)
	Eumeces gilberti arizonensis	Arizona Skink	G1	SC
	Rana yavapaiensis	Lowland Leopard Frog	G4	SC
Invertebrate	*Cicindela oregona maricopa*	Maricopa tiger beetle	G3	SC
Mammal	*Macrotus californicus*	California Leaf-nosed Bat	G4	SC
	Myotis velifer	Cave Myotis	G5	SC
Plant	*Agave murpheyi*	Hohokam Agave	G2	SC
Biophysical Unit	*Desert Riparian Woodland (group)*	Desert Riparian Woodland (group)	GU	
	Interior riparian shrub/woodland (group)	Interior riparian shrub/woodland (group)	GU	
	Larrea tridentata (group)	Creosotebush-bursage (group)	GU	

Appendix 4. Conservation Targets Identified within Conservation Sites.

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Biophysical Unit	*Mesquite woodland (group)*	Mesquite woodland (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	

Conservation Site #: **24 San Jacinto Foothills** Total Conservation Targets* **23** *(Excluding Biophysical Units)*

Site Size acres: **164,528** Hectares: **67,960** Ecoregional Subdivision: **Lower Colorado River Valley**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Desert Riparian Woodland (group)*	Desert Riparian Woodland (group)	GU	
	Washingtonia filifera association	California fan palm oasis	G2	
	Ecological gradient	Ecological gradient		
Bird	*Dendroica petechia*	Yellow Warbler	G3	
	Falco mexicanus	Prairie Falcon	G5	
	Vireo bellii pusillus	Least Bell's Vireo	G2	CA(LE)
Herpetofauna	*Batrachoseps aridus*	Desert slender salamander	G1	LE
	Rana aurora draytoni	California Red-legged Frog	G2	CA(LT)
	Uma inornata	Coachella Valley Fringe-toed Lizard	G1	LT
	Xantusia vigilis	Desert Night Lizard	G5	SN(T)
Mammal	*Macrotus californicus*	California Leaf-nosed Bat	G4	SC
	Ovis canadensis cremnobates	Peninsular Bighorn Sheep	G1	CA(LE)
	Spermophilus tereticaudus chlorus	Coachella Round-tailed Ground Squirrel	G2	SC
Plant	*Argythamnia californica*	California Ditaxis	G2	
	Astragalus lentiginosus var coachellae	Coachella Valley Milkvetch	G2	CA(LE)
	Astragalus tricarinatus	Triple-rib Milkvetch	G1	CA(LE)
	Linanthus floribundus ssp. hallii	Santa Rosa Mtns. Linanthus	G1	
	Pseudorontium cyathiferum	Deep Canyon Snapdragon	G3	
	Thelypteris puberula var sonorensis	Aravaipa Wood Fern	G3	
	Washingtonia filifera	California fan palm	G2	
Plant	*Washingtonia filifera*	California Fan Palm	G2	
	Xylorhiza cognata	Mecca Aster	G2	SC
	Xylorhiza orcuttii	Orcutt's Woody Aster	G3	SC
Biophysical Unit	*Interior chaparral/encinal (group)*	Interior chaparral/encinal (group)	GU	
	Larrea tridentata (group)	Creosotebush-bursage (group)	GU	

Conservation Site #: **25 Anza Borrego** Total Conservation Targets* **41** *(Excluding Biophysical Units)*

Site Size acres: **653,444** Hectares: **264,462** Ecoregional Subdivision: **Lower Colorado River Valley**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Playa lake*	Intermittently flooded playa lake bed	GU	
	Prosopis (sp. glandulosa, velutina)	Mesquite woodland	G3	

Appendix 4. Conservation Targets Identified within Conservation Sites.

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Populus fremonti-Salix gooddingii*	Fremont cottonwood-Goodding's black willow riparian woodland	G2	
	Washingtonia filifera association	California fan palm oasis	G2	
	Desert Spring/Seep	Desert Spring/Seep	GU	
	Larrea tridentata (group)	Creosotebush-bursage (group)	GU	
	Yucca brevifolia	Joshua tree woodland	G4	
	Acacia greggi-Parkinsonia microphylla	Cat claw acacia -yellow palo verde shrubland	G4	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mixed cacti (group)	GU	
	Quercus turbinella	Turbinella live-oak-Mexican manzanita shrubland	G4	
	Arctostaphylos pungens	Mexican manzanita shrubland	G4	
	Cercocarpus montanus-Eriogonum fasciculatum	Birchleaf mountain-mahogany-California buckwheat shrubland	G3	
	Ecological gradient	Ecological gradient		
Bird	*Dendroica petechia*	Yellow Warbler	G3	
	Falco mexicanus	Prairie Falcon	G5	
	Vireo bellii pusillus	Least Bell's Vireo	G2	CA(LE)
Fish	*Cyprinodon macularius*	Desert Pupfish	G1	LE
Herpetofauna	*Coleonyx switaki*	Barefoot Banded Gecko	G3	SC
	Crotalus exsul ruber	Red Diamond Rattlesnake	G4	SC
	Phrynosoma mcallii	Flat-tailed Horned Lizard	G3	SC
	Thamnophis hammondii	Two-striped Garter Snake	G3	SC
Invertebrate	*Pogonomyrmex anzensis*		GU	
Mammal	*Lasiurus xanthinus*	Western Yellow Bat	G5	
	Macrotus californicus	California Leaf-nosed Bat	G4	SC
	Nyctinomops femorosaccus	Pocketed Free-tailed Bat	G4	
	Ovis canadensis cremnobates	Peninsular Bighorn Sheep	G1	CA(LE)
Plant	*Astragalus insularis var harwoodii*	Harwood Milkvetch	G3	
	Astragalus magdalenae var peirsonii	Peirson's Milkvetch	G2	PE, CA(LT)
	Bursera microphylla	Elephant Tree	G4	
	Chaenactis carphoclinia var peirsonii	Peirson's Pincushion	G1	
	Chamaesyce platysperma	Flatseed Spurge	G3	SC
	Cryptantha ganderi	Gander's Cryptantha	G2	SC
	Eucnide rupestris	Rock Stingbush	G3	
	Galium angustifolium ssp. borregoense	Borrego Bedstraw	G2	SC, Rare
	Hulsea californica	San Diego Hulsea	G2	
	Lepidium flavum var felipense	Borrego Valley Pepper-grass	G1	
	Mentzelia hirsutissima	California Stick-leaf	G3	
	Opuntia wigginsii	Wiggin's Cholla	G3	
	Streptanthus campestris	Southern Jewelflower	G2	
	Washingtonia filifera	California Fan Palm	G2	
	Xylorhiza orcuttii	Orcutt's Woody Aster	G3	SC
Biophysical Unit	*Interior chaparral/encinal (group)*	Interior chaparral/encinal (group)	GU	
	Larrea tridentata (group)	Creosotebush-bursage (group)	GU	

Appendix 4. Conservation Targets Identified within Conservation Sites.

Conservation Site #: **26 Coachella Valley** Total Conservation Targets* **3** *(Excluding Biophysical Units)*

Site Size acres: **36,838** Hectares: **14,908** Ecoregional Subdivision: **Lower Colorado River Valley**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Herpetofauna	*Phrynosoma mcallii*	Flat-tailed Horned Lizard	G3	SC
	Uma inornata	Coachella Valley Fringe-toed Lizard	G1	LT
Mammal	*Spermophilus tereticaudus chlorus*	Coachella Round-tailed Ground Squirrel	G2	SC
Biophysical Unit	*Larrea tridentata (group)*	Creosotebush-bursage (group)	GU	

Conservation Site #: **27 Chocolate Mountains** Total Conservation Targets* **28** *(Excluding Biophysical Units)*

Site Size acres: **1,143,211** Hectares: **463,382** Ecoregional Subdivision: **Lower Colorado River Valley**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Typha domingensis*	Interior cattail marsh	G5	
	Prosopis (sp. glandulosa, velutina)	Mesquite woodland	G3	
	Prosopis velutina-mixed short tree	Mesquite-mixed short tree woodland	GU	
	Washingtonia filifera association	California fan palm oasis	G2	
	Perennial/Intermittent Stream	Perennial/Intermittent Stream	GU	
	Larrea tridentata (group)	Creosotebush-bursage (group)	GU	
	Cercidium floridum	Blue palo verde mixed desert scrub	G3	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mixed cacti (group)	GU	
Bird	*Falco mexicanus*	Prairie Falcon	G5	
	Migratory Bird Concentration Area	Migratory Bird Concentration Area	GU	
	Rallus longirostris yumanensis	Yuma Clapper Rail	G3	LE
	Toxostoma lecontei	Le Conte's Thrasher	G3	
Fish	*Cyprinodon macularius*	Desert Pupfish	G1	LE
Herpetofauna	*Charina trivirgata gracia*	Desert Rosy Boa	G3	SC
	Gopherus agassizii	Desert Tortoise	G4	CA(LT),AZ(C)
	Xantusia vigilis	Desert Night Lizard	G5	SN(T)
Mammal	*Macrotus californicus*	California Leaf-nosed Bat	G4	SC
	Myotis velifer	Cave Myotis	G5	SC
	Ovis canadensis nelsoni	Desert Bighorn Sheep	G4	
Plant	*Argythamnia californica*	California Ditaxis	G2	
	Astragalus insularis var harwoodii	Harwood Milkvetch	G3	
	Carnegiea gigantea	Saguaro Cactus	G5	
	Castela emoryi	Crucifixion Thorn	G4	
	Escobaria vivipara		G5	
	Opuntia munzii	Munz Cholla	G1	
	Opuntia wigginsii	Wiggin's Cholla	G3	
	Salvia greatae	Orocopia Sage	G2	SC
	Washingtonia filifera	California Fan Palm	G2	
Biophysical Unit	*Larrea tridentata (group)*	Creosotebush-bursage (group)	GU	
	Mesquite woodland (group)	Mesquite woodland (group)	GU	

Appendix 4. Conservation Targets Identified within Conservation Sites.

Conservation Site #: **28 Coachella Canal** Total Conservation Targets* **1**
(Excluding Biophysical Units)

Site Size acres: **11,840** Hectares: **5,997** Ecoregional Subdivision: **Lower Colorado River Valley**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Bird	*Laterallus jamaicensis coturniculus*	California Black Rail	G1	SC, AZ(T)
Biophysical Unit	*Larrea tridentata (group)*	Creosotebush-bursage (group)	GU	
	Mesquite woodland (group)	Mesquite woodland (group)	GU	

Conservation Site #: **29 McCoy Mountains** Total Conservation Targets* **11**
(Excluding Biophysical Units)

Site Size acres: **332,799** Hectares: **136,325** Ecoregional Subdivision: **Lower Colorado River Valley**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Parkinsonia-Carnegia-Opuntia (group)*	Palo verde-mixed cacti (group)	GU	
	Ecological gradient	Ecological gradient		
Bird	*Falco mexicanus*	Prairie Falcon	G5	
Herpetofauna	*Charina trivirgata gracia*	Desert Rosy Boa	G3	SC
	Gopherus agassizii	Desert Tortoise	G4	CA(LT),AZ(C)
	Uma scoparia	Mojave Fringe-toed Lizard	G3	
Invertebrate	*Micrarionta rowelli mccoiana*	California mccoy snail	G1	
Mammal	*Macrotus californicus*	California Leaf-nosed Bat	G4	SC
	Ovis canadensis nelsoni	Desert Bighorn Sheep	G4	
Plant	*Castela emoryi*	Crucifixion Thorn	G4	
	Escobaria vivipara		G5	
Biophysical Unit	*Abronium-Eriogonum (group)*	Interior dunes and plains (group)	GU	
	Larrea tridentata (group)	Creosotebush-bursage (group)	GU	
	Mesquite woodland (group)	Mesquite woodland (group)	GU	

Conservation Site #: **30 Riverside Mountains** Total Conservation Targets* **4**
(Excluding Biophysical Units)

Site Size acres: **9,612** Hectares: **4,697** Ecoregional Subdivision: **Lower Colorado River Valley**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Bird	*Falco mexicanus*	Prairie Falcon	G5	
Invertebrate	*Eremarionta immaculata*	White desertsnail	G1	
Mammal	*Macrotus californicus*	California Leaf-nosed Bat	G4	SC

Appendix 4. Conservation Targets Identified within Conservation Sites.

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Mammal	*Myotis velifer*	Cave Myotis	G5	SC
Biophysical Unit	*Larrea tridentata (group)*	Creosotebush-bursage (group)	GU	
	Mesquite woodland (group)	Mesquite woodland (group)	GU	

Conservation Site #: **31 Whipple Mountains** Total Conservation Targets* **9**
(Excluding Biophysical Units)

Site Size acres: **106,955** Hectares: **53,214** Ecoregional Subdivision: **Lower Colorado River Valley**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Platanus wrightii*	Arizona sycamore riparian woodland	G4	
	Washingtonia filifera association	California fan palm oasis	G2	
	Carnegia gigantea-Prosopis velutina	Saguaro cactus/velvet mesquite wooded shrubland	G4	
Mammal	*Lasiurus xanthinus*	Western Yellow Bat	G5	
	Macrotus californicus	California Leaf-nosed Bat	G4	SC
	Myotis velifer	Cave Myotis	G5	SC
	Ovis canadensis mexicana	Desert Bighorn Sheep	G4	
Plant	*Carnegiea gigantea*	Saguaro Cactus	G5	
	Pholistoma auritum var arizonicum	Arizona Pholistoma	G1	
Biophysical Unit	*Larrea tridentata (group)*	Creosotebush-bursage (group)	GU	
	Mesquite woodland (group)	Mesquite woodland (group)	GU	

Conservation Site #: **32 Sand Tanks Mountains** Total Conservation Targets* **12**
(Excluding Biophysical Units)

Site Size acres: **636,196** Hectares: **257,465** Ecoregional Subdivision: **Arizona Uplands**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Hilaria rigida*	Big galleta grassland	G3	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mixed cacti (group)	GU	
	Ecological gradient	Ecological gradient		
Bird	*Colaptes chrysoides*	Gilded Flicker	G5	
	Pipilo aberti	Abert's Towhee	G3	
Herpetofauna	*Cnemidophorus burti xanthonotus*	Redback Whiptail	G2	SC
	Gopherus agassizii	Desert Tortoise	G4	CA(LT),AZ(C)
Mammal	*Antilocapra americana sonoriensis*	Sonoran Pronghorn	G1	LE
	Macrotus californicus	California Leaf-nosed Bat	G4	SC
	Myotis velifer	Cave Myotis	G5	SC
Plant	*Berberis harrisoniana*	Kofa Barberry	G2	
	Echinomastus erectocentrus var acunensis	Acuna Cactus	G1	C
Biophysical Unit	*Larrea tridentata (group)*	Creosotebush-bursage (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	
	Tobosa-Hilaria-Aristida-Prosopis (group)	Semi-desert grassland (group)	GU	

Appendix 4. Conservation Targets Identified within Conservation Sites.

Conservation Site #: **33 Salton Sea** Total Conservation Targets* **8** *(Excluding Biophysical Units)*

Site Size acres: **255,393** Hectares: **103,356** Ecoregional Subdivision: **Lower Colorado River Valley**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Bird	*Athene cunicularia*	Burrowing Owl	G4	SC
	Charadrius alexandrinus nivosus	Western Snowy Plover	G3	CA(PS)
	Dendroica petechia	Yellow Warbler	G3	
	Mycteria americana	Wood Stork	G4	SN(T)
	Rallus longirostris yumanensis	Yuma Clapper Rail	G3	LE
	Sterna nilotica	Gull-billed Tern	G5	
	Toxostoma lecontei	Le Conte's Thrasher	G3	
Fish	*Cyprinodon macularius macularius*	Desert Pupfish	G1	LE
Biophysical Unit	*Larrea tridentata (group)*	Creosotebush-bursage (group)	GU	

Conservation Site #: **34 Joshua Tree** Total Conservation Targets* **32** *(Excluding Biophysical Units)*

Site Size acres: **467,273** Hectares: **189,103** Ecoregional Subdivision: **Lower Colorado River Valley**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Sparsely vegetated coastal rock shore*	Coastal rock shore	GU	
	Typha-Phragmites-Scirpus (group)	Interior riparian marsh (group)	GU	
	Baccharis sarothroides	Rosinbush sonoran desert wash	G4	
	Prosopis (sp. glandulosa, velutina)	Mesquite woodland	G3	
	Populus fremonti-Salix gooddingii	Fremont cottonwood-Goodding's black willow riparian woodland	G2	
	Washingtonia filifera association	California fan palm oasis	G2	
	Larrea tridentata (group)	Creosotebush-bursage (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mixed cacti (group)	GU	
Bird	*Dendroica petechia*	Yellow Warbler	G3	
	Falco mexicanus	Prairie Falcon	G5	
	Toxostoma bendirei	Bendire's Thrasher	G4	
	Toxostoma lecontei	Le Conte's Thrasher	G3	
	Vireo bellii pusillus	Least Bell's Vireo	G2	CA(LE)
Fish	*Cyprinodon macularius*	Desert Pupfish	G1	LE
Herpetofauna	*Charina trivirgata gracia*	Desert Rosy Boa	G3	SC
	Gopherus agassizii	Desert Tortoise	G4	CA(LT),AZ(C)
	Phrynosoma mcallii	Flat-tailed Horned Lizard	G3	SC
	Uma inornata	Coachella Valley Fringe-toed Lizard	G1	LT
	Xantusia vigilis	Desert Night Lizard	G5	SN(T)
Invertebrate	*Oliarces clara*	Cheese-weed owlfly	G2	SC
Mammal	*Lasiurus xanthinus*	Western Yellow Bat	G5	
	Macrotus californicus	California Leaf-nosed Bat	G4	SC

Appendix 4. Conservation Targets Identified within Conservation Sites.

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Mammal	*Ovis canadensis nelsoni*	Desert Bighorn Sheep	G4	
Plant	*Ammoselinum giganteum*	Western Sand-parsley	G3	
	Argythamnia californica	California Ditaxis	G2	
	Astragalus lentiginosus var coachellae	Coachella Valley Milkvetch	G2	CA(LE)
	Castela emoryi	Crucifixion Thorn	G4	
	Escobaria vivipara		G5	
	Gilia maculata	Little San Bernardino Mtns. Gilia	G1	
	Stylocline sonorensis	Mesquite Neststraw	G4	
	Washingtonia filifera	California Fan Palm	G2	
	Xylorhiza cognata	Mecca Aster	G2	SC
Biophysical Unit	*Abronium-Eriogonum (group)*	Interior dunes and plains (group)	GU	
	Larrea tridentata (group)	Creosotebush-bursage (group)	GU	
	Mesquite woodland (group)	Mesquite woodland (group)	GU	
	Sonoran/Mohave playa lake (group)	Sonoran/Mohave playa lake (group)	GU	

Conservation Site #: **35 Algodones Dunes** Total Conservation Targets* **24** *(Excluding Biophysical Units)*

Site Size acres: **291,397** Hectares: **117,927** Ecoregional Subdivision: **Lower Colorado River Valley**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Abronia villosa-mixed shrub*	Desert sand-verbena interior dune	G1	
	Larrea tridentata-Hilaria mutica	Creosotebush/tobosa grassland	G2	
	Cercidium floridum	Blue palo verde mixed desert scrub	G3	
Bird	*Colinus virginianus ridgwayi*	Masked Bobwhite	G1	LE
	Laterallus jamaicensis coturniculus	California Black Rail	G1	SC, AZ(T)
	Toxostoma lecontei	Le Conte's Thrasher	G3	
Herpetofauna	*Phrynosoma mcallii*	Flat-tailed Horned Lizard	G3	SC
	Uma notata notata	Fringe-toed Lizard	G3	SN(T)
Invertebrate	*Acmaeodera yumae*		GU	
	Acmaeoderoides straminea		GU	
	Anomala carlsoni	Carlson's dune beetle	G2	
	Anomala hardyorum	Hardy's dune beetle	G2	
	Hippomelas imperialis	Large buprestid beetle	GU	
	Lepismaedora algodonnes		GU	
	Monachister californicus	Sand burrowing sp.	GU	
	Philoxenus desertorum	Sand burrowing beetle	GU	
	Pseudocotalpa andrewsi	Andrew's dune beetle	G2	
Plant	*Astragalus insularis var harwoodii*	Harwood Milkvetch	G3	
	Astragalus magdalenae var peirsonii	Peirson's Milkvetch	G2	PE, CA(LT)
	Croton wigginsii	Dune Croton	G2	
	Eriogonum deserticola	Desert Wild-buckwheat	G3	
	Helianthus niveus ssp. tephrodes	Algodones Dunes Sunflower	G2	SC, CA(LE)
	Palafoxia arida var gigantea	Giant Spanish Needle	G3	SC
	Pholisma sonorae	Sand Food	G3	SC
Biophysical Unit	*Abronium-Eriogonum (group)*	Interior dunes and plains (group)	GU	
	Larrea tridentata (group)	Creosotebush-bursage (group)	GU	
	Mesquite woodland (group)	Mesquite woodland (group)	GU	

Appendix 4. Conservation Targets Identified within Conservation Sites.

Conservation Site #: **36 Palen Dry Lake** Total Conservation Targets* **2** *(Excluding Biophysical Units)*

Site Size acres: **3,479** Hectares: **1,408** Ecoregional Subdivision: **Lower Colorado River Valley**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Larrea tridentata (group)*	Creosotebush-bursage (group)	GU	
Herpetofauna	*Gopherus agassizii*	Desert Tortoise	G4	CA(LT),AZ(C)
Biophysical Unit	*Abronium-Eriogonum (group)*	Interior dunes and plains (group)	GU	
	Larrea tridentata (group)	Creosotebush-bursage (group)	GU	
	Mesquite woodland (group)	Mesquite woodland (group)	GU	
	Sonoran/Mohave playa lake (group)	Sonoran/Mohave playa lake (group)	GU	

Conservation Site #: **37 Central Gulf Coast** Total Conservation Targets* **8** *(Excluding Biophysical Units)*

Site Size acres: **174,700** Hectares: **77,967** Ecoregional Subdivision: **Central Gulf Coast**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Abronia maritima-Helianthus-Jouvea*	Gulf of California coastal strand	G5	
	Distichlis spicata	Coastal saltgrass	G5	
	Rhizophora mangle	Red mangrove (black-white mangrove) forest	G3	
	Prosopis (sp. glandulosa, velutina)	Mesquite woodland	G3	
	Jatropha sp.-Bursera microphylla-Pachycereus pringlei	Torchwood-limberbush-cardon association	GU	
Mammal	*Tamias dorsalis sonoriensis*	Chichimoco	GU	
Plant	*Ferocactus wislizeni var tiburonensis*		G2	
	Opuntia reflexispina	Cholla	GU	
Biophysical Unit	*Abronium-Eriogonum (group)*	Interior dunes and plains (group)	GU	
	Agave-Ambrosia-Fouquieria (group)	Agave-bursage scrub (group)	GU	
	Atriplex-Allenrolfea-Suaeda (group)	Saltbush desert scrub (group)	GU	
	Larrea tridentata (group)	Creosotebush-bursage (group)	GU	
	Mesquite woodland (group)	Mesquite woodland (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	

Appendix 4. Conservation Targets Identified within Conservation Sites.

Conservation Site #: **38 Colorado River / Río Hardy** Total Conservation Targets* **31** *(Excluding Biophysical Units)*

Site Size acres: **434,141** Hectares: **176,806** Ecoregional Subdivision: **Lower Colorado River Valley**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Typha-Phragmites-Scirpus (group)*	Interior riparian marsh (group)	GU	
	Typha domingensis	Interior cattail marsh	G5	
	Phragmites sp.	Interior giant reed marsh	GU	
	Prosopis (sp. glandulosa, velutina)	Mesquite woodland	G3	
	Populus fremonti-Salix gooddingii	Fremont cottonwood-Goodding's black willow riparian woodland	G2	
	Salix gooddingii-Fraxinus velutina	Goodding's black willow-velvet ash woodland	G2	
Bird	*Athene cunicularia*	Burrowing Owl	G4	SC
	Coccyzus americanus occidentalis	Western Yellow-billed Cuckoo	G3	PE
	Colaptes chrysoides	Gilded Flicker	G5	
	Dendroica petechia	Yellow Warbler	G3	
	Empidonax traillii extimus	Southwestern Willow Flycatcher	G2	LE
	Haliaeetus leucocephalus	Bald Eagle	G4	CA(PS)
	Ixobrychus exilis hesperis	Western Least Bittern	GU	AZ(C)
	Laterallus jamaicensis coturniculus	California Black Rail	G1	SC, AZ(T)
	Micrathene whitneyi	Elf Owl	G5	
	Pipilo aberti	Abert's Towhee	G3	
	Rallus longirostris yumanensis	Yuma Clapper Rail	G3	LE
Fish	*Catostomus latipinnis*	Flannelmouth Sucker	G3	SC
	Elops affinis	Pacific Tenpounder	G5	
	Gila elegans	Bonytail	G1	LE
	Gila robusta	Roundtail Chub	G3	SC
	Plagopterus argentissimus	Woundfin	G1	LE
	Ptychocheilus lucius	Colorado Squawfish	G1	LE(CA-LE/XN)
	Xyrauchen texanus	Razorback Sucker	G1	LE
Invertebrate	*Oliarces clara*	Cheese-weed owlfly	G2	SC
Mammal	*Macrotus californicus*	California Leaf-nosed Bat	G4	SC
	Myotis velifer	Cave Myotis	G5	SC
	Sigmodon hispidus eremicus	Yuma Cotton Rat	G3	SC
Plant	*Carnegiea gigantea*	Saguaro Cactus	G5	
	Escobaria vivipara		G5	
	Palafoxia arida var gigantea	Giant Spanish Needle	G3	SC
Biophysical Unit	*Abronium-Eriogonum (group)*	Interior dunes and plains (group)	GU	
	Atriplex-Allenrolfea-Suaeda (group)	Saltbush desert scrub (group)	GU	
	Desert Riparian Woodland (group)	Desert Riparian Woodland (group)	GU	
	Interior chaparral/encinal (group)	Interior chaparral/encinal (group)	GU	
	Interior riparian shrub/woodland (group)	Interior riparian shrub/woodland (group)	GU	
	Larrea tridentata (group)	Creosotebush-bursage (group)	GU	
	Mesquite woodland (group)	Mesquite woodland (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	
	Sonoran/Mohave playa lake (group)	Sonoran/Mohave playa lake (group)	GU	
	Typha-Phragmites-Scirpus (group)	Interior riparian marsh (group)	GU	

Appendix 4. Conservation Targets Identified within Conservation Sites.

Conservation Site #: **39 Sierra de Lopez** Total Conservation Targets* (Excluding Biophysical Units) **3**

Site Size acres: **20,521** Hectares: **8,305** Ecoregional Subdivision: **Plains of Sonora**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Ecological gradient*	Ecological gradient		
Plant	*Agave fortiflora*		GU	
	Agave pelona	Mescal Pelon	G1	
Biophysical Unit	*Jatropha-Bursera (group)*	Torchwood-limberbush (group)	GU	
	Larrea tridentata (group)	Creosotebush-bursage (group)	GU	
	Mesquite woodland (group)	Mesquite woodland (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	

Conservation Site #: **40 Cueva del Tigre** Total Conservation Targets* (Excluding Biophysical Units) **2**

Site Size acres: **1,453** Hectares: **588** Ecoregional Subdivision: **Plains of Sonora**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Mammal	*Leptonycteris curasoae yerbabuenae*	Lesser Long-nosed Bat	G4	LE
	Macrotus californicus	California Leaf-nosed Bat	G4	SC
Biophysical Unit	*Jatropha-Bursera (group)*	Torchwood-limberbush (group)	GU	

Conservation Site #: **41 Sierra La Cobriza** Total Conservation Targets* (Excluding Biophysical Units) **1**

Site Size acres: **3,928** Hectares: **1,590** Ecoregional Subdivision: **Plains of Sonora**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Plant	*Brahea armata*		G3	
Biophysical Unit	*Jatropha-Bursera (group)*	Torchwood-limberbush (group)	GU	
	Larrea tridentata (group)	Creosotebush-bursage (group)	GU	

Appendix 4. Conservation Targets Identified within Conservation Sites.

Conservation Site #: **42 Sierra La Jojoba** Total Conservation Targets* **3** *(Excluding Biophysical Units)*

Site Size acres: **10,483** Hectares: **4,243** Ecoregional Subdivision: **Arizona Uplands**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Herpetofauna	*Charina trivirgata gracia*	Desert Rosy Boa	G3	SC
	Gopherus agassizii	Desert Tortoise	G4	CA(LT),AZ(C)
Plant	*Agave fortiflora*		GU	
Biophysical Unit	*Jatropha-Bursera (group)*	Torchwood-limberbush (group)	GU	
	Larrea tridentata (group)	Creosotebush-bursage (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	

Conservation Site #: **43 San Pedro Nolasco Island** Total Conservation Targets* **9** *(Excluding Biophysical Units)*

Site Size acres: **968** Hectares: **392** Ecoregional Subdivision: **Central Gulf Coast**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Herpetofauna	*Cnemidophorus nolascoensis*	San Pedro Nolasco Whiptail	GU	
	Ctenosaura hemilopha nolascoensis	San Pedro Nolasco Spiny-tailed Iguana	GU	SN(P)
	Phyllodactylus homolepidurus nolascoensis	San Pedro Nolasco Gecko	GU	SN(R)
	Uta nolascensis	San Pedro Nolasco Side-blotched Lizard	GU	
Plant	*Agave chrysoglossa*		G2	
	Coreocarpus sanpedroensis		G1	
	Euphorbia magdalenae		GU	
	Mammillaria multidigitata		GU	
	Mammillaria tayloriorum		G3	
Biophysical Unit	*Jatropha-Bursera (group)*	Torchwood-limberbush (group)	GU	

Conservation Site #: **44 Río Matape** Total Conservation Targets* **2** *(Excluding Biophysical Units)*

Site Size acres: **205,217** Hectares: **83,166** Ecoregional Subdivision: **Plains of Sonora**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Fish	*Gila eremica*	Desert Chub	GU	
	Poeciliopsis occidentalis occidentalis	Gila Topminnow	G3	LE, MX(T)
Biophysical Unit	*Desert Riparian Woodland (group)*	Desert Riparian Woodland (group)	GU	
	Jatropha-Bursera (group)	Torchwood-limberbush (group)	GU	
	Larrea tridentata (group)	Creosotebush-bursage (group)	GU	
	Mesquite woodland (group)	Mesquite woodland (group)	GU	

Appendix 4. Conservation Targets Identified within Conservation Sites.

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Biophysical Unit	*Sinaloan/foothills thornscrub (group)*	Sinaloan/foothills thornscrub (group)	GU	

Conservation Site #: **45 Las Guasimas** Total Conservation Targets* (Excluding Biophysical Units) **2**

Site Size acres: **1,065** Hectares: **431** Ecoregional Subdivision: **Central Gulf Coast**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Plant	*Mammillaria johnstonii*		GU	
	Mammillaria yaquensis		G3	
Biophysical Unit	*Mesquite woodland (group)*	Mesquite woodland (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	

Conservation Site #: **46 Cerro Agualurca** Total Conservation Targets* (Excluding Biophysical Units) **3**

Site Size acres: **11,462** Hectares: **4,639** Ecoregional Subdivision: **Plains of Sonora**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Herpetofauna	*Charina trivirgata trivirgata*	Mexican Rosy Boa	G3	SC
	Gopherus agassizii	Desert Tortoise	G4	CA(LT),AZ(C)
Plant	*Adelia obovata*		GU	
Biophysical Unit	*Jatropha-Bursera (group)*	Torchwood-limberbush (group)	GU	
	Mesquite woodland (group)	Mesquite woodland (group)	GU	

Conservation Site #: **47 La Poza/Southwest Hermosillo** Total Conservation Targets* (Excluding Biophysical Units) **2**

Site Size acres: **69,640** Hectares: **28,183** Ecoregional Subdivision: **Plains of Sonora**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Ecological gradient*	Ecological gradient		
Herpetofauna	*Charina trivirgata trivirgata*	Mexican Rosy Boa	G3	SC
Biophysical Unit	*Desert Riparian Woodland (group)*	Desert Riparian Woodland (group)	GU	
	Jatropha-Bursera (group)	Torchwood-limberbush (group)	GU	
	Larrea tridentata (group)	Creosotebush-bursage (group)	GU	
	Mesquite woodland (group)	Mesquite woodland (group)	GU	

Appendix 4. Conservation Targets Identified within Conservation Sites.

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Biophysical Unit	*Parkinsonia-Carnegia-Opuntia (group)*	Palo verde-mxed cacti (group)	GU	

Conservation Site #: **48 South Ures** Total Conservation Targets* (Excluding Biophysical Units) **1**

Site Size acres: **15,585** Hectares: **6,307** Ecoregional Subdivision: **Plains of Sonora**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Herpetofauna	*Gopherus agassizii*	Desert Tortoise	G4	CA(LT),AZ(C)
Biophysical Unit	*Mesquite woodland (group)*	Mesquite woodland (group)	GU	
	Sinaloan/foothills thornscrub (group)	Sinaloan/foothills thornscrub (group)	GU	

Conservation Site #: **49 Sierra de Mazatan** Total Conservation Targets* (Excluding Biophysical Units) **2**

Site Size acres: **165,641** Hectares: **67,034** Ecoregional Subdivision: **Plains of Sonora**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Encelia-Olneya (group)*	Brittlebush-ironwood "Plains Of Sonora" (group)	GU	
	Fouquieria-Ipomoea-Acacia	Sinaloan mixed thornscrub	GU	
Biophysical Unit	*Interior chaparral/encinal (group)*	Interior chaparral/encinal (group)	GU	
	Mesquite woodland (group)	Mesquite woodland (group)	GU	
	Sinaloan/foothills thornscrub (group)	Sinaloan/foothills thornscrub (group)	GU	

Conservation Site #: **50 Río Sonora/Río San Miguel** Total Conservation Targets* (Excluding Biophysical Units) **6**

Site Size acres: **244,755** Hectares: **99,051** Ecoregional Subdivision: **Plains of Sonora**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Populus fremonti-Salix gooddingii*	Fremont cottonwood-Goodding's black willow riparian woodland	G2	
Bird	*Migratory Bird Concentration Area*	Migratory Bird Concentration Area	GU	
Fish	*Campostoma ornatum*	Mexcan Stoneroller	G3	SC
	Catostomus wigginsi	Opata Sucker	GU	
	Poeciliopsis occidentalis occidentalis	Gila Topminnow	G3	LE, MX(T)
Plant	*Capsicum annuum*	Chiltepin	G5	
Biophysical Unit	*Desert Riparian Woodland (group)*	Desert Riparian Woodland (group)	GU	

Appendix 4. Conservation Targets Identified within Conservation Sites.

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Biophysical Unit	*Jatropha-Bursera (group)*	Torchwood-limberbush (group)	GU	
	Larrea tridentata (group)	Creosotebush-bursage (group)	GU	
	Mesquite woodland (group)	Mesquite woodland (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	
	Sinaloan/foothills thornscrub (group)	Sinaloan/foothills thornscrub (group)	GU	

Conservation Site #: **51 El Papago** Total Conservation Targets* **1** *(Excluding Biophysical Units)*

Site Size acres: **4,012** Hectares: **1,624** Ecoregional Subdivision: **Plains of Sonora**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Plant	*Abutilon thurberi*	Thurber Indian Mallow	G2	SC
Biophysical Unit	*Larrea tridentata (group)*	Creosotebush-bursage (group)	GU	
	Mesquite woodland (group)	Mesquite woodland (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	

Conservation Site #: **52 Cañon La Palma** Total Conservation Targets* **2** *(Excluding Biophysical Units)*

Site Size acres: **28,402** Hectares: **11,494** Ecoregional Subdivision: **Plains of Sonora**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Washingtonia filifera association*	California fan palm oasis	G2	
Invertebrate	*Opsiphanes boisduralii*		GU	
Biophysical Unit	*Interior chaparral/encinal (group)*	Interior chaparral/encinal (group)	GU	
	Mesquite woodland (group)	Mesquite woodland (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	
	Tobosa-Hilaria-Aristida-Prosopis (group)	Semi-desert grassland (group)	GU	

Conservation Site #: **53 Atascosa Mountains** Total Conservation Targets* **22** *(Excluding Biophysical Units)*

Site Size acres: **167,960** Hectares: **67,972** Ecoregional Subdivision: **Arizona Uplands**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Bird	*Coccyzus americanus occidentalis*	Western Yellow-billed Cuckoo	G3	PE

Appendix 4. Conservation Targets Identified within Conservation Sites.

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Bird	*Falco peregrinus anatum*	American Peregrine Falcon	G3	
	Glaucidium brasilianum cactorum	Cactus Ferruginous Pygmy-owl	G3	LE
Fish	*Gila ditaenia*	Sonora Chub	G2	LT
Herpetofauna	*Rana tarahumarae*	Tarahumara Frog	G3	SC
	Rana yavapaiensis	Lowland Leopard Frog	G4	SC
Invertebrate	*Amblyscirtes elissa*	Elissa skipper	GU	
	Atrytonopsis cestus	Cestus skipper	G1	
	Heliopetes lavianus	Laviana skipper	G5	
Mammal	*Antilocapra americana sonoriensis*	Sonoran Pronghorn	G1	LE
	Choeronycteris mexicana	Mexican Long-tongued Bat	G4	SC
	Myotis velifer	Cave Myotis	G5	SC
Plant	*Dalea tentaculoides*	Gentry Indigo Bush	G1	C
	Fraxinus gooddingii	Goodding Ash	G3	
	Graptopetalum bartramii	Bartram Stonecrop	G3	SC
	Laennecia eriophylla	Woolly Fleabane	G2	
	Lotus alamosanus	Alamos Beer Vetch	G3	
	Macroptilium supinum	Supine Bean	G1	
	Metastelma mexicanum	Wiggins Milkweed Vine	G3	
	Paspalum virletii	Virlet Paspalum	G3	
	Pectis imberbis	Beardless Chinch Weed	G3	SC
	Senecio hartwegii	Seemann Groundsel	G3	
Biophysical Unit	*Larrea tridentata (group)*	Creosotebush-bursage (group)	GU	
	Mesquite woodland (group)	Mesquite woodland (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	
	Tobosa-Hilaria-Aristida-Prosopis (group)	Semi-desert grassland (group)	GU	

Conservation Site #: **54 Tubutama** Total Conservation Targets* **1**
(Excluding Biophysical Units)

Site Size acres: **23,208** Hectares: **9,392** Ecoregional Subdivision: **Arizona Uplands**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Invertebrate	*Ascia howarthi*	Howarth's white	GU	
Biophysical Unit	*Jatropha-Bursera (group)*	Torchwood-limberbush (group)	GU	
	Mesquite woodland (group)	Mesquite woodland (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	

Appendix 4. Conservation Targets Identified within Conservation Sites.

Conservation Site #: **55 Sierra El Alamo** Total Conservation Targets* **1** *(Excluding Biophysical Units)*

Site Size acres: **28,785** Hectares: **11,649** Ecoregional Subdivision: **Lower Colorado River Valley**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Mammal	*Ovis canadensis mexicana*	Desert Bighorn Sheep	G4	
Biophysical Unit	*Jatropha-Bursera (group)*	Torchwood-limberbush (group)	GU	
	Larrea tridentata (group)	Creosotebush-bursage (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	

Conservation Site #: **56 No site name designated** Total Conservation Targets* **1** *(Excluding Biophysical Units)*

Site Size acres: **20,562** Hectares: **8,321** Ecoregional Subdivision: **Lower Colorado River Valley**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Plant	*Adelia obovata*		GU	
Biophysical Unit	*Jatropha-Bursera (group)*	Torchwood-limberbush (group)	GU	
	Larrea tridentata (group)	Creosotebush-bursage (group)	GU	
	Mesquite woodland (group)	Mesquite woodland (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	

Conservation Site #: **57 Puerto Lobos** Total Conservation Targets* **13** *(Excluding Biophysical Units)*

Site Size acres: **240,931** Hectares: **105,654** Ecoregional Subdivision: **Central Gulf Coast**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Distichlis spicata*	Coastal saltgrass	G5	
	Salicornia sp.	Glasswort sand flats	GU	
	Batis maritima	Glasswort-saltwort flats	G5	
	Washingtonia filifera association	California fan palm oasis	G2	
	Desert Spring/Seep	Desert Spring/Seep	GU	
	Allenrolfea occidentalis	Pickleweed shrubland	G3	
Bird	*Migratory Bird Concentration Area*	Migratory Bird Concentration Area	GU	
	Sterna elegans	Elegant Tern	G2	
	Toxostoma lecontei	Le Conte's Thrasher	G3	
Mammal	*Myotis vivesi*	Fishing Bat	G3	
	Ovis canadensis mexicana	Desert Bighorn Sheep	G4	
Plant	*Agave subsimplex*		G1	
	Suaeda puertopenascoa		GU	

Appendix 4. Conservation Targets Identified within Conservation Sites.

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Biophysical Unit	*Abronium-Eriogonum (group)*	Interior dunes and plains (group)	GU	
	Atriplex-Allenrolfea-Suaeda (group)	Saltbush desert scrub (group)	GU	
	Jatropha-Bursera (group)	Torchwood-limberbush (group)	GU	
	Larrea tridentata (group)	Creosotebush-bursage (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	

Conservation Site #: **58 Altar Valley** Total Conservation Targets* (Excluding Biophysical Units) **2**

Site Size acres: **373,993** Hectares: **151,353** Ecoregional Subdivision: **Arizona Uplands**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Ecological gradient*	Ecological gradient		
Bird	*Pipilo aberti*	Abert's Towhee	G3	
Biophysical Unit	*Interior chaparral/encinal (group)*	Interior chaparral/encinal (group)	GU	
	Larrea tridentata (group)	Creosotebush-bursage (group)	GU	
	Mesquite woodland (group)	Mesquite woodland (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	
	Tobosa-Hilaria-Aristida-Prosopis (group)	Semi-desert grassland (group)	GU	

Conservation Site #: **59 Quitovac** Total Conservation Targets* (Excluding Biophysical Units) **1**

Site Size acres: **15,176** Hectares: **6,142** Ecoregional Subdivision: **Arizona Uplands**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Desert Spring/Seep*	Desert Spring/Seep	GU	
Biophysical Unit	*Jatropha-Bursera (group)*	Torchwood-limberbush (group)	GU	
	Larrea tridentata (group)	Creosotebush-bursage (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	

Appendix 4. Conservation Targets Identified within Conservation Sites.

Conservation Site #: **60 Sierra Cubabi** Total Conservation Targets* **3** *(Excluding Biophysical Units)*

Site Size acres: **10,032** Hectares: **4,060** Ecoregional Subdivision: **Arizona Uplands**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Mammal	*Antilocapra americana sonoriensis*	Sonoran Pronghorn	G1	LE
	Ovis canadensis mexicana	Desert Bighorn Sheep	G4	
Plant	*Echinomastus erectocentrus var acunensis*	Acuna Cactus	G1	C
Biophysical Unit	*Jatropha-Bursera (group)*	Torchwood-limberbush (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	

Conservation Site #: **61 San Simon/Sonoyta Valley** Total Conservation Targets* **11** *(Excluding Biophysical Units)*

Site Size acres: **188,024** Hectares: **76,092** Ecoregional Subdivision: **Arizona Uplands**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Washingtonia filifera association*	California fan palm oasis	G2	
Fish	*Agosia chrysogaster*	Longfin Dace	G4	SC
	Cyprinodon macularius	Desert Pupfish	G1	LE
	Cyprinodon macularius eremus	Quitobaquito Desert Pupfish	G1	LE
Herpetofauna	*Kinosternon flavescens arizonense*	Southwestern Mud Turtle	G4	
	Kinosternon sonoriense longifemorale	Sonoyta Mud Turtle	G1	C
	Phyllorhynchus browni lucidus	Maricopa Leafnose Snake	G2	
Invertebrate	*Ascia howarthi*	Howarth's white	GU	
	Bee Biodiversity Area	Bee Biodiversity Area	GU	
	Eupackardia calleta		G5	
Plant	*Atamisquea emarginata*	Desert Tree Caper	G4	
Biophysical Unit	*Abronium-Eriogonum (group)*	Interior dunes and plains (group)	GU	
	Jatropha-Bursera (group)	Torchwood-limberbush (group)	GU	
	Larrea tridentata (group)	Creosotebush-bursage (group)	GU	
	Mesquite woodland (group)	Mesquite woodland (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	

Conservation Site #: **62 Ejido Saldala** Total Conservation Targets* **2** *(Excluding Biophysical Units)*

Site Size acres: **44,985** Hectares: **18,205** Ecoregional Subdivision: **Lower Colorado River Valley**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Eriogonum deserticola association*	Colorado desert wild buckwheat sand dune	G1	

Appendix 4. Conservation Targets Identified within Conservation Sites.

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Prosopis glandulosa*	Honey mesquite shrubland	G3	
Biophysical Unit	*Abronium-Eriogonum (group)*	Interior dunes and plains (group)	GU	
	Larrea tridentata (group)	Creosotebush-bursage (group)	GU	

Conservation Site #: **63 Sunrise Butte / Guadalupe Canyon** Total Conservation Targets* **10** *(Excluding Biophysical Units)*

Site Size acres: **68,067** Hectares: **30,317** Ecoregional Subdivision: **Lower Colorado River Valley**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Larrea tridentata (group)*	Creosotebush-bursage (group)	GU	
	Cercidium floridum	Blue palo verde mixed desert scrub	G3	
Herpetofauna	*Bufo microscaphus californicus*	Arroyo toad	G2	LE
	Charina trivirgata gracia	Desert Rosy Boa	G3	SC
	Coleonyx switaki	Barefoot Banded Gecko	G3	SC
	Crotalus exsul ruber	Red Diamond Rattlesnake	G4	SC
	Phrynosoma mcallii	Flat-tailed Horned Lizard	G3	SC
	Thamnophis hammondii	Two-striped Garter Snake	G3	SC
	Xantusia vigilis	Desert Night Lizard	G5	SN(T)
Invertebrate	*Paracotalpa deserta*		GU	
Biophysical Unit	*Atriplex-Allenrolfea-Suaeda (group)*	Saltbush desert scrub (group)	GU	
	Larrea tridentata (group)	Creosotebush-bursage (group)	GU	

Conservation Site #: **64 Laguna Salada** Total Conservation Targets* **1** *(Excluding Biophysical Units)*

Site Size acres: **113,056** Hectares: **45,753** Ecoregional Subdivision: **Lower Colorado River Valley**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Fish	*Cyprinodon macularius macularius*	Desert Pupfish	G1	LE
Biophysical Unit	*Abronium-Eriogonum (group)*	Interior dunes and plains (group)	GU	
	Atriplex-Allenrolfea-Suaeda (group)	Saltbush desert scrub (group)	GU	
	Larrea tridentata (group)	Creosotebush-bursage (group)	GU	

Appendix 4. Conservation Targets Identified within Conservation Sites.

Conservation Site #: **65 Yuha Basin** Total Conservation Targets* **13**
(Excluding Biophysical Units)

Site Size acres: **87,711** Hectares: **35,496** Ecoregional Subdivision: **Lower Colorado River Valley**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Larrea tridentata-Canotia holocantha*	Creosote-crucifixion thorn shrubland	GU	
Bird	*Toxostoma lecontei*	Le Conte's Thrasher	G3	
Herpetofauna	*Bufo microscaphus californicus*	Arroyo toad	G2	LE
	Charina trivirgata gracia	Desert Rosy Boa	G3	SC
	Coleonyx switaki	Barefoot Banded Gecko	G3	SC
	Crotalus exsul ruber	Red Diamond Rattlesnake	G4	SC
	Phrynosoma mcallii	Flat-tailed Horned Lizard	G3	SC
	Thamnophis hammondii	Two-striped Garter Snake	G3	SC
	Uma notata notata	Fringe-toed Lizard	G3	SN(T)
	Xantusia vigilis	Desert Night Lizard	G5	SN(T)
Plant	*Castela emoryi*	Crucifixion Thorn	G4	
	Ipomopsis effusa	Baja California Ipomopsis	G3	
	Washingtonia filifera	California Fan Palm	G2	
Biophysical Unit	*Interior chaparral/encinal (group)*	Interior chaparral/encinal (group)	GU	
	Larrea tridentata (group)	Creosotebush-bursage (group)	GU	

Conservation Site #: **67 West Mesa/Superstition Hills** Total Conservation Targets* **5**
(Excluding Biophysical Units)

Site Size acres: **108,443** Hectares: **44,561** Ecoregional Subdivision: **Lower Colorado River Valley**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Herpetofauna	*Charina trivirgata gracia*	Desert Rosy Boa	G3	SC
	Phrynosoma mcallii	Flat-tailed Horned Lizard	G3	SC
	Rana yumanensis	San Felipe Leopard Frog	GU	
	Uma notata notata	Fringe-toed Lizard	G3	SN(T)
Plant	*Chamaesyce platysperma*	Flatseed Spurge	G3	SC
Biophysical Unit	*Larrea tridentata (group)*	Creosotebush-bursage (group)	GU	
	Mesquite woodland (group)	Mesquite woodland (group)	GU	

Appendix 4. Conservation Targets Identified within Conservation Sites.

Conservation Site #: **68 San Felipe Creek** Total Conservation Targets* **6** *(Excluding Biophysical Units)*

Site Size acres: **21,291** Hectares: **8,616** Ecoregional Subdivision: **Lower Colorado River Valley**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Typha-Phragmites-Scirpus (group)*	Interior riparian marsh (group)	GU	
Fish	*Cyprinodon macularius macularius*	Desert Pupfish	G1	LE
Herpetofauna	*Phrynosoma mcallii*	Flat-tailed Horned Lizard	G3	SC
	Rana yumanensis	San Felipe Leopard Frog	GU	
Plant	*Chaenactis carphoclinia var peirsonii*	Peirson's Pincushion	G1	
	Opuntia wigginsii	Wiggin's Cholla	G3	
Biophysical Unit	*Larrea tridentata (group)*	Creosotebush-bursage (group)	GU	
	Mesquite woodland (group)	Mesquite woodland (group)	GU	

Conservation Site #: **69 Ramer Lake** Total Conservation Targets* **1** *(Excluding Biophysical Units)*

Site Size acres: **403** Hectares: **163** Ecoregional Subdivision: **Lower Colorado River Valley**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Bird	*Dendrocygna bicolor*	Fulvous Whistling-duck	G5	AZ(C)

Conservation Site #: **70 Orococpa Valley** Total Conservation Targets* **8** *(Excluding Biophysical Units)*

Site Size acres: **24,067** Hectares: **9,842** Ecoregional Subdivision: **Lower Colorado River Valley**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Washingtonia filifera association*	California fan palm oasis	G2	
Bird	*Rallus longirostris yumanensis*	Yuma Clapper Rail	G3	LE
Fish	*Cyprinodon macularius macularius*	Desert Pupfish	G1	LE
Herpetofauna	*Phrynosoma mcallii*	Flat-tailed Horned Lizard	G3	SC
Mammal	*Lasiurus xanthinus*	Western Yellow Bat	G5	
	Macrotus californicus	California Leaf-nosed Bat	G4	SC
Plant	*Salvia greatae*	Orocopia Sage	G2	SC
	Washingtonia filifera	California Fan Palm	G2	
Biophysical Unit	*Larrea tridentata (group)*	Creosotebush-bursage (group)	GU	
	Mesquite woodland (group)	Mesquite woodland (group)	GU	

Appendix 4. Conservation Targets Identified within Conservation Sites.

Conservation Site #: **71 Mecca Hills/Painted Canyon** Total Conservation Targets* **6**
(Excluding Biophysical Units)

Site Size acres: **27,483** Hectares: **11,122** Ecoregional Subdivision: **Lower Colorado River Valley**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Washingtonia filifera association*	California fan palm oasis	G2	
Bird	*Falco mexicanus*	Prairie Falcon	G5	
Mammal	*Nyctinomops femorosaccus*	Pocketed Free-tailed Bat	G4	
Plant	*Argythamnia californica*	California Ditaxis	G2	
	Salvia greatae	Orocopia Sage	G2	SC
	Xylorhiza cognata	Mecca Aster	G2	SC
Biophysical Unit	*Larrea tridentata (group)*	Creosotebush-bursage (group)	GU	
	Mesquite woodland (group)	Mesquite woodland (group)	GU	

Conservation Site #: **72 Whitewater River** Total Conservation Targets* **33**
(Excluding Biophysical Units)

Site Size acres: **90,853** Hectares: **37,201** Ecoregional Subdivision: **Lower Colorado River Valley**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Typha-Phragmites-Scirpus (group)*	Interior riparian marsh (group)	GU	
	Typha domingensis	Interior cattail marsh	G5	
	Platanus wrightii	Arizona sycamore riparian woodland	G4	
	Platanus racemosa	California sycamore riparian woodland	G4	
	Populus fremonti-Salix gooddingii	Fremont cottonwood-Goodding's black willow riparian woodland	G2	
	Washingtonia filifera association	California fan palm oasis	G2	
	Desert Spring/Seep	Desert Spring/Seep	GU	
	Larrea tridentata (group)	Creosotebush-bursage (group)	GU	
Bird	*Dendroica petechia*	Yellow Warbler	G3	
	Falco mexicanus	Prairie Falcon	G5	
	Migratory Bird Concentration Area	Migratory Bird Concentration Area	GU	
	Sterna nilotica	Gull-billed Tern	G5	
	Toxostoma lecontei	Le Conte's Thrasher	G3	
	Vireo bellii pusillus	Least Bell's Vireo	G2	CA(LE)
Herpetofauna	*Cnemidophorus hyperythrus*	Orangethroat Whiptail	G5	
	Phrynosoma mcallii	Flat-tailed Horned Lizard	G3	SC
	Uma inornata	Coachella Valley Fringe-toed Lizard	G1	LT
Invertebrate	*Acmaeodera atactospilata*		GU	
	Acmaeodera cribocoilis		GU	
	Acmaeodera curticulata		GU	
	Acmaeodera lanata		GU	
	Acmaeodera tuta		GU	
	Acmaeodera verityi		GU	
	Chrysobothris platti		GU	
	Macrobaenetes valgum	Coachella giant sand treader cricket	G1	
	Squamodera ephedrae		GU	

Appendix 4. Conservation Targets Identified within Conservation Sites.

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Invertebrate	*Stenopelmatus cahuilaensis*	Coachella Valley Jerusalem cricket	G1	
Mammal	*Spermophilus tereticaudus chlorus*	Coachella Round-tailed Ground Squirrel	G2	SC
Plant	*Astragalus lentiginosus var coachellae*	Coachella Valley Milkvetch	G2	CA(LE)
	Chorizanthe parryi var parryi	Parry's Spineflower	G2	
	Euphorbia misera	Cliff Spurge	G5	
	Gilia maculata	Little San Bernardino Mtns. Gilia	G1	
	Nemacaulis denudata var gracilis	Slender Woolly-heads	G3	
Biophysical Unit	*Larrea tridentata (group)*	Creosotebush-bursage (group)	GU	

Conservation Site #: **73 Danby Playa** Total Conservation Targets* **6**
(Excluding Biophysical Units)

Site Size acres: **61,596** Hectares: **24,928** Ecoregional Subdivision: **Lower Colorado River Valley**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Abronia villosa-mixed shrub*	Desert sand-verbena interior dune	G1	
	Playa lake	Intermittently flooded playa lake bed	GU	
Herpetofauna	*Charina trivirgata gracia*	Desert Rosy Boa	G3	SC
	Gopherus agassizii	Desert Tortoise	G4	CA(LT),AZ(C)
	Uma scoparia	Mojave Fringe-toed Lizard	G3	
	Xantusia vigilis	Desert Night Lizard	G5	SN(T)
Biophysical Unit	*Abronium-Eriogonum (group)*	Interior dunes and plains (group)	GU	
	Larrea tridentata (group)	Creosotebush-bursage (group)	GU	
	Mesquite woodland (group)	Mesquite woodland (group)	GU	
	Sonoran/Mohave playa lake (group)	Sonoran/Mohave playa lake (group)	GU	

Conservation Site #: **74 Carl's Dunes** Total Conservation Targets* **2**
(Excluding Biophysical Units)

Site Size acres: **4,885** Hectares: **1,977** Ecoregional Subdivision: **Lower Colorado River Valley**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Bird	*Dendroica petechia*	Yellow Warbler	G3	
Herpetofauna	*Uma scoparia*	Mojave Fringe-toed Lizard	G3	
Biophysical Unit	*Larrea tridentata (group)*	Creosotebush-bursage (group)	GU	
	Mesquite woodland (group)	Mesquite woodland (group)	GU	

Appendix 4. Conservation Targets Identified within Conservation Sites.

Conservation Site #: **75 Yuma Proving Ground Dunes** Total Conservation Targets* **1**
(Excluding Biophysical Units)

Site Size acres: **3,158** Hectares: **1,278** Ecoregional Subdivision: **Lower Colorado River Valley**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Herpetofauna	*Uma scoparia*	Mojave Fringe-toed Lizard	G3	
Biophysical Unit	*Larrea tridentata (group)*	Creosotebush-bursage (group)	GU	

Conservation Site #: **76 Deson Mine** Total Conservation Targets* **2**
(Excluding Biophysical Units)

Site Size acres: **6,605** Hectares: **2,673** Ecoregional Subdivision: **Lower Colorado River Valley**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Fish	*Cyprinodon macularius*	Desert Pupfish	G1	LE
Mammal	*Macrotus californicus*	California Leaf-nosed Bat	G4	SC
Biophysical Unit	*Larrea tridentata (group)*	Creosotebush-bursage (group)	GU	
	Mesquite woodland (group)	Mesquite woodland (group)	GU	

Conservation Site #: **77 Harcuvar Mountains** Total Conservation Targets* **4**
(Excluding Biophysical Units)

Site Size acres: **126,364** Hectares: **51,139** Ecoregional Subdivision: **Arizona Uplands**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Ecological gradient*	Ecological gradient		
Mammal	*Leptonycteris curasoae yerbabuenae*	Lesser Long-nosed Bat	G4	LE
	Macrotus californicus	California Leaf-nosed Bat	G4	SC
	Myotis velifer	Cave Myotis	G5	SC
Biophysical Unit	*Interior chaparral/encinal (group)*	Interior chaparral/encinal (group)	GU	
	Larrea tridentata (group)	Creosotebush-bursage (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	
	Tobosa-Hilaria-Aristida-Prosopis (group)	Semi-desert grassland (group)	GU	

Appendix 4. Conservation Targets Identified within Conservation Sites.

Conservation Site #: **78 Baboquivari Mountains** Total Conservation Targets* **5** *(Excluding Biophysical Units)*

Site Size acres: **128,708** Hectares: **52,087** Ecoregional Subdivision: **Arizona Uplands**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Mammal	*Felis onca*	Jaguar	G3	LE
	Perognathus intermedius pinacate	Rock Pocket Mouse	GU	
	Peromyscus eremicus papagensis	Pinacate Cactus Mouse	G2	C
Plant	*Amsonia kearneyana*	Kearney's Blue Star	G1	LE, AZ(C)
	Dalea tentaculoides	Gentry Indigo Bush	G1	C
Biophysical Unit	*Interior chaparral/encinal (group)*	Interior chaparral/encinal (group)	GU	
	Larrea tridentata (group)	Creosotebush-bursage (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	
	Tobosa-Hilaria-Aristida-Prosopis (group)	Semi-desert grassland (group)	GU	

Conservation Site #: **79 El Tigre Mine** Total Conservation Targets* **2** *(Excluding Biophysical Units)*

Site Size acres: **4,219** Hectares: **1,707** Ecoregional Subdivision: **Arizona Uplands**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Mammal	*Macrotus californicus*	California Leaf-nosed Bat	G4	SC
	Myotis velifer	Cave Myotis	G5	SC
Biophysical Unit	*Larrea tridentata (group)*	Creosotebush-bursage (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	

Conservation Site #: **80 Black Pearl** Total Conservation Targets* **2** *(Excluding Biophysical Units)*

Site Size acres: **19,307** Hectares: **7,813** Ecoregional Subdivision: **Arizona Uplands**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Mammal	*Macrotus californicus*	California Leaf-nosed Bat	G4	SC
	Myotis velifer	Cave Myotis	G5	SC
Biophysical Unit	*Larrea tridentata (group)*	Creosotebush-bursage (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	

Appendix 4. Conservation Targets Identified within Conservation Sites.

Conservation Site #: **81 Date Creek** Total Conservation Targets* **6** *(Excluding Biophysical Units)*

Site Size acres: **60,871** Hectares: **24,634** Ecoregional Subdivision: **Arizona Uplands**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Fish	*Agosia chrysogaster*	Longfin Dace	G4	SC
	Catostomus clarki	Desert Sucker	G3	SC
	Catostomus insignis	Sonora Sucker	G3	SC
	Gila robusta	Roundtail Chub	G3	SC
	Rhinichthys osculus	Speckled Dace	G5	SC
Plant	*Carnegiea gigantea*	Saguaro Cactus	G5	
Biophysical Unit	*Desert Riparian Woodland (group)*	Desert Riparian Woodland (group)	GU	
	Interior chaparral/encinal (group)	Interior chaparral/encinal (group)	GU	
	Larrea tridentata (group)	Creosotebush-bursage (group)	GU	
	Mesquite woodland (group)	Mesquite woodland (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	

Conservation Site #: **82 Bill William's Complex** Total Conservation Targets* **36** *(Excluding Biophysical Units)*

Site Size acres: **349,932** Hectares: **143,399** Ecoregional Subdivision: **Arizona Uplands**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Populus fremonti-Salix gooddingii*	Fremont cottonwood-Goodding's black willow riparian woodland	G2	
	Yucca brevifolia	Joshua tree woodland	G4	
Bird	*Coccyzus americanus occidentalis*	Western Yellow-billed Cuckoo	G3	PE
	Dendroica petechia	Yellow Warbler	G3	
	Empidonax traillii extimus	Southwestern Willow Flycatcher	G2	LE
	Falco peregrinus anatum	American Peregrine Falcon	G3	
	Haliaeetus leucocephalus	Bald Eagle	G4	CA(PS)
	Laterallus jamaicensis coturniculus	California Black Rail	G1	SC, AZ(T)
	Pipilo aberti	Abert's Towhee	G3	
	Rallus longirostris yumanensis	Yuma Clapper Rail	G3	LE
Fish	*Agosia chrysogaster*	Longfin Dace	G4	SC
	Catostomus clarki	Desert Sucker	G3	SC
	Catostomus insignis	Sonora Sucker	G3	SC
	Cyprinodon macularius macularius	Desert Pupfish	G1	LE
	Gila elegans	Bonytail	G1	LE
	Gila robusta	Roundtail Chub	G3	SC
	Poeciliopsis occidentalis occidentalis	Gila Topminnow	G3	LE, MX(T)
	Rhinichthys osculus	Speckled Dace	G5	SC
	Xyrauchen texanus	Razorback Sucker	G1	LE
Herpetofauna	*Bufo microscaphus microscaphus*	Arizona toad	G4	AZ(C), SN(P)
	Charina trivirgata gracia	Desert Rosy Boa	G3	SC
	Gopherus agassizii	Desert Tortoise	G4	CA(LT),AZ(C)
	Rana yavapaiensis	Lowland Leopard Frog	G4	SC

Appendix 4. Conservation Targets Identified within Conservation Sites.

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Herpetofauna	*Xantusia vigilis*	Desert Night Lizard	G5	SN(T)
Invertebrate	*Cicindela oregona maricopa*	Maricopa tiger beetle	G3	SC
Mammal	*Lasiurus xanthinus*	Western Yellow Bat	G5	
	Macrotus californicus	California Leaf-nosed Bat	G4	SC
	Myotis velifer	Cave Myotis	G5	SC
	Nyctinomops femorosaccus	Pocketed Free-tailed Bat	G4	
	Ovis canadensis mexicana	Desert Bighorn Sheep	G4	
Plant	*Astragalus newberryi var aquarii*	Newberry's Milkvetch	G2	
	Cirsium mohavense		G2	
	Cirsium wrightii	Wright's Marsh Thistle	G1	
	Phacelia parishii		G2	
	Purshia subintegra	Arizona Cliffrose	G1	LE
	Thelypteris puberula var sonorensis	Aravaipa Wood Fern	G3	
Biophysical Unit	*Desert Riparian Woodland (group)*	Desert Riparian Woodland (group)	GU	
	Interior chaparral/encinal (group)	Interior chaparral/encinal (group)	GU	
	Interior riparian shrub/woodland (group)	Interior riparian shrub/woodland (group)	GU	
	Larrea tridentata (group)	Creosotebush-bursage (group)	GU	
	Mesquite woodland (group)	Mesquite woodland (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	
	Sonoran/Mohave playa lake (group)	Sonoran/Mohave playa lake (group)	GU	
	Tobosa-Hilaria-Aristida-Prosopis (group)	Semi-desert grassland (group)	GU	
	Typha-Phragmites-Scirpus (group)	Interior riparian marsh (group)	GU	

Conservation Site #: **83 Agua Fria Watershed** Total Conservation Targets* **22**
(Excluding Biophysical Units)

Site Size acres: **554,856** Hectares: **224,547** Ecoregional Subdivision: **Arizona Uplands**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Ecological gradient*	Ecological gradient		
Bird	*Coccyzus americanus occidentalis*	Western Yellow-billed Cuckoo	G3	PE
	Haliaeetus leucocephalus	Bald Eagle	G4	CA(PS)
Fish	*Agosia chrysogaster*	Longfin Dace	G4	SC
	Catostomus clarki	Desert Sucker	G3	SC
	Cyprinodon macularius macularius	Desert Pupfish	G1	LE
	Gila intermedia	Gila Chub	G2	C, SN(P)
	Gila robusta	Roundtail Chub	G3	SC
	Poeciliopsis occidentalis occidentalis	Gila Topminnow	G3	LE, MX(T)
	Rhinichthys osculus	Speckled Dace	G5	SC
Herpetofauna	*Bufo microscaphus microscaphus*	Arizona toad	G4	AZ(C), SN(P)
	Rana yavapaiensis	Lowland Leopard Frog	G4	SC
	Thamnophis eques megalops	Mexican Garter Snake	G3	SC
Invertebrate	*Cicindela oregona maricopa*	Maricopa tiger beetle	G3	SC
Mammal	*Macrotus californicus*	California Leaf-nosed Bat	G4	SC
	Myotis velifer	Cave Myotis	G5	SC
	Nyctinomops femorosaccus	Pocketed Free-tailed Bat	G4	
Plant	*Agave arizonica*	Arizona Agave	G1	LE
	Agave murpheyi	Hohokam Agave	G2	SC

Appendix 4. Conservation Targets Identified within Conservation Sites.

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Plant	*Ericameria brachylepis*	Rayless Turpentine Bush	G4	
	Heuchera eastwoodiae	Eastwood Alum Root	G3	
	Washingtonia filifera	California Fan Palm	G2	
Biophysical Unit	*Interior chaparral/encinal (group)*	Interior chaparral/encinal (group)	GU	
	Interior riparian shrub/woodland (group)	Interior riparian shrub/woodland (group)	GU	
	Larrea tridentata (group)	Creosotebush-bursage (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	
	Tobosa-Hilaria-Aristida-Prosopis (group)	Semi-desert grassland (group)	GU	

Conservation Site #: **84 Dixie Mine** Total Conservation Targets* **4**
(Excluding Biophysical Units)

Site Size acres: **4,330** Hectares: **1,752** Ecoregional Subdivision: **Arizona Uplands**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Mammal	*Leptonycteris curasoae yerbabuenae*	Lesser Long-nosed Bat	G4	LE
	Macrotus californicus	California Leaf-nosed Bat	G4	SC
	Myotis velifer	Cave Myotis	G5	SC
Plant	*Agave murpheyi*	Hohokam Agave	G2	SC
Biophysical Unit	*Parkinsonia-Carnegia-Opuntia (group)*	Palo verde-mxed cacti (group)	GU	

Conservation Site #: **85 Superstition Mountains** Total Conservation Targets* **10**
(Excluding Biophysical Units)

Site Size acres: **199,784** Hectares: **84,867** Ecoregional Subdivision: **Arizona Uplands**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Bird	*Falco peregrinus anatum*	American Peregrine Falcon	G3	
Fish	*Agosia chrysogaster*	Longfin Dace	G4	SC
	Poeciliopsis occidentalis occidentalis	Gila Topminnow	G3	LE, MX(T)
Herpetofauna	*Rana yavapaiensis*	Lowland Leopard Frog	G4	SC
Plant	*Abutilon parishii*	Pima Indian Mallow	G2	
	Ericameria brachylepis	Rayless Turpentine Bush	G4	
	Erigeron piscaticus	Fish Creek Fleabane	G1	SC
	Justicia candicans	Hierba Azul	G4	
	Mabrya acerifolia	Mapleleaf False Snapdragon	G3	
	Perityle saxicola	Fish Creek Rock Daisy	G2	SC
Biophysical Unit	*Interior chaparral/encinal (group)*	Interior chaparral/encinal (group)	GU	
	Interior riparian shrub/woodland (group)	Interior riparian shrub/woodland (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	

Appendix 4. Conservation Targets Identified within Conservation Sites.

Conservation Site #: **86 Tonto National Forest** Total Conservation Targets* (Excluding Biophysical Units) **5**

Site Size acres: **19,870** Hectares: **8,041** Ecoregional Subdivision: **Arizona Uplands**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Fish	*Poeciliopsis occidentalis occidentalis*	Gila Topminnow	G3	LE, MX(T)
Herpetofauna	*Gopherus agassizii*	Desert Tortoise	G4	CA(LT),AZ(C)
	Rana yavapaiensis	Lowland Leopard Frog	G4	SC
	Xantusia vigilis	Desert Night Lizard	G5	SN(T)
Invertebrate	*Cicindela oregona maricopa*	Maricopa tiger beetle	G3	SC
Biophysical Unit	*Interior chaparral/encinal (group)*	Interior chaparral/encinal (group)	GU	
	Interior riparian shrub/woodland (group)	Interior riparian shrub/woodland (group)	GU	
	Mesquite woodland (group)	Mesquite woodland (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	

Conservation Site #: **88 Buckeye Copper Mine** Total Conservation Targets* (Excluding Biophysical Units) **2**

Site Size acres: **10,703** Hectares: **4,331** Ecoregional Subdivision: **Arizona Uplands**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Mammal	*Macrotus californicus*	California Leaf-nosed Bat	G4	SC
	Myotis velifer	Cave Myotis	G5	SC
Biophysical Unit	*Larrea tridentata (group)*	Creosotebush-bursage (group)	GU	

Conservation Site #: **89 La Ciénega** Total Conservation Targets* (Excluding Biophysical Units) **1**

Site Size acres: **3,560** Hectares: **1,441** Ecoregional Subdivision: **Plains of Sonora**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Invertebrate	*Concentration of aquatic invertebrates*	Concentration of aquatic invertebrates	GU	
Biophysical Unit	*Jatropha-Bursera (group)*	Torchwood-limberbush (group)	GU	
	Mesquite woodland (group)	Mesquite woodland (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	

Appendix 4. Conservation Targets Identified within Conservation Sites.

Conservation Site #: **90 Picacho Peak** Total Conservation Targets* **3** *(Excluding Biophysical Units)*

Site Size acres: **5,052** Hectares: **2,044** Ecoregional Subdivision: **Arizona Uplands**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Mammal	*Leptonycteris curasoae yerbabuenae*	Lesser Long-nosed Bat	G4	LE
	Macrotus californicus	California Leaf-nosed Bat	G4	SC
	Myotis velifer	Cave Myotis	G5	SC
Biophysical Unit	*Larrea tridentata (group)*	Creosotebush-bursage (group)	GU	
	Mesquite woodland (group)	Mesquite woodland (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	

Conservation Site #: **91 Unplowed Valley** Total Conservation Targets* **3** *(Excluding Biophysical Units)*

Site Size acres: **101,679** Hectares: **41,149** Ecoregional Subdivision: **Arizona Uplands**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Fish	*Cyprinodon macularius macularius*	Desert Pupfish	G1	LE
Plant	*Abutilon parishii*	Pima Indian Mallow	G2	
	Echinomastus erectocentrus var acunensis	Acuna Cactus	G1	C
Biophysical Unit	*Parkinsonia-Carnegia-Opuntia (group)*	Palo verde-mxed cacti (group)	GU	

Conservation Site #: **92 Old Mammon Mine** Total Conservation Targets* **4** *(Excluding Biophysical Units)*

Site Size acres: **32,811** Hectares: **13,278** Ecoregional Subdivision: **Arizona Uplands**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Atriplex canescens-Ehphedra viridis*	Four-wing saltbush shrubland	G4	
	Frankenia palmeri-Atriplex sp.	Palmer alkali heath shrubland	GU	
Mammal	*Leptonycteris curasoae yerbabuenae*	Lesser Long-nosed Bat	G4	LE
	Macrotus californicus	California Leaf-nosed Bat	G4	SC
Biophysical Unit	*Larrea tridentata (group)*	Creosotebush-bursage (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	

Appendix 4. Conservation Targets Identified within Conservation Sites.

Conservation Site #: **93 Tucson Mountains** Total Conservation Targets* **9**
(Excluding Biophysical Units)

Site Size acres: **102,074** Hectares: **41,309** Ecoregional Subdivision: **Arizona Uplands**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Parkinsonia-Carnegia-Opuntia (group)*	Palo verde-mixed cacti (group)	GU	
Bird	*Aimophila carpalis*	Rufous-winged Sparrow	G4	
Herpetofauna	*Gopherus agassizii*	Desert Tortoise	G4	CA(LT),AZ(C)
	Phyllorhynchus browni lucidus	Maricopa Leafnose Snake	G2	
Invertebrate	*Bee Biodiversity Area*	Bee Biodiversity Area	GU	
Mammal	*Macrotus californicus*	California Leaf-nosed Bat	G4	SC
	Myotis velifer	Cave Myotis	G5	SC
Plant	*Abutilon parishii*	Pima Indian Mallow	G2	
	Hermannia pauciflora	Sparseleaf Hermannia	G3	
Biophysical Unit	*Larrea tridentata (group)*	Creosotebush-bursage (group)	GU	
	Mesquite woodland (group)	Mesquite woodland (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	
	Tobosa-Hilaria-Aristida-Prosopis (group)	Semi-desert grassland (group)	GU	

Conservation Site #: **95 Sabino Canyon** Total Conservation Targets* **6**
(Excluding Biophysical Units)

Site Size acres: **7,855** Hectares: **3,179** Ecoregional Subdivision: **Arizona Uplands**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Bird	*Glaucidium brasilianum cactorum*	Cactus Ferruginous Pygmy-owl	G3	LE
Fish	*Gila intermedia*	Gila Chub	G2	C, SN(P)
Herpetofauna	*Rana yavapaiensis*	Lowland Leopard Frog	G4	SC
	Thamnophis eques megalops	Mexican Garter Snake	G3	SC
Plant	*Abutilon parishii*	Pima Indian Mallow	G2	
	Muhlenbergia dubioides	Box Canyon Muhly	G2	
Biophysical Unit	*Desert Riparian Woodland (group)*	Desert Riparian Woodland (group)	GU	
	Interior riparian shrub/woodland (group)	Interior riparian shrub/woodland (group)	GU	
	Mesquite woodland (group)	Mesquite woodland (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	
	Tobosa-Hilaria-Aristida-Prosopis (group)	Semi-desert grassland (group)	GU	

Appendix 4. Conservation Targets Identified within Conservation Sites.

Conservation Site #: **96 East Tucson Riparian Complex** Total Conservation Targets* **5**
(Excluding Biophysical Units)

Site Size acres: **7,441** Hectares: **3,011** Ecoregional Subdivision: **Arizona Uplands**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Prosopis velutina-mixed short tree*	Mesquite-mixed short tree woodland	GU	
	Populus fremonti-Salix gooddingii	Fremont cottonwood-Goodding's black willow riparian woodland	G2	
	Simmondsia chinensis-Cercidium microphylla	Jojoba -yellow paloverde shrubland	G4	
	Atriplex canescens-Ehphedra viridis	Four-wing saltbush shrubland	G4	
Mammal	*Nyctinomops femorosaccus*	Pocketed Free-tailed Bat	G4	
Biophysical Unit	*Parkinsonia-Carnegia-Opuntia (group)*	Palo verde-mxed cacti (group)	GU	
	Tobosa-Hilaria-Aristida-Prosopis (group)	Semi-desert grassland (group)	GU	

Conservation Site #: **97 San Simon Springs/Ciénega** Total Conservation Targets* **3**
(Excluding Biophysical Units)

Site Size acres: **18,805** Hectares: **7,610** Ecoregional Subdivision: **Arizona Uplands**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Fish	*Cyprinodon macularius macularius*	Desert Pupfish	G1	LE
	Gila intermedia	Gila Chub	G2	C, SN(P)
	Poeciliopsis occidentalis occidentalis	Gila Topminnow	G3	LE, MX(T)
Biophysical Unit	*Larrea tridentata (group)*	Creosotebush-bursage (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	
	Tobosa-Hilaria-Aristida-Prosopis (group)	Semi-desert grassland (group)	GU	

Conservation Site #: **98 Upper Gila River** Total Conservation Targets* **40**
(Excluding Biophysical Units)

Site Size acres: **374,754** Hectares: **151,678** Ecoregional Subdivision: **Arizona Uplands**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Prosopis (sp. glandulosa, velutina)*	Mesquite woodland	G3	
	Populus fremonti-Salix gooddingii	Fremont cottonwood-Goodding's black willow riparian woodland	G2	
	Atriplex polycarpa	All-scale shrubland	G5	
Bird	*Coccyzus americanus occidentalis*	Western Yellow-billed Cuckoo	G3	PE
	Colaptes chrysoides	Gilded Flicker	G5	
	Dendroica petechia	Yellow Warbler	G3	
	Empidonax traillii extimus	Southwestern Willow Flycatcher	G2	LE
	Falco peregrinus anatum	American Peregrine Falcon	G3	

Appendix 4. Conservation Targets Identified within Conservation Sites.

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Bird	*Glaucidium brasilianum cactorum*	Cactus Ferruginous Pygmy-owl	G3	LE
	Haliaeetus leucocephalus	Bald Eagle	G4	CA(PS)
	Ixobrychus exilis hesperis	Western Least Bittern	GU	AZ(C)
	Migratory Bird Concentration Area	Migratory Bird Concentration Area	GU	
	Pipilo aberti	Abert's Towhee	G3	
	Rallus longirostris yumanensis	Yuma Clapper Rail	G3	LE
	Toxostoma lecontei	Le Conte's Thrasher	G3	
Fish	*Agosia chrysogaster*	Longfin Dace	G4	SC
	Catostomus clarki	Desert Sucker	G3	SC
	Catostomus insignis	Sonora Sucker	G3	SC
	Catostomus latipinnis	Flannelmouth Sucker	G3	SC
	Cyprinodon macularius macularius	Desert Pupfish	G1	LE
	Gila intermedia	Gila Chub	G2	C, SN(P)
	Gila robusta	Roundtail Chub	G3	SC
	Meda fulgida	Spikedace	G2	LT
	Poeciliopsis occidentalis occidentalis	Gila Topminnow	G3	LE, MX(T)
	Ptychocheilus lucius	Colorado Squawfish	G1	LE(CA-LE/XN)
	Rhinichthys osculus	Speckled Dace	G5	SC
	Tiaroga cobitis	Loach Minnow	G2	LT
	Xyrauchen texanus	Razorback Sucker	G1	LE
Herpetofauna	*Bufo microscaphus microscaphus*	Arizona toad	G4	AZ(C), SN(P)
	Rana yavapaiensis	Lowland Leopard Frog	G4	SC
	Thamnophis rufipunctatus	Narrow-headed Garter Snake	G4	SC
Invertebrate	*Cicindela oregona maricopa*	Maricopa tiger beetle	G3	SC
	Pyrgulopsis arizonae	Bylas springsnail	G2	SC
	Tryonia gilae	Gila tryonia	G1	SC
Mammal	*Macrotus californicus*	California Leaf-nosed Bat	G4	SC
	Myotis velifer	Cave Myotis	G5	SC
Plant	*Echinomastus erectocentrus var acunensis*	Acuna Cactus	G1	C
	Eriogonum apachense	Apache Wild-buckwheat	G1	AZ(C)
	Perityle gilensis var gilensis	Gila Rock Daisy	G3	
	Purshia subintegra	Arizona Cliffrose	G1	LE
Biophysical Unit	*Atriplex-Allenrolfea-Suaeda (group)*	Saltbush desert scrub (group)	GU	
	Desert Riparian Woodland (group)	Desert Riparian Woodland (group)	GU	
	Interior riparian shrub/woodland (group)	Interior riparian shrub/woodland (group)	GU	
	Larrea tridentata (group)	Creosotebush-bursage (group)	GU	
	Mesquite woodland (group)	Mesquite woodland (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	
	Tobosa-Hilaria-Aristida-Prosopis (group)	Semi-desert grassland (group)	GU	

Conservation Site #: **99 San Pedro River / Aravaipa Creek** Total Conservation Targets* **39**
(Excluding Biophysical Units)

Site Size acres: **899,287** Hectares: **374,813** Ecoregional Subdivision: **Arizona Uplands**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Prosopis velutina-mixed short tree*	Mesquite-mixed short tree woodland	GU	
	Platanus wrightii	Arizona sycamore riparian woodland	G4	

Appendix 4. Conservation Targets Identified within Conservation Sites.

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Populus fremonti-Salix gooddingii*	Fremont cottonwood-Goodding's black willow riparian woodland	G2	
	Ecological gradient	Ecological gradient		
Bird	*Aimophila carpalis*	Rufous-winged Sparrow	G4	
	Asturina nitida maxima	Northern Gray Hawk	G3	AZ(C)
	Coccyzus americanus occidentalis	Western Yellow-billed Cuckoo	G3	PE
	Colaptes chrysoides	Gilded Flicker	G5	
	Dendroica petechia	Yellow Warbler	G3	
	Empidonax traillii extimus	Southwestern Willow Flycatcher	G2	LE
	Falco peregrinus anatum	American Peregrine Falcon	G3	
	Glaucidium brasilianum cactorum	Cactus Ferruginous Pygmy-owl	G3	LE
	Pipilo aberti	Abert's Towhee	G3	
Fish	*Agosia chrysogaster*	Longfin Dace	G4	SC
	Catostomus clarki	Desert Sucker	G3	SC
	Catostomus insignis	Sonora Sucker	G3	SC
	Cyprinodon macularius macularius	Desert Pupfish	G1	LE
	Gila intermedia	Gila Chub	G2	C, SN(P)
	Gila robusta	Roundtail Chub	G3	SC
	Meda fulgida	Spikedace	G2	LT
	Rhinichthys osculus	Speckled Dace	G5	SC
	Tiaroga cobitis	Loach Minnow	G2	LT
Herpetofauna	*Rana yavapaiensis*	Lowland Leopard Frog	G4	SC
Invertebrate	*Amblyscirtes texanae*	Texas roadside skipper	G3	
	Atrytonopsis cestus	Cestus skipper	G1	
	Chioides catillus albofasciatus	Silver-banded skipper	GU	
	Cicindela oregona maricopa	Maricopa tiger beetle	G3	SC
Mammal	*Choeronycteris mexicana*	Mexican Long-tongued Bat	G4	SC
	Idionycteris phyllotis	Allen's Big-eared Bat	G4	SC
	Leptonycteris curasoae yerbabuenae	Lesser Long-nosed Bat	G4	LE
	Macrotus californicus	California Leaf-nosed Bat	G4	SC
	Myotis velifer	Cave Myotis	G5	SC
Plant	*Abutilon parishii*	Pima Indian Mallow	G2	
	Echinomastus erectocentrus var erectocentrus	Needle-spined Pineapple Cactus	G3	SC
	Erigeron piscaticus	Fish Creek Fleabane	G1	SC
	Penstemon discolor	Catalina Beardtongue	G1	
	Puccinellia parishii	Parish Alkali Grass	G2	PE
	Salvia amissa	Aravaipa Sage	G1	
	Thelypteris puberula var sonorensis	Aravaipa Wood Fern	G3	
Biophysical Unit	*Desert Riparian Woodland (group)*	Desert Riparian Woodland (group)	GU	
	Interior riparian shrub/woodland (group)	Interior riparian shrub/woodland (group)	GU	
	Larrea tridentata (group)	Creosotebush-bursage (group)	GU	
	Mesquite woodland (group)	Mesquite woodland (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	
	Tobosa-Hilaria-Aristida-Prosopis (group)	Semi-desert grassland (group)	GU	

Appendix 4. Conservation Targets Identified within Conservation Sites.

Conservation Site #: **101 Ciénega de Saracachi** Total Conservation Targets* (Excluding Biophysical Units) **2**

Site Size acres: **1,322** Hectares: **535** Ecoregional Subdivision: **Plains of Sonora**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Interior riparian shrub/woodland (group)*	Interior riparian shrub/woodland (group)	GU	
	Populus fremonti	Fremont cottonwood riparian woodland	G3	
Biophysical Unit	*Desert Riparian Woodland (group)*	Desert Riparian Woodland (group)	GU	
	Mesquite woodland (group)	Mesquite woodland (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	

Conservation Site #: **102 Harquahala Mountains** Total Conservation Targets* (Excluding Biophysical Units) **6**

Site Size acres: **44,463** Hectares: **17,994** Ecoregional Subdivision: **Arizona Uplands**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Community	*Ecological gradient*	Ecological gradient		
Herpetofauna	*Charina trivirgata gracia*	Desert Rosy Boa	G3	SC
	Rana yavapaiensis	Lowland Leopard Frog	G4	SC
Invertebrate	*Calephelis wrighti*	Wright's metalmark	G4	
Mammal	*Macrotus californicus*	California Leaf-nosed Bat	G4	SC
	Myotis velifer	Cave Myotis	G5	SC
Biophysical Unit	*Larrea tridentata (group)*	Creosotebush-bursage (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	
	Tobosa-Hilaria-Aristida-Prosopis (group)	Semi-desert grassland (group)	GU	

Conservation Site #: **103 Trout Creek** Total Conservation Targets* (Excluding Biophysical Units) **5**

Site Size acres: **30,241** Hectares: **12,238** Ecoregional Subdivision: **Arizona Uplands**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Fish	*Agosia chrysogaster*	Longfin Dace	G4	SC
	Catostomus clarki	Desert Sucker	G3	SC
	Catostomus insignis	Sonora Sucker	G3	SC
	Gila robusta	Roundtail Chub	G3	SC
Herpetofauna	*Rana yavapaiensis*	Lowland Leopard Frog	G4	SC
Biophysical Unit	*Desert Riparian Woodland (group)*	Desert Riparian Woodland (group)	GU	
	Interior chaparral/encinal (group)	Interior chaparral/encinal (group)	GU	
	Interior riparian shrub/woodland (group)	Interior riparian shrub/woodland (group)	GU	

Appendix 4. Conservation Targets Identified within Conservation Sites.

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Biophysical Unit	*Larrea tridentata (group)*	Creosotebush-bursage (group)	GU	
	Mesquite woodland (group)	Mesquite woodland (group)	GU	
	Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mxed cacti (group)	GU	
	Tobosa-Hilaria-Aristida-Prosopis (group)	Semi-desert grassland (group)	GU	

Conservation Site #: **104 Cerro Prieto Ponds** Total Conservation Targets* **1**
(Excluding Biophysical Units)

Site Size acres: **15,605** Hectares: **6,315** Ecoregional Subdivision: **Lower Colorado River Valley**

Conservation Targets

Taxon	Scientific Name	Common Name	Global	ESA Status*
Fish	*Cyprinodon macularius macularius*	Desert Pupfish	G1	LE
Biophysical Unit	*Atriplex-Allenrolfea-Suaeda (group)*	Saltbush desert scrub (group)	GU	

Appendix 5. Conservation Targets Identified within 79 Special Element Sites.

Site No.	Taxon	Subdivision	Scientific Name	Common Name	Global	ESA Status
200	Plant	Arizona Uplands	*Puccinellia parishii*	Parish Alkali Grass	G2	PE
201	Plant	Arizona Uplands	*Agave delamateri*	Tonto Basin Agave	G1	SC
202	Plant	Arizona Uplands	*Agave delamateri*	Tonto Basin Agave	G1	SC
203	Plant	Arizona Uplands	*Agave delamateri*	Tonto Basin Agave	G1	SC
204	Plant	Arizona Uplands	*Agave delamateri*	Tonto Basin Agave	G1	SC
205	Plant	Arizona Uplands	*Agave delamateri*	Tonto Basin Agave	G1	SC
206	Plant	Arizona Uplands	*Agave delamateri*	Tonto Basin Agave	G1	SC
207	Plant	Arizona Uplands	*Agave delamateri*	Tonto Basin Agave	G1	SC
208	Plant	Arizona Uplands	*Agave delamateri*	Tonto Basin Agave	G1	SC
209	Plant	Arizona Uplands	*Agave delamateri*	Tonto Basin Agave	G1	SC
210	Plant	Arizona Uplands	*Agave delamateri*	Tonto Basin Agave	G1	SC
211	Plant	Arizona Uplands	*Agave delamateri*	Tonto Basin Agave	G1	SC
212	Plant	Arizona Uplands	*Agave delamateri*	Tonto Basin Agave	G1	SC
213	Plant	Arizona Uplands	*Agave delamateri*	Tonto Basin Agave	G1	SC
214	Plant	Arizona Uplands	*Agave delamateri*	Tonto Basin Agave	G1	SC
215	Plant	Arizona Uplands	*Agave arizonica*	Arizona Agave	G1	LE
216	Plant	Arizona Uplands	*Purshia subintegra*	Arizona Cliffrose	G1	LE
217	Plant	Arizona Uplands	*Purshia subintegra*	Arizona Cliffrose	G1	LE
218	Plant	Arizona Uplands	*Abutilon parishii*	Pima Indian Mallow	G2	
219	Plant	Arizona Uplands	*Abutilon parishii*	Pima Indian Mallow	G2	
220	Plant	Arizona Uplands	*Abutilon parishii*	Pima Indian Mallow	G2	
221	Plant	Arizona Uplands	*Abutilon parishii*	Pima Indian Mallow	G2	
222	Plant	Arizona Uplands	*Abutilon parishii*	Pima Indian Mallow	G2	
222	Plant	Arizona Uplands	*Hermannia pauciflora*	Sparseleaf Hermannia	G3	
223	Plant	Arizona Uplands	*Abutilon parishii*	Pima Indian Mallow	G2	
224	Plant	Arizona Uplands	*Abutilon parishii*	Pima Indian Mallow	G2	
225	Plant	Arizona Uplands	*Salvia amissa*	Aravaipa Sage	G1	
226	Plant	Arizona Uplands	*Lysiloma microphylla var thornberi*	Feather Bush	G1	
227	Plant	Arizona Uplands	*Echinomastus erectocentrus var acunensis*	Acuna Cactus	G1	C
228	Plant	Arizona Uplands	*Agave delamateri*	Tonto Basin Agave	G1	SC
228	Plant	Arizona Uplands	*Erigeron anchana*	Mogollon Fleabane	G2	SC
229	Fish	Arizona Uplands	*Agosia chrysogaster*	Longfin Dace	G4	SC
229	Fish	Arizona Uplands	*Catostomus clarki*	Desert Sucker	G3	SC
229	Fish	Arizona Uplands	*Catostomus insignis*	Sonora Sucker	G3	SC
229	Fish	Arizona Uplands	*Gila robusta*	Roundtail Chub	G3	SC
229	Fish	Arizona Uplands	*Rhinichthys osculus*	Speckled Dace	G5	SC
229	Plant	Arizona Uplands	*Erigeron anchana*	Mogollon Fleabane	G2	SC
230	Invertebrate	Lower Colorado River Valley	*Sonorella allynsmithi*	Squaw Peak talussnail	G1	SC
231	Invertebrate	Lower Colorado River Valley	*Sonorella allynsmithi*	Squaw Peak talussnail	G1	SC
232	Reptile	Lower Colorado River Valley	*Phyllorhynchus browni lucidus*	Maricopa Leafnose Snake	G2	
233	Amphibian	Arizona Uplands	*Rana yavapaiensis*	Lowland Leopard Frog	G4	SC
233	Fish	Arizona Uplands	*Agosia chrysogaster*	Longfin Dace	G4	SC
233	Fish	Arizona Uplands	*Cyprinodon macularius macularius*	Desert Pupfish	G1	LE
233	Fish	Arizona Uplands	*Poeciliopsis occidentalis occidentalis*	Gila Topminnow	G3	LE, MX(T)
234	Fish	Arizona Uplands	*Cyprinodon macularius macularius*	Desert Pupfish	G1	LE
235	Bird	Lower Colorado River Valley	*Empidonax traillii extimus*	Southwestern Willow Flycatcher	G2	LE
236	Plant	Lower Colorado River Valley	*Astragalus lentiginosus var coachellae*	Coachella Valley Milkvetch	G2	CA(LE)
237	Plant	Lower Colorado River Valley	*Astragalus lentiginosus var coachellae*	Coachella Valley Milkvetch	G2	CA(LE)
238	Plant	Lower Colorado River Valley	*Astragalus lentiginosus var coachellae*	Coachella Valley Milkvetch	G2	CA(LE)
239	Plant	Lower Colorado River Valley	*Argythamnia californica*	California Ditaxis	G2	
240	Plant	Lower Colorado River Valley	*Astragalus tricarinatus*	Triple-rib Milkvetch	G1	CA(LE)

Appendix 5. Conservation Targets Identified within 79 Special Element Sites.

Site No.	Taxon	Subdivision	Scientific Name	Common Name	Global	ESA Status
240	Plant	Lower Colorado River Valley	*Gilia maculata*	Little San Bernardino Mtns. Gilia	G1	
240	Reptile	Lower Colorado River Valley	*Uma inornata*	Coachella Valley Fringe-toed Lizard	G1	LT
241	Plant	Lower Colorado River Valley	*Argythamnia californica*	California Ditaxis	G2	
242	Reptile	Lower Colorado River Valley	*Uma inornata*	Coachella Valley Fringe-toed Lizard	G1	LT
243	Plant	Lower Colorado River Valley	*Astragalus lentiginosus var coachellae*	Coachella Valley Milkvetch	G2	CA(LE)
244	Plant	Lower Colorado River Valley	*Astragalus lentiginosus var coachellae*	Coachella Valley Milkvetch	G2	CA(LE)
245	Plant	Lower Colorado River Valley	*Astragalus magdalenae var peirsonii*	Peirson's Milkvetch	G2	PE, CA(LT)
246	Reptile	Lower Colorado River Valley	*Uma inornata*	Coachella Valley Fringe-toed Lizard	G1	LT
247	Plant	Lower Colorado River Valley	*Xylorhiza cognata*	Mecca Aster	G2	SC
248	Reptile	Lower Colorado River Valley	*Uma inornata*	Coachella Valley Fringe-toed Lizard	G1	LT
249	Plant	Lower Colorado River Valley	*Gilia maculata*	Little San Bernardino Mtns. Gilia	G1	
250	Plant	Lower Colorado River Valley	*Astragalus magdalenae var peirsonii*	Peirson's Milkvetch	G2	PE, CA(LT)
251	Fish	Lower Colorado River Valley	*Cyprinodon macularius*	Desert Pupfish	G1	LE
252	Reptile	Lower Colorado River Valley	*Uma inornata*	Coachella Valley Fringe-toed Lizard	G1	LT
253	Reptile	Lower Colorado River Valley	*Uma inornata*	Coachella Valley Fringe-toed Lizard	G1	LT
254	Plant	Lower Colorado River Valley	*Argythamnia californica*	California Ditaxis	G2	
255	Plant	Lower Colorado River Valley	*Astragalus lentiginosus var coachellae*	Coachella Valley Milkvetch	G2	CA(LE)
256	Fish	Lower Colorado River Valley	*Xyrauchen texanus*	Razorback Sucker	G1	LE
257	Plant	Lower Colorado River Valley	*Chaenactis carphoclinia var peirsonii*	Peirson's Pincushion	G1	
258	Plant	Lower Colorado River Valley	*Astragalus lentiginosus var coachellae*	Coachella Valley Milkvetch	G2	CA(LE)
258	Reptile	Lower Colorado River Valley	*Uma inornata*	Coachella Valley Fringe-toed Lizard	G1	LT
259	Reptile	Lower Colorado River Valley	*Uma inornata*	Coachella Valley Fringe-toed Lizard	G1	LT
260	Reptile	Lower Colorado River Valley	*Uma inornata*	Coachella Valley Fringe-toed Lizard	G1	LT
261	Plant	Lower Colorado River Valley	*Gilia maculata*	Little San Bernardino Mtns. Gilia	G1	
262	Reptile	Lower Colorado River Valley	*Uma inornata*	Coachella Valley Fringe-toed Lizard	G1	LT
263	Invertebrate	Lower Colorado River Valley	*Macrobaenetes valgum*	Coachella giant sand treader cricket	G1	
264	Bird	Lower Colorado River Valley	*Coccyzus americanus occidentalis*	Western Yellow-billed Cuckoo	G3	PE
264	Bird	Lower Colorado River Valley	*Laterallus jamaicensis coturniculus*	California Black Rail	G1	SC, AZ(T)
264	Community	Lower Colorado River Valley	*Populus fremonti-Salix gooddingii*	Fremont cottonwood-Goodding's black willow riparian woodland	G2	
265	Bird	Lower Colorado River Valley	*Toxostoma lecontei*	Le Conte's Thrasher	G3	
265	Invertebrate	Lower Colorado River Valley	*Oliarces clara*	Cheese-weed owlfly	G2	SC
265	Mammal	Lower Colorado River Valley	*Spermophilus tereticaudus chlorus*	Coachella Round-tailed Ground Squirrel	G2	SC
265	Plant	Lower Colorado River Valley	*Nemacaulis denudata var gracilis*	Slender Woolly-heads	G3	
265	Reptile	Lower Colorado River Valley	*Phrynosoma mcallii*	Flat-tailed Horned Lizard	G3	SC
266	Mammal	Lower Colorado River Valley	*Spermophilus tereticaudus chlorus*	Coachella Round-tailed Ground Squirrel	G2	SC
267	Reptile	Lower Colorado River Valley	*Uma inornata*	Coachella Valley Fringe-toed Lizard	G1	LT
268	Plant	Lower Colorado River Valley	*Argythamnia californica*	California Ditaxis	G2	
269	Reptile	Lower Colorado River Valley	*Uma inornata*	Coachella Valley Fringe-toed Lizard	G1	LT
270	Bird	Lower Colorado River Valley	*Toxostoma lecontei*	Le Conte's Thrasher	G3	
270	Plant	Lower Colorado River Valley	*Gilia maculata*	Little San Bernardino Mtns. Gilia	G1	
271	Plant	Lower Colorado River Valley	*Argythamnia californica*	California Ditaxis	G2	
272	Plant	Lower Colorado River Valley	*Astragalus lentiginosus var coachellae*	Coachella Valley Milkvetch	G2	CA(LE)
273	Reptile	Lower Colorado River Valley	*Uma inornata*	Coachella Valley Fringe-toed Lizard	G1	LT
274	Mammal	Plains of Sonora	*Tamias dorsalis sonoriensis*	Chichimoco	GU	
275	Plant	Lower Colorado River Valley	*Agave zebra*		GU	
276	Plant	Plains of Sonora	*Agave fortiflora*		GU	
277	Plant	Plains of Sonora	*Agave felgeri*		G3	
278	Community	Lower Colorado River Valley	*Washingtonia filifera association*	California fan palm oasis	G2	

Appendix 6. Summary of known occurrences for the 78 natural vegetation communities in the Sonoran Desert Ecoregion (derived from Natural Heritage Program and expert-derived data).

Natural Vegetation Communities **23 Ecological Groups in grey rows** TNC National Vegetation Classification Associations in white rows				**Known Occurrences - Sonoran Desert Ecoregion**				
	Global Rank[1]	**Ecoregion Distrib.[2]**	**Patch Type[3]**	**Lower Colorado Valley**	**Arizona Uplands**	**Central Gulf Coast**	**Plains of Sonora**	**Group total[Ψ]** **Assoc. total**
Interior Dunes And Plains "Lower Colorado River Valley" (Group)		L	LP	7				7
Desert Sand-Verbena Interior Dune	G2G3	L	LP	4				4
Colorado Desert Wild Buckwheat Sand Dune	G1	L	LP	3				3
Desert Pavement	GU	L	LP					
Coastal Dunes (Group)		W	LP		N/A	5	N/A	5
Coastal Dune	GU	L	LP			1		1
Gulf Of California Coastal Strand	GU	W	L			4		4
Bedrock Shore/Sea Cave (Group)		W	L	1	N/A	1	N/A	2
Coastal Rock Shore	GU	W	L	1		1		2
Sea Cave	GU	L	SP					
Sonora/Mojave Bedrock Outcrop (Group)		L	LP					
Sparsely Vegetated Desert Outcrops	GU	L	LP					
Sonora/Mojave Playa Lake (Group)		W	LP	4		N/A	N/A	4
Intermittently Flooded Playa Lake Bed	GU	W	LP	4				4
Semi-Desert Grassland (Group)		L	LP	2	3		1	6
Mesquite/Tobosa Grassland	G5	P	LP					
Creosote Bush/Tobosa Grassland	G2	L	LP	1	1			2
Big Galleta Grassland	G3G4	L	LP	1	1			2
Blue Palo Verde/Curley Mesquite	G3Q	L	LP					
Small Leaf Ayenia-Black Grama	G2	P	LP					
Coastal Marsh (Group)		W	LP	7	N/A	5	N/A	12
Coastal Saltgrass	G5	W	LP	4		3		7
Glasswort Sand Flats	GU	W	SP	1				1
Glasswort-Saltwort Flats	G5	P	SP	1				1
Ditch-Grass Marsh	G1G3?	W	LP					
Eelgrass Bed	GU	W	L	1		2		3
Coastal Mangrove Forest (Group)		P	LP	1	N/A	5	N/A	11
Black Mangrove - (Red Mangrove) Forest	G4Q	P	LP					
Red Mangrove (Black-White Mangrove) Forest	G2G3Q	P	LP			4		4
White Mangrove Forest	G3Q	P	LP			1		1
Interior Riparian Marsh "Lower Colorado River Valley" (Group)		W	SP	11				11
Interior Cattail Marsh	GU	W	SP	4				4
Interior Giant Reed Marsh	GU	W	SP	2				2
Interior American Bulrush Marsh	G5	W	SP					
Interior Three-Square Marsh	G?	W	SP					
Pondweed Marsh	G?	W	SP					
Interior Riparian Shrub/Woodland (Group)		L	SP	1			1	2
Rosinbush Sonoran Desert Wash	G4	P	SP	1				1
Rosinbush-Yellow Paloverde Shrubland	G4	L	SP					
Scalebroom Shrubland	G3?	P	SP					
Mesquite Woodland (Group)		L	LP	7	3	3		13
Mesquite Woodland	G3?	L	LP	6	1	3		10
Mesquite-Mixed Short Tree Woodland	GU	L	LP	1	2			3
Arrow Weed Shrubland	G3?	L	LP					

Natural Vegetation Communities **23 Ecological Groups in grey rows** TNC National Vegetation Classification Associations in white rows				**Known Occurrences - Sonoran Desert Ecoregion**				
	Global Rank[1]	**Ecoregion Distrib.[2]**	**Patch Type[3]**	**Lower Colorado Valley**	**Arizona Uplands**	**Central Gulf Coast**	**Plains of Sonora**	**Group total[Ψ]** **Assoc. total**
Desert Riparian Woodland (Group)		L	L	34	8		2	44
Arizona Sycamore Riparian Woodland	GU	L	L	3	1			4
California Sycamore Riparian Woodland	G4?	L	L	1				1
Fremont's Cottonwood-Gooding's Black Willow Riparian Woodland	G2	L	L	28	7		1	36
Fremont's Cottonwood Woodland	G3?	L	L				1	1
Gooding's Black Willow-Velvet Ash Woodland	G2	P	L	1				1
Netleaf Hackberry/Shiny Hackberry	G3	P	SP					
California Fan Palm Oasis (Group)*		L	SP	72	3	5	2	82
California Fan Palm Oasis	G3?	L	SP	71	2	5	1	79
California Fan Palm-Fremont's Cottonwood Woodland	GU	L	SP					
California Fan Palm-Blue Palm Woodland	GU	L	SP	1	1		1	3
California Fan Palm- Date Palm Woodland	GU	L	SP					
Streams, Springs, And Sinks (Group)		L	SP	5	2	3		10
Perennial/Intermittent Stream	GU	L	SP	1				1
Desert Spring/Seep/*Tinaja*	GU	L	SP	4	2	3		9
Creosote-Bursage "Lower Colorado Valley" (Group)		L	M	28		2		30
Creosote-Bush Shrubland	G5	L	M					
Creosote Bush-White Bursage Shrubland	G4	L	M					
White Bursage-Big Galleta Grass	G2	L	M					
Honey Mesquite Shrubland	G3	L	LP	6				6
Blue Palo Verde Mixed Desert Scrub	G3?	L	LP	10		2		12
Teddy-Bear Cholla Shrubland	G4?	L	LP					
Mixed Acacia-Mixed Thorn Shrubland	GU	L	LP					
Agave-Bursage 'Viscaino Desert" Scrub (Group)		L	LP					
White Bursage-Cardon-Organ Pipe Cactus	GU	L	LP					
Agave- *Hechtia Montana*- Sotal Desert Scrub	GU	L	LP					
Boojum-Elephant Tree Desert Scrub	GU	L	LP					
Mojave Desert Shrubland (Group)		L	LP	3		N/A	N/A	3
Joshua Tree Wooded Shrubland	G4?	L	LP	2				2
Cat Claw Acacia-Yellow Paloverde	G4	L	LP	1				1
Palo Verde-Mixed Cacti "Az Upland" (Group)		L	M	11	5			16
Bursage-Paloverde-Jojoba Shrubland	G4	L	M					
Saguaro Cactus/Velvet Mesquite Wooded Shrubland	G?	L	M	2	1			3
Jojoba-Yellow Palo Verde Shrubland	G4	L	LP		1			1
Creosote Bush- Crucifixion Thorn Shrubland	GU	L	LP	1				1
Brittlebush Shrubland	G5	L	M					
Blue Palo Verde-Ironwood-Smoke Tree Woodland	G3?	L	LP	1				1
Ocotillo Shrubland	GU	L	LP	1				1
Brittlebush-Ironwood "Plains Of Sonora" (Group)		L	LP			1	1	2
Brittlebush-Ironwood-Morman Tea Shrubland	G3	L	LP					
Brittlebush-Mixed Desert Scrub	GU	L	LP					
Mixed Short Tree-Thorn Scrub	GU	P	LP					
Torchwood-Limberbush Desert Scrub (Group)		L	LP	10		5	1	16
Torchwood-Limberbush-Short Tree Scrub	GU	L	LP	4				4
Torchwood-Limberbush-Cardon-Association	GU	L	LP	5		3		8
Torchwood-Limberbush-Boojum Desert Scrub	GU	L	LP					

Natural Vegetation Communities **23 Ecological Groups in grey rows** TNC National Vegetation Classification Associations in white rows				**Known Occurrences - Sonoran Desert Ecoregion**				
	Global Rank[1]	**Ecoregion Distrib.[2]**	**Patch Type[3]**	**Lower Colorado Valley**	**Arizona Uplands**	**Central Gulf Coast**	**Plains of Sonora**	**Group total[Ψ]** **Assoc. total**
Saltbush Desert Scrub (Group)		L	LP	5	3			8
All-Scale Shrubland	G5	L	LP					
Four-Wing Saltbush Shrubland	G4	L	LP		2			2
Pickleweed Shrubland	G3	P	LP	3				3
Palmer Alkali Heath Shrubland	GU	L	LP		1			
Sinaloan/Foothills Thornscrub (Group)*		P	LP	N/A	N/A	2	1	3
Sinaloan Mixed Thornscrub	GU	P	LP			2	1	3
Interior Chaparral/Encinal (Group)*		P	LP	3		N/A		3
Turbinella Live-Oak-Mexican Manzanita Shrubland	G4	P	LP	1				1
Mexican Manzanita Shrubland	G4	P	LP	1				1
Birchleaf Mountainmahogany-California Buckwheat Shrubland	G3?	P	LP	1				1
Total Occurrences				212	27	42	9	290

[1] See **Appendix 2** for Global Ranking definitions.
[2] See **Table 3** for descriptions of Ecoregional Distribution categories: E=endemic, L=limited, W=widespresad, P=peripheral.
[3] See **Table 4** for descriptions of Ecoregional Patch Types: M=matrix, LP=large patch, SP=small patch, L=linear.
N/A = ecological group unlikely present in Ecoregional Subdivision.

Appendix 7. Conservation Target Occurrence Summary by Ecoregional Subdivision.

Scientific Name	Common Name	Number of Sites within Subdivision: Arizona Uplands	Central Gulf Coast	Lower Colorado River Valley	Plains of Sonora	Total Number of Sites with Target	Total Target Occurrences
Bird							
Aimophila carpalis	Rufous-winged Sparrow	5				5	6
Asturina nitida maxima	Northern Gray Hawk	3				3	18
Athene cunicularia	Burrowing Owl			2		2	2
Charadrius alexandrinus nivosus	Western Snowy Plover			1		1	1
Coccyzus americanus occidentalis	Western Yellow-billed Cuckoo	8		2		10	54
Colaptes chrysoides	Gilded Flicker	6		2		8	14
Colinus virginianus ridgwayi	Masked Bobwhite	1		1	1	3	8
Dendrocygna bicolor	Fulvous Whistling-duck			1		1	1
Dendroica petechia	Yellow Warbler	6		7	1	14	20
Dendroica petechia bryanti	Mangrove yellow warbler		1			1	2
Empidonax traillii extimus	Southwestern Willow Flycatcher	5		2		7	69
Falco mexicanus	Prairie Falcon			8		8	35
Falco peregrinus anatum	American Peregrine Falcon	6				6	14
Glaucidium brasilianum cactorum	Cactus Ferruginous Pygmy-owl	6		1		7	55
Haliaeetus leucocephalus	Bald Eagle	4		1		5	23
Ixobrychus exilis	Least Bittern		1			1	1
Ixobrychus exilis hesperis	Western Least Bittern	1		3		4	6
Laterallus jamaicensis coturniculus	California Black Rail	1		5		6	22
Micrathene whitneyi	Elf Owl			1		1	7
Migratory Bird Concentration Area	Migratory Bird Concentration Area	1	4	3	2	10	15
Mycteria americana	Wood Stork			1		1	1
Pipilo aberti	Abert's Towhee	7		2		9	12
Rallus longirostris yumanensis	Yuma Clapper Rail	3	1	6		10	58
Sterna elegans	Elegant Tern		2			2	2
Sterna nilotica	Gull-billed Tern			2		2	6
Sterna nilotica vanrossemi	Van Rossem's Gull-billed Tern			1		1	1
Toxostoma bendirei	Bendire's Thrasher			1		1	3
Toxostoma lecontei	Le Conte's Thrasher	1	3	8		12	19
Vireo bellii pusillus	Least Bell's Vireo			4		4	24
Community							
Abronia maritima-Helianthus-Jouvea	Gulf of California coastal strand		4			4	4
Abronia villosa-mixed shrub	Desert sand-verbena interior dune			4		4	5
Abronia-Opuntia-Coccoloba	Coastal dune		2			2	2
Acacia greggi-Parkinsonia microphylla	Cat claw acacia -yellow palo verde shrubland			1		1	1
Allenrolfea occidentalis	Pickleweed shrubland		1	3		4	4
Arctostaphylos pungens	Mexican manzanita shrubland			1		1	1
Atriplex canescens-Ehphedra viridis	Four-wing saltbush shrubland	2				2	2
Atriplex polycarpa	All-scale shrubland	1				1	1
Atriplex-Allenrolfea-Suaeda (group)	Saltbush scrub (group)			2		2	2
Avicennia-Rhizophora-Lanungularia (group)	Coastal mangrove forest (group)		4	1		5	7
Baccharis sarothroides	Rosinbush sonoran desert wash			1		1	1
Batis maritima	Glasswort-saltwort flats		1	1		2	2
Carnegia gigantea-Prosopis velutina	Saguaro cactus/velvet mesquite wooded shrubland	1		1		2	3
Cercidium floridum	Blue palo verde mixed desert scrub		1	4		5	11
Cercidium floridum-Olneya tesota	Blue palo verde-ironwood-smoke tree woodland			1		1	1
Cercocarpus montanus-Eriogonum fasciculatum	Birchleaf mountain-mahogany-California buckwheat shrubland			1		1	1
Desert Riparian Woodland (group)	Desert Riparian Woodland (group)			1		1	1
Desert Spring/Seep	Desert Spring/Seep	2	3	3		8	9

Appendix 7. Conservation Target Occurrence Summary by Ecoregional Subdivision.

Scientific Name	Common Name	Number of Sites within Subdivision: Arizona Uplands	Central Gulf Coast	Lower Colorado River Valley	Plains of Sonora	Total Number of Sites with Target	Total Target Occur-ences
Community							
Distichlis spicata	Coastal saltgrass		4	3		7	8
Ecological gradient	Ecological gradient	7		4	3	14	14
Encelia-Olneya (group)	Brittlebush-ironwood "Plains Of Sonora" (group)		1		1	2	2
Eriogonum deserticola association	Colorado desert wild buckwheat sand dune			2		2	3
Fouquieria splendens	Ocotillo shrubland			1		1	1
Fouquieria-Ipomoea-Acacia	Sinaloan mixed thornscrub		3		1	4	4
Frankenia palmeri-Atriplex sp.	Palmer alkali heath shrubland	1				1	1
Hilaria rigida	Big galleta grassland	1		1		2	2
Interior riparian shrub/woodland (group)	Interior riparian shrub/woodland (group)				1	1	1
Jatropha cinerea-Bursera microphylla	Torchwood-limberbush-short tree scrub			1		1	4
Jatropha sp.-Bursera microphylla-Pachycereus pringlei	Torchwood-limberbush-cardon association		2	1		3	7
Jatropha-Bursera (group)	Torchwood-limberbush (group)		2	1	1	4	4
Larrea tridentata (group)	Creosotebush-bursage (group)			8		8	12
Larrea tridentata-Canotia holocantha	Creosote-crucifixion thorn shrubland			1		1	1
Larrea tridentata-Hilaria mutica	Creosotebush/tobosa grassland	1		1		2	2
Leguncularia racemosa	White mangrove forest		1			1	1
Parkinsonia-Carnegia-Opuntia (group)	Palo verde-mixed cacti (group)	3		6		9	9
Perennial/Intermittent Stream	Perennial/Intermittent Stream			1		1	1
Phragmites sp.	Interior giant reed marsh			2		2	2
Platanus racemosa	California sycamore riparian woodland			1		1	1
Platanus wrightii	Arizona sycamore riparian woodland	1		3		4	4
Playa lake	Intermittently flooded playa lake bed			3		3	4
Populus fremonti	Fremont cottonwood riparian woodland				1	1	1
Populus fremonti-Salix gooddingii	Fremont cottonwood-Goodding's black willow riparian woodland	5		6	1	12	36
Prosopis (sp. glandulosa, velutina)	Mesquite woodland	1	2	5		8	9
Prosopis glandulosa	Honey mesquite shrubland			2		2	6
Prosopis velutina-mixed short tree	Mesquite-mixed short tree woodland	2		1		3	3
Quercus turbinella	Turbinella live-oak-Mexican manzanita shrubland			1		1	1
Rhizophora mangle	Red mangrove (black-white mangrove) forest		3			3	3
Salicornia sp.	Glasswort sand flats		1	1		2	2
Salix gooddingii-Fraxinus velutina	Goodding's black willow-velvet ash woodland			1		1	1
Simmondsia chinensis-Cercidium microphylla	Jojoba -yellow paloverde shrubland	1				1	1
Sparsely vegetated coastal rock shore	Coastal rock shore		1	1		2	2
Tobosa-Hilaria-Aristida-Prosopis (group)	Semi-desert grassland (group)	1			1	2	2
Typha domingensis	Interior cattail marsh			4		4	4
Typha-Phragmites-Scirpus (group)	Interior riparian marsh (group)			4		4	5
Washingtonia filifera association	California fan palm oasis	2	4	10	1	17	79
Washingtonia filifera-Brahea armata	California fan palm-blue palm oasis	1		1	1	3	3
Yucca brevifolia	Joshua tree woodland	1		1		2	2
Zostera maritima	Eelgrass bed		2	1		3	4
Fish							
Agosia chrysogaster	Longfin Dace	14				14	79
Campostoma ornatum	Mexcan Stoneroller				1	1	1
Catostomus clarki	Desert Sucker	9				9	55
Catostomus insignis	Sonora Sucker	7				7	51
Catostomus latipinnis	Flannelmouth Sucker	2		2		4	5
Catostomus wigginsi	Opata Sucker				1	1	1
Cyprinodon macularius	Desert Pupfish	1		6		7	10
Cyprinodon macularius eremus	Quitobaquito Desert Pupfish	1		1		2	3
Cyprinodon macularius macularius	Desert Pupfish	12		6		18	20

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Scientific Name	Common Name	Number of Sites within Subdivision: Arizona Uplands	Central Gulf Coast	Lower Colorado River Valley	Plains of Sonora	Total Number of Sites with Target	Total Target Occur-ences
Fish							
Elops affinis	Pacific Tenpounder			2		2	3
Gila ditaenia	Sonora Chub	2				2	8
Gila elegans	Bonytail	3		2		5	11
Gila eremica	Desert Chub				1	1	1
Gila intermedia	Gila Chub	6				6	26
Gila robusta	Roundtail Chub	8		2		10	51
Meda fulgida	Spikedace	3				3	18
Plagopterus argentissimus	Woundfin	1		2		3	4
Poeciliopsis occidentalis occidentalis	Gila Topminnow	11			2	13	33
Ptychocheilus lucius	Colorado Squawfish	2		2		4	7
Rhinichthys osculus	Speckled Dace	7				7	35
Tiaroga cobitis	Loach Minnow	3				3	20
Xyrauchen texanus	Razorback Sucker	4		3		7	28
Herpetofauna							
Batrachoseps aridus	Desert slender salamander			1		1	3
Bufo microscaphus californicus	Arroyo toad			3		3	3
Bufo microscaphus microscaphus	Arizona toad	4				4	34
Bufo retiformis	Sonoran green toad	1		1		2	10
Charina trivirgata gracia	Desert Rosy Boa	4		9		13	23
Charina trivirgata trivirgata	Mexican Rosy Boa			2	3	5	16
Chionactis palarostris organica	Organ Pipe Shovelnose Snake			1		1	15
Cnemidophorus burti xanthonotus	Redback Whiptail	1		1		2	8
Cnemidophorus estebanensis	San Esteban Whiptail		1			1	1
Cnemidophorus hyperythrus	Orangethroat Whiptail			1		1	1
Cnemidophorus nolascoensis	San Pedro Nolasco Whiptail		1			1	1
Coleonyx switaki	Barefoot Banded Gecko			4		4	6
Crotalus exsul ruber	Red Diamond Rattlesnake			4		4	4
Crotalus molossus estebanensis	San Esteban Blacktail Rattlesnake		1			1	1
Ctenosaura hemilopha nolascoensis	San Pedro Nolasco Spiny-tailed Iguana		1			1	1
Eumeces gilberti arizonensis	Arizona Skink	1				1	7
Gopherus agassizii	Desert Tortoise	6	2	7	4	19	28
Hypsiglena torquata tiburonensis	Tiburon Island Night Snake		1			1	1
Kinosternon flavescens arizonense	Southwestern Mud Turtle	2				2	2
Kinosternon sonoriense longifemorale	Sonoyta Mud Turtle	1		1		2	2
Phrynosoma mcallii	Flat-tailed Horned Lizard			14		14	89
Phyllodactylus homolepidurus nolascoensis	San Pedro Nolasco Gecko		1			1	1
Phyllodactylus xanti estebanensis	San Esteban Leaf-toed Gecko		1			1	1
Phyllorhynchus browni lucidus	Maricopa Leafnose Snake	4		2		6	20
Rana aurora draytoni	California Red-legged Frog			1		1	1
Rana tarahumarae	Tarahumara Frog	1				1	1
Rana yavapaiensis	Lowland Leopard Frog	15				15	148
Rana yumanensis	San Felipe Leopard Frog			2		2	2
Sauromalus varius	Chuckwalla		1			1	1
Thamnophis eques megalops	Mexican Garter Snake	2				2	7
Thamnophis hammondii	Two-striped Garter Snake			4		4	4
Thamnophis rufipunctatus	Narrow-headed Garter Snake	2				2	3
Uma inornata	Coachella Valley Fringe-toed Lizard			17		17	42
Uma notata notata	Fringe-toed Lizard			3		3	3
Uma notata rufopunctata	Cowles Fringe-toed Lizard			2		2	14
Uma scoparia	Mojave Fringe-toed Lizard			5		5	7
Uta nolascensis	San Pedro Nolasco Side-blotched Lizard		1			1	1

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Herpetofauna							
Xantusia vigilis	Desert Night Lizard	3		7		10	11
Invertebrate							
Acmaeodera atactospilata				1		1	1
Acmaeodera cribocoilis				1		1	1
Acmaeodera curticulata				1		1	1
Acmaeodera lanata				1		1	1
Acmaeodera tuta				1		1	1
Acmaeodera verityi				1		1	1
Acmaeodera yumae				1		1	1
Acmaeoderoides straminea				1		1	1
Adopaeoides prittwitzi	Sunrise skipper	1				1	1
Amblyscirtes elissa	Elissa skipper	1				1	1
Amblyscirtes texanae	Texas roadside skipper	1				1	1
Ancyloxypha arene	Tropical least skipper	1				1	1
Anomala carlsoni	Carlson's dune beetle			1		1	17
Anomala hardyorum	Hardy's dune beetle			1		1	16
Ascia howarthi	Howarth's white	2	1			3	3
Atrytonopsis cestus	Cestus skipper	3				3	3
Bee Biodiversity Area	Bee Biodiversity Area	2				2	3
Calephelis wrighti	Wright's metalmark	1				1	1
Centris caesalpiniae		1				1	1
Chioides catillus albofasciatus	Silver-banded skipper	1				1	1
Chrysobothris platti				1		1	1
Cicindela oregona maricopa	Maricopa tiger beetle	7				7	11
Concentration of aquatic invertebrates	Concentration of aquatic invertebrates				1	1	1
Eremarionta immaculata	White desertsnail			1		1	1
Euchloe guaymasensis	Guaymas marble		1			1	1
Eupackardia calleta		1				1	1
Heliopetes lavianus	Laviana skipper	1				1	1
Hippomelas imperialis	Large buprestid beetle			1		1	1
Hypostrymon critola	Sonoran hairstreak		1			1	1
Lepismaedora algodonnes				1		1	1
Macrobaenetes valgum	Coachella giant sand treader cricket			2		2	5
Micrarionta rowelli mccoiana	California mccoy snail			1		1	2
Monachister californicus	Sand burrowing sp.			1		1	1
Neopachylopus sp.				2		2	2
Oliarces clara	Cheese-weed owlfly			3		3	3
Opsiphanes boisduralii					1	1	1
Panoquina errans			1			1	1
Paracotalpa deserta				1		1	1
Philoxenus desertorum	Sand burrowing beetle			1		1	1
Pogonomyrmex anzensis				1		1	1
Polites norae			1			1	1
Pseudocotalpa andrewsi	Andrew's dune beetle			1		1	28
Pyrgulopsis arizonae	Bylas springsnail	1				1	3
Sonorella allynsmithi	Squaw Peak talussnail			2		2	2
Sonorella burgesi	talussnail		1			1	2
Sonorella eremita	San Xavier talussnail	1				1	1
Sonorella pratti	talussnail		1			1	1
Sonorella rothi	talussnail		1			1	1
Sonorella seri	talussnail		1			1	1

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Invertebrate							
Squamodera ephedrae				1		1	1
Stenopelmatus cahuilaensis	Coachella Valley Jerusalem cricket			1		1	2
Stinga morrisoni	Morrison's skipper	1				1	1
Tryonia gilae	Gila tryonia	1				1	4
Tryonia quitobaquitae	Quitobaquito tryonia			1		1	2
Tryonia sp.	Aquatic invertebrate			1		1	1
Mammal							
Antilocapra americana sonoriensis	Sonoran Pronghorn	3		1		4	23
Castor canadensis frondator	Beaver			1		1	1
Choeronycteris mexicana	Mexican Long-tongued Bat	4		1		5	9
Eumops underwoodi	Underwood's Mastiff Bat	1		1		2	4
Felis onca	Jaguar	2				2	2
Idionycteris phyllotis	Allen's Big-eared Bat	1				1	1
Lasiurus xanthinus	Western Yellow Bat	2		4		6	8
Leptonycteris curasoae yerbabuenae	Lesser Long-nosed Bat	5		1	1	7	25
Lepus alleni tiburonensis	Tiburon Antelope Jackrabbit		1			1	2
Macrotus californicus	California Leaf-nosed Bat	21	1	11	1	34	137
Myotis velifer	Cave Myotis	21		5		26	63
Myotis vivesi	Fishing Bat		4			4	9
Neotoma varia			1			1	1
Nyctinomops femorosaccus	Pocketed Free-tailed Bat	6		3		9	16
Odocoileus hemionus sheldoni	Tiburon Mule Deer		1			1	3
Ovis canadensis cremnobates	Peninsular Bighorn Sheep			3		3	7
Ovis canadensis mexicana	Desert Bighorn Sheep	4	3	3		10	23
Ovis canadensis nelsoni	Desert Bighorn Sheep			3		3	8
Perognathus baileyi insularis	Pocket Mouse		1			1	1
Perognathus intermedius pinacate	Rock Pocket Mouse	2		1		3	4
Peromyscus crinitus delgadilli	Delgadillo's Canyon Mouse			1		1	1
Peromyscus eremicus papagensis	Pinacate Cactus Mouse	2		1		3	5
Peromyscus eremicus tiburonensis	Tiburon Cactus Mouse		1			1	1
Peromyscus merriami	Mesquite Mouse	2		1		3	4
Peromyscus pembertoni	San Pedro Nolasco Deer Mouse		1			1	1
Peromyscus stephani	San Esteban Deer Mouse		1			1	1
Sigmodon hispidus eremicus	Yuma Cotton Rat			1		1	4
Spermophilus tereticaudus chlorus	Coachella Round-tailed Ground Squirrel			5		5	6
Spermophilus variegatus tiburonensis	Tiburon Rock Squirrel		1			1	2
Tamias dorsalis sonoriensis	Chichimoco		2		1	3	16
Plant							
Abutilon parishii	Pima Indian Mallow	14				14	24
Abutilon thurberi	Thurber Indian Mallow				1	1	1
Acalypha californica				1		1	1
Adelia obovata				1	1	2	2
Agave arizonica	Arizona Agave	2				2	24
Agave chrysoglossa			3			3	5
Agave colorata			1			1	1
Agave delamateri	Tonto Basin Agave	16				16	39
Agave deserti		1				1	1
Agave felgeri			1		1	2	9
Agave fortiflora		1	1		2	4	4
Agave jaiboli					1	1	1

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Plant							
Agave moranii				1		1	2
Agave murpheyi	Hohokam Agave	5				5	39
Agave pelona	Mescal Pelon		2		1	3	4
Agave schottii var treleasei	Trelease Agave			1		1	2
Agave subsimplex			3			3	5
Agave zebra			1	1		2	4
Allium haematochiton	Red Skin Onion		1			1	1
Allium parishii	Parish Onion	1				1	2
Ammoselinum giganteum	Western Sand-parsley			1		1	1
Amsonia kearneyana	Kearney's Blue Star	1				1	1
Argemone subintegrifolia				2		2	2
Argythamnia californica	California Ditaxis			9		9	14
Astragalus insularis var harwoodii	Harwood Milkvetch			3		3	6
Astragalus lentiginosus var coachellae	Coachella Valley Milkvetch			11		11	17
Astragalus magdalenae var peirsonii	Peirson's Milkvetch			5		5	7
Astragalus newberryi var aquarii	Newberry's Milkvetch	1				1	1
Astragalus tricarinatus	Triple-rib Milkvetch			2		2	2
Atamisquea emarginata	Desert Tree Caper	1		1		2	5
Berberis harrisoniana	Kofa Barberry	2		1		3	10
Brahea armata				1	2	3	4
Brickellia vollmeri				2		2	2
Brongniartia shrevei					1	1	1
Bursera hindsiana	Red Elephant Tree			1		1	5
Bursera microphylla	Elephant Tree	1		2		3	17
Capsicum annuum	Chiltepin				1	1	2
Capsicum annuum var aviculare	Chiltepin			1		1	2
Carnegiea gigantea	Saguaro Cactus	1		3		4	12
Castela emoryi	Crucifixion Thorn			4		4	8
Castela polyandra			1			1	2
Chaenactis carphoclinia var peirsonii	Peirson's Pincushion			3		3	4
Chamaesyce platysperma	Flatseed Spurge			3		3	5
Chorizanthe parryi var parryi	Parry's Spineflower			1		1	1
Cirsium mohavense		1				1	1
Cirsium wrightii	Wright's Marsh Thistle	1				1	1
Coreocarpus sanpedroensis			1			1	2
Coryphantha scheeri var robustispina	Pima Pineapple Cactus	4				4	53
Croton wigginsii	Dune Croton			2		2	5
Cryptantha ganderi	Gander's Cryptantha			2		2	6
Dalea juncea				2		2	2
Dalea orcuttii				2		2	2
Dalea tentaculoides	Gentry Indigo Bush	2				2	9
Drymaria viscosa				1		1	1
Echinocactus horizonthalonius var nicholii	Nichol Turk's Head Cactus	2	1			3	14
Echinocereus grandis			1			1	1
Echinomastus erectocentrus var acunensis	Acuna Cactus	5		1		6	12
Echinomastus erectocentrus var erectocentrus	Needle-spined Pineapple Cactus	2				2	9
Encelia ravenii				1		1	1
Ephedra funerea	Death Valley Mormon Tea			1		1	3
Ericameria brachylepis	Rayless Turpentine Bush	3				3	7
Erigeron anchana	Mogollon Fleabane	2				2	4
Erigeron piscaticus	Fish Creek Fleabane	2				2	5

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Plant							
Eriogonum apachense	Apache Wild-buckwheat	1				1	1
Eriogonum deserticola	Desert Wild-buckwheat			2		2	6
Eriogonum galioides				1		1	1
Eriogonum ripleyi	Ripley Wild-buckwheat	1				1	5
Eryngium nasturtiifolium	Hierba Del Sapo			1		1	3
Escobaria vivipara				4		4	33
Eucnide rupestris	Rock Stingbush			3		3	6
Euphorbia magdalenae			1			1	1
Euphorbia misera	Cliff Spurge		1	1		2	2
Euphorbia xantii			3			3	4
Ferocactus wislizeni var tiburonensis			2			2	2
Fouquieria columnaris	Boojum Tree		1			1	12
Fraxinus gooddingii	Goodding Ash	1				1	6
Galium angustifolium ssp. borregoense	Borrego Bedstraw			1		1	7
Gilia maculata	Little San Bernardino Mtns. Gilia			6		6	8
Graptopetalum bartramii	Bartram Stonecrop	1				1	4
Helianthus niveus	Dune Sunflower			1		1	3
Helianthus niveus ssp. tephrodes	Algodones Dunes Sunflower			2		2	5
Hermannia pauciflora	Sparseleaf Hermannia	2				2	4
Heuchera eastwoodiae	Eastwood Alum Root	1				1	2
Hulsea californica	San Diego Hulsea			1		1	1
Ipomopsis effusa	Baja California Ipomopsis			1		1	1
Justicia candicans	Hierba Azul	2		1		3	10
Laennecia eriophylla	Woolly Fleabane	1				1	2
Lepidium flavum var felipense	Borrego Valley Pepper-grass			1		1	4
Linanthus floribundus ssp. hallii	Santa Rosa Mtns. Linanthus			1		1	1
Lotus alamosanus	Alamos Beer Vetch	1				1	1
Lotus mearnsii var equisolensis		1				1	2
Lysiloma candida	Palo Blanco		1			1	4
Lysiloma microphylla var thornberi	Feather Bush	1				1	2
Mabrya acerifolia	Mapleleaf False Snapdragon	2				2	11
Machaeranthera arida	Arid Tansy-aster			1		1	1
Macroptilium supinum	Supine Bean	1				1	4
Mammillaria boolii	Viejito		1			1	2
Mammillaria estebanensis			1			1	1
Mammillaria johnstonii			2			2	4
Mammillaria multidigitata			1			1	2
Mammillaria tayloriorum			1			1	1
Mammillaria yaquensis			1			1	1
Marina orcuttii var orcuttii	California Marina			1		1	1
Mentzelia hirsutissima	California Stick-leaf			1		1	9
Metastelma mexicanum	Wiggins Milkweed Vine	1				1	4
Muhlenbergia dubioides	Box Canyon Muhly	1				1	1
Muhlenbergia gooddingii				1		1	1
Nemacaulis denudata var gracilis	Slender Woolly-heads			2		2	4
Opuntia munzii	Munz Cholla			1		1	2
Opuntia reflexispina	Cholla		1			1	6
Opuntia wigginsii	Wiggin's Cholla	1		3		4	6
Palafoxia arida var gigantea	Giant Spanish Needle			3		3	7
Paspalum virletii	Virlet Paspalum	1				1	1
Pectis imberbis	Beardless Chinch Weed	1				1	1

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Plant							
Penstemon discolor	Catalina Beardtongue	1				1	2
Perityle ajoensis	Ajo Rock Daisy			1		1	5
Perityle gilensis var gilensis	Gila Rock Daisy	1				1	1
Perityle saxicola	Fish Creek Rock Daisy	2				2	3
Petalonyx linearis	Longleaf Sandpaper Plant			1		1	1
Phacelia parishii		1				1	1
Pholisma arenarium	Scaly Sandplant			1		1	4
Pholisma sonorae	Sand Food			2		2	10
Pholistoma auritum var arizonicum	Arizona Pholistoma			1		1	1
Pithecellobium confine			1			1	1
Pseudorontium cyathiferum	Deep Canyon Snapdragon			1		1	1
Puccinellia parishii	Parish Alkali Grass	2				2	2
Purshia subintegra	Arizona Cliffrose	5				5	10
Rhus kearneyi	Kearney Sumac		1	1		2	9
Salvia amissa	Aravaipa Sage	2				2	4
Salvia davidsonii	Davidson Sage	1				1	1
Salvia greatae	Orocopia Sage			3		3	26
Schoepfia shreveana			1			1	1
Senecio hartwegii	Seemann Groundsel	1				1	1
Senecio pinacatensis				1		1	1
Sibara angelorum				2		2	2
Sibara pectinata			1			1	1
Stegnosperma halimifolium	Amole			1		1	1
Stephanomeria schottii	Schott's Wire-lettuce			1		1	8
Streptanthus campestris	Southern Jewelflower			1		1	3
Stylocline sonorensis	Mesquite Neststraw			1		1	1
Suaeda puertopenascoa			1	2		3	3
Thelypteris puberula var sonorensis	Aravaipa Wood Fern	2		1		3	3
Tithonia thurberi	Thurber Tithonia	1				1	1
Triteleiopsis palmeri	Blue Sand Lily			1		1	6
Vallesia baileyana			1			1	2
Washingtonia filifera	California Fan Palm	2		7		9	26
Xylorhiza cognata	Mecca Aster			4		4	20
Xylorhiza orcuttii	Orcutt's Woody Aster			2		2	23
Yucca whipplei	Whippley's Yucca			1		1	1

Appendix 8. Results of biophysical Analysis (see Appendix 3 for key to coding system).

CODE	Biophysical Unit Description	Total Acres	% of Ecoregion Subdivision	Acres w/in Conservation Sites	% of Unit in Conservation Sites	Acres Outside Conservation Sites	% of Unit Outside Conservation Sites	Under-represented (U) Overrepresented (O)	
Arizona Uplands									
Creosote-Bursage Desert Scrub (matrix-forming communities)									
103111		69,626	1.20	11,681	17	57,945	83		
103122		4,285	0.07	1,469	34	2,816	66		
103123		3,148	0.05	1,562	50	1,586	50		
103211		543,060	9.32	137,946	25	405,114	75		
103221		660	0.01	347	53	313	47		
103222	***low-mid. elev./mod.S-SW slope***	***38,861***	***0.67***	***17,124***	***44***	***21,737***	***56***	O	
103223	***low-mid. elev./mod.N-NE slope***	***33,741***	***0.58***	***15,774***	***47***	***17,967***	***53***	O	
103233		81	0.00	36	44	45	56		
103311	***mid-high elev./gentle-flat***	***160,892***	***2.76***	***79,151***	***49***	***81,741***	***51***	O	
103322		20,847	0.36	9,381	45	11,466	55		
103323		11,066	0.19	5,226	47	5,840	53		
103333		28	0.00	11	39	17	61		
103411		4,831	0.08	643	13	4,188	87		
103422		3,641	0.06	811	22	2,830	78		
103423		2,707	0.05	817	30	1,890	70		
103432		17	0.00	17	100	0	0		
Estimated extent circa 1800: 1,140,000 ac		**897,491**	**15.41**	**281,996**	**31**	**615,495**	**53**		
Dunes and Plains									
104111		1,200	0.02	788	66	412	34		
104211	**low-mid. elev./gentle-flat**	**806**	**0.01**					U	
Desert Playa									
105111		534	0.01	434	81	100	19		
Interior Chaparral/Encinal									
106211		2,732	0.05	1,422	52	1,310	48		
106222		349	0.01	283	81	66	19		
106223		717	0.01	545	76	172	24		
106311		10,625	0.18	3,627	34	6,998	66		
106322		6,961	0.12	2,980	43	3,981	57		
106323		4,421	0.08	2,544	58	1,877	42		
106332		25	0.00	13	52	12	48		
106333		24	0.00	19	79	5	21		
106411		9,374	0.16	1,904	20	7,470	80		
106422		14,495	0.25	5,361	37	9,134	63		
106423		9,391	0.16	4,348	46	5,043	54		
106432		130	0.00	60	46	70	54		
106433		64	0.00	23	36	41	64		
Interior Riparian Shrub/Woodland									
109111		3,524	0.06	2,179	62	1,345	38		
109122		963	0.02	543	56	420	44		
109211	***low-mid. elev./gentle-flat***	***18,051***	***0.31***	***14,068***	***78***	***3,983***	***22***	O	
109222		2,181	0.04	343	16	1,838	84		
109223		969	0.02	431	44	538	56		
109311		7,014	0.12	5,642	80	1,372	20		
109322		931	0.02	225	24	706	76		
109323		1,058	0.02	328	31	730	69		
109422	**high elev./mod.S-SW slope**	**507**	**0.01**	**35**	**7**	**472**	**93**	U	
109423		299	0.01	100	33	199	67		

CODE	Biophysical Unit Description	Total Acres	% of Ecoregion Subdivision	Acres w/in Conservation Sites	% of Unit in Conservation Sites	Acres Outside Conservation Sites	% of Unit Outside Conservation Sites	Under-represented (U) Overrepresented (O)	
Interior Riparian Woodlands									
110111	**low elev./gentle-flat**	**801**	**0.01**	**39**	**5**	**762**	**95**	U	
110211		3,255	0.06	2,300	71	955	29		
110311		525	0.01	440	84	85	16		
110333		17	0.00	16	94	1	6		
Torchwood-Limberbush									
111111		13,696	0.24	3,943	29	9,753	71		
111122		1,154	0.02	243	21	911	79		
111123		692	0.01	87	13	605	87		
111211	**low-mid.elev./gentle-flat**	**103,017**	**1.77**	**2,264**	**2**	**100,753**	**98**	U	
111222	**low-mid.elev./mod. S-SW slope**	**32,551**	**0.56**	**1,002**	**3**	**31,549**	**97**	U	
111223	**low-mid.elev./mod. N-NE slope**	**23,641**	**0.41**	**1,007**	**4**	**22,634**	**96**	U	
111232	**low-mid.elev./steep S-SW slope**	**17**	**0.00**	**1**	**6**	**16**	**94**	U	
111233	**low-mid.elev./steep N-NE slope**	**16**	**0.00**					U	
111311	**mid-high elev./gentle-flat**	**4,066**	**0.07**	**268**	**7**	**3,798**	**93**	U	
111322	**mid-high elev./mod. S-SW slope**	**8,696**	**0.15**	**374**	**4**	**8,322**	**96**	U	
111323	**mid-high elev./mod. N-NE slope**	**8,580**	**0.15**	**703**	**8**	**7,877**	**92**	U	
111332	**mid-high elev./steep S-SW slope**	**27**	**0.00**			**27**	**100**	U	
111333	**mid-high elev./steep N-NE slope**	**62**	**0.00**			**62**	**100**	U	
111422	**mid-high elev./mod. S-SW slope**	**742**	**0.01**	**1**	**0**	**741**	**100**	U	
111423	**high elev./mod. N-NE slope**	**450**	**0.01**					U	
Mesquite Woodland									
113111		8,054	0.14	1,050	13	7,004	87		
113211		91,439	1.57	20,615	23	70,824	77		
113222		541	0.01	292	54	249	46		
113223		375	0.01	256	68	119	32		
113311		58,911	1.01	22,062	37	36,849	63		
113322		1,427	0.02	815	57	612	43		
113323		693	0.01	287	41	406	59		
113433		23	0.00	23	100	0	0		
Palo verde-Mixed Cacti Desert Scrub (matrix-forming communities)									
115111	***low elev./gentle-flat***	***71,978***	***1.24***	***40,862***	***57***	***31,116***	***43***	O	
115122		4,626	0.08	1,243	27	3,383	73		
115123		3,352	0.06	1,200	36	2,152	64		
115211		2,248,383	38.61	697,725	31	1,550,658	69		
115221		2,504	0.04	1,677	67	827	33		
115222	***low-mid. elev./mod. S-SW slope***	***192,906***	***3.31***	***103,701***	***54***	***89,205***	***46***	O	
115223	***low-mid. elev./mod. N-NE slope***	***156,565***	***2.69***	***93,273***	***60***	***63,292***	***40***	O	
115232		574	0.01	446	78	128	22		
115233		309	0.01	286	93	23	7		
115311		830,527	14.26	255,530	31	574,997	69		
115321		1,605	0.03	833	52	772	48		
115322	***mid-high elev./mod. S-SW slope***	***218,604***	***3.75***	***95,057***	***43***	***123,547***	***57***	O	
115323	***mid-high elev./mod. N-NE slope***	***151,715***	***2.61***	***82,888***	***55***	***68,827***	***45***	O	
115332		944	0.02	713	76	231	24		
115333		722	0.01	611	85	111	15		
115411		62,810	1.08	17,971	29	44,839	71		
115422		48,971	0.84	16,461	34	32,510	66		
115423	***high elev./mod. N-NE slope***	***27,444***	***0.47***	***13,108***	***48***	***14,336***	***52***	O	
115432		352	0.01	227	64	125	36		
115433		325	0.01	270	83	55	17		
Estimated extent circa 1800: 4,040,000 ac		**4,025,216**	**69.12**	**1,424,082**	**35**	**2,601,134**	**63**		

CODE	Biophysical Unit Description	Total Acres	% of Ecoregion Subdivision	Acres w/in Conservation Sites	% of Unit in Conservation Sites	Acres Outside Conservation Sites	% of Unit Outside Conservation Sites	Under-represented (U) Overrepresented (O)	
Semi-Desert Grassland									
117211		7,506	0.13	2,375	32	5,131	68		
117311	***mid-high elev./gentle-flat***	***86,898***	***1.49***	***46,123***	***53***	***40,775***	***47***	O	
117322		10,818	0.19	5,347	49	5,471	51		
117323		6,732	0.12	4,701	70	2,031	30		
117332		38	0.00	19	50	19	50		
117411		20,438	0.35	9,476	46	10,962	54		
117422	***high elev./mod. S-SW slope***	***17,496***	***0.30***	***11,671***	***67***	***5,825***	***33***	O	
117423	***high elev./mod. N-NE slope***	***12,848***	***0.22***	***10,860***	***85***	***1,988***	***15***	O	
117432		128	0.00	84	66	44	34		
117433		125	0.00	121	97	4	3		
Water									
119111		3,785	0.06	2,894	76	891	24		
119211		12,706	0.22	11,889	94	817	6		
119222	(slope = map artifact)	529	0.01	500	95	29	5		
119223	(slope = map artifact)	484	0.01	473	98	11	2		
119233	(slope = map artifact)	16	0.00	16	100	0	0		
119311		1,006	0.02	394	39	612	61		
Subdivision total		**5,824,000**							
Central Gulf Coast									
Agave-Bursage Scrub									
201111		5,170	0.55	4,671	90	499	10		
201122		1,079	0.11	856	79	223	21		
201123		595	0.06	573	96	22	4		
Creosote-Bursage Desert Scrub									
203111		***164,828***	***17.40***	***94,984***	***58***	***69,844***	***42***		
203122		1,849	0.20	1,497	81	352	19		
203123		2,999	0.32	2,705	90	294	10		
Dunes and Plains									
204111	***low elev./gentle-flat***	***18,211***	***1.92***	***16,171***	***89***	***2,040***	***11***	O	
Torchwood-Limberbush									
211111	***low elev./gentle-flat***	***177,403***	***18.72***	***163,613***	***92***	***13,790***	***8***	O	
211121		1,447	0.15	1,218	84	229	16		
211122	***low elev./mod.S-SW slope***	***58,149***	***6.14***	***54,922***	***94***	***3,227***	***6***	O	
211123	***low elev./mod. N-NE slope***	***41,510***	***4.38***	***39,020***	***94***	***2,490***	***6***	O	
211132		149	0.02	149	100	0	0		
211133		102	0.01	102	100	0	0		
211211		4,969	0.52	4,728	95	241	5		
211222		8,452	0.89	8,199	97	253	3		
211223		7,856	0.83	7,629	97	227	3		
211232		80	0.01	80	100	0	0		
211233		139	0.01	139	100	0	0		
Mangrove Swamp									
212111		1,261	0.13	1,146	91	115	9		
Mesquite Woodland									
213111	***low elev./ gentle-flat***	***87,531***	***9.24***	***61,377***	***70***	***26,154***	***30***	O	
213122		463	0.05	414	89	49	11		
213123		823	0.09	789	96	34	4		
Palo verde-Mixed Cacti Desert Scrub									
215111	***low elev./ gentle-flat***	***138,938***	***14.66***	***117,166***	***84***	***21,772***	***16***	O	

CODE	Biophysical Unit Description	Total Acres	% of Ecoregion Subdivision	Acres w/in Conservation Sites	% of Unit in Conservation Sites	Acres Outside Conservation Sites	% of Unit Outside Conservation Sites	Under-represented (U) Overrepresented (O)	
215122		1,047	0.11	900	86	147	14		
215123		1,407	0.15	1,325	94	82	6		
215211		2,730	0.29	2,721	100	9	0		
Saltbush-Saltmarsh									
216111	***low elev./ gentle-flat***	***89,785***	***9.48***	***73,766***	***82***	***16,019***	***18***	O	
216122		869	0.09	848	98	21	2		
Subdivision total		**947,000**							
Lower Colorado River Valley									
Creosote-Bursage Desert Scrub (matrix-forming communities)									
303111	***low elev./ gentle-flat***	***4,125,028***	***34.00***	***2,093,032***	***51***	***2,031,996***	***49***	O	
303121		1,740	0.01	935	54	805	46		
303122	***low elev./mod. S-SW slope***	***140,145***	***1.16***	***87,157***	***62***	***52,988***	***38***	O	
303123	***low elev./mod. N-NE slope***	***147,240***	***1.21***	***97,820***	***66***	***49,420***	***34***	O	
303132		87	0.00	49	56	38	44		
303133		133	0.00	106	80	27	20		
303211	***low-mid. elev./gentle-flat***	***1,635,436***	***13.48***	***701,739***	***43***	***933,697***	***57***	O	
303221		632	0.01	215	34	417	66		
303222	***low-mid. elev./mod.S-SW slope***	***184,364***	***1.52***	***143,130***	***78***	***41,234***	***22***	O	
303223	***low-mid. elev./mod.N-NE slope***	***216,131***	***1.78***	***178,888***	***83***	***37,243***	***17***	O	
303232		630	0.01	448	71	182	29		
303233		927	0.01	726	78	201	22		
303311	***mid-high elev./gentle-flat***	***20,812***	***0.17***	***18,484***	***89***	***2,328***	***11***	O	
303322	***mid-high elev./mod. S-SW slope***	***32,527***	***0.27***	***27,744***	***85***	***4,783***	***15***	O	
303323	***mid-high elev./mod. N-NE slope***	***50,686***	***0.42***	***45,884***	***91***	***4,802***	***9***	O	
303332		166	0.00	144	87	22	13		
303333		378	0.00	328	87	50	13		
303411		3,687	0.03	3,281	89	406	11		
303422		9,190	0.08	8,432	92	758	8		
303423	***high elev./mod. N-NE slope***	***17,439***	***0.14***	***16,128***	***92***	***1,311***	***8***	O	
303432		145	0.00	139	96	6	4		
303433		255	0.00	250	98	5	2		
Estimated extent circa 1800: 8,015,000 ac		**6,587,778**	**54.30**	**3,425,059**	**51**	**3,162,719**	**39**		
Dunes and Plains									
304111	***low elev./ gentle-flat***	***1,659,247***	***13.68***	***1,343,912***	***81***	***315,335***	***19***	O	
304122		9,536	0.08	4,503	47	5,033	53		
304123		9,104	0.08	4,299	47	4,805	53		
304132	**low elev./steep S-SW slope**	**33**	**0.00**			**33**	**100**	U	
304133	**low elev./steep N-NE slope**	**31**	**0.00**			**31**	**100**	U	
304211		9,886	0.08	6,856	69	3,030	31		
304222	**low-mid. elev./mod. S-SW slope**	**1,939**	**0.02**	**51**	**3**	**1,888**	**97**	U	
304223	**low-mid. elev./mod. N-NE slope**	**1,361**	**0.01**	**12**	**1**	**1,349**	**99**	U	
304232	**low-mid. elev./steep S-SW slope**	**27**	**0.00**			**27**	**100**	U	
304233	**low-mid. elev./steep N-NE slope**	**54**	**0.00**			**54**	**100**	U	
Desert Playa									
305111	***low elev./ gentle-flat***	***28,173***	***0.23***	***15,455***	***55***	***12,718***	***45***	O	
305211		521	0.00	521	100	0	0		
Interior Chaparral/Encinal									
306111		5,421	0.04	1,764	33	3,657	67		
306211		1,652	0.01	1,470	89	182	11		
306311		7,273	0.06	7,073	97	200	3		
306322		1,482	0.01	1,198	81	284	19		

CODE	Biophysical Unit Description	Total Acres	% of Ecoregion Subdivision	Acres w/in Conservation Sites	% of Unit in Conservation Sites	Acres Outside Conservation Sites	% of Unit Outside Conservation Sites	Under-represented (U) Overrepresented (O)	
306323		1,453	0.01	1,302	90	151	10		
306411		2,007	0.02	1,707	85	300	15		
306422		2,099	0.02	1,503	72	596	28		
306423		3,430	0.03	2,832	83	598	17		
306433		16	0.00	16	100	0	0		
Interior Riparian Marsh									
308111		1,514	0.01	1,486	98	28	2		
Interior Riparian Shrubland/Woodland									
309111	***low elev./ gentle-flat***	***41,503***	***0.34***	***29,313***	***71***	***12,190***	***29***	O	
Interior Riparian Woodlands									
310111		16,326	0.13	6,200	38	10,126	62		
310211		920	0.01	879	96	41	4		
Torchwood-Limberbush									
311111	***low elev./ gentle-flat***	***140,819***	***1.16***	***91,191***	***65***	***49,628***	***35***	O	
311122	***low elev./mod.S-SW slope***	***23,320***	***0.19***	***16,925***	***73***	***6,395***	***27***	O	
311123	***low elev./mod.N-NE slope***	***15,639***	***0.13***	***11,416***	***73***	***4,223***	***27***	O	
311132		15	0.00	9	60	6	40		
311211	***low-mid. elev./ gentle-flat***	***73,689***	***0.61***	***52,831***	***72***	***20,858***	***28***	O	
311222	***low-mid. elev./mod.S-SW slope***	***34,544***	***0.28***	***26,993***	***78***	***7,551***	***22***	O	
311223	***low-mid. elev./mod.N-NE slope***	***34,676***	***0.29***	***29,318***	***85***	***5,358***	***15***	O	
311232		137	0.00	134	98	3	2		
311233		152	0.00	145	95	7	5		
311323		604	0.00	590	98	14	2		
Mesquite Woodland									
313111	***low elev./ gentle-flat***	***278,664***	***2.30***	***158,844***	***57***	***119,820***	***43***	O	
313122		3,089	0.03	2,614	85	475	15		
313211	***low-mid. elev./ gentle-flat***	***93,462***	***0.77***	***65,148***	***70***	***28,314***	***30***	O	
313222		4,064	0.03	3,873	95	191	5		
313223		2,322	0.02	2,185	94	137	6		
Palo verde-Mixed Cacti Desert Scrub (matrix-forming communities)									
315111		638,317	5.26	215,126	34	423,191	66		
315122	***low elev./mod.S-SW slope***	***16,252***	***0.13***	***10,372***	***64***	***5,880***	***36***		
315123		12,606	0.10	9,180	73	3,426	27		
315132		43	0.00	43	100	0	0		
315133		31	0.00	24	77	7	23		
315211		535,754	4.42	154,165	29	381,589	71		
315222	***low-mid. elev./mod.S-SW slope***	***32,518***	***0.27***	***15,589***	***48***	***16,929***	***52***		
315223	***low-mid. elev./mod.N-NE slope***	***26,206***	***0.22***	***14,826***	***57***	***11,380***	***43***		
315232		264	0.00	214	81	50	19		
315233		213	0.00	167	78	46	22		
315322		2,501	0.02	773	31	1,728	69		
315323		2,224	0.02	1,300	58	924	42		
315332		113	0.00	36	32	77	68		
315333		75	0.00	42	56	33	44		
315432		20	0.00	11	55	9	45		
315433	**high elev./steep N-NE slope**	**17**	**0.00**	**1**	**6**	**16**	**94**	U	
Estimated extent circa 1800: 1,342,000 ac		**1,267,154**	**10.45**	**421,869**	**33**	**845,285**	**65**		
Saltbush-Saltmarsh									
316111	***low elev./ gentle-flat***	***118,002***	***0.97***	***84,527***	***72***	***33,475***	***28***	**O**	
316211		15,749	0.13	9,009	57	6,740	43		
Semi-Desert Grassland									
317111	**low elev./ gentle-flat**	**2,101**	**0.02**	**159**	**8**	**1,942**	**92**	U	

CODE	Biophysical Unit Description	Total Acres	% of Ecoregion Subdivision	Acres w/in Conservation Sites	% of Unit in Conservation Sites	Acres Outside Conservation Sites	% of Unit Outside Conservation Sites	Under-represented (U) Overrepresented (O)	
Water									
319111		120,457	0.99	101,015	84	19,442	16		
319211		2,115	0.02	76	4	2,039	96		
Subdivision total		**12, 131, 000**							
Plains of Sonora									
Creosote-Bursage Desert Scrub									
403111		152,474	4.49	20,696	14	131,778	86		
403122	**low elev./mod.S-SW slope**	**846**	**0.02**	**37**	**4**	**809**	**96**	U	
403123		582	0.02	81	14	501	86		
403211		69,023	2.03	17,649	26	51,374	74		
403222		543	0.02	138	25	405	75		
403223		763	0.02	352	46	411	54		
403311		11,389	0.34	8,765	77	2,624	23		
403322		755	0.02	263	35	492	65		
403323		754	0.02	267	35	487	65		
Interior Chaparral/Encinal									
406211		722	0.02	722	100	0	0		
406311		1,007	0.03	409	41	598	59		
406323	**mid.-high elev./mod.N-NE slope**	**633**	**0.02**	**5**	**1**	**628**	**99**	U	
406411		1,807	0.05	463	26	1,344	74		
406422		1,912	0.06	382	20	1,530	80		
406423		2,185	0.06	276	13	1,909	87		
Interior Riparian Woodlands									
410111		5,842	0.17	5,385	92	457	8		
410211		1,154	0.03	292	25	862	75		
Torchwood-Limberbush									
411111	***low elev./ gentle-flat***	***160,268***	***4.72***	***78,778***	***49***	***81,490***	***51***	**O**	
411122		35,008	1.03	12,170	35	22,838	65		
411123		25,107	0.74	10,124	40	14,983	60		
411132		34	0.00	7	21	27	79		
411211		79,825	2.35	18,787	24	61,038	76		
411222		33,242	0.98	13,168	40	20,074	60		
411223	***low-mid. elev./mod.N-NE slope***	***29,165***	***0.86***	***14,291***	***49***	***14,874***	***51***	**O**	
411232		194	0.01	178	92	16	8		
411233		139	0.00	133	96	6	4		
411311		11,951	0.35	3,644	30	8,307	70		
411322		5,845	0.17	1,775	30	4,070	70		
411323		5,494	0.16	1,829	33	3,665	67		
411332		23	0.00	23	100	0	0		
411411		1,710	0.05	1,436	84	274	16		
411422		1,301	0.04	725	56	576	44		
411423		1,352	0.04	940	70	412	30		
Mesquite Woodland									
413111		736,213	21.70	149,419	20	586,794	80		
413122		4,697	0.14	1,539	33	3,158	67		
413123		5,651	0.17	1,573	28	4,078	72		
413211		418,095	12.32	79,974	19	338,121	81		
413222		2,212	0.07	437	20	1,775	80		
413223		2,680	0.08	660	25	2,020	75		
413311		19,222	0.57	8,205	43	11,017	57		

CODE	Biophysical Unit Description	Total Acres	% of Ecoregion Subdivision	Acres w/in Conservation Sites	% of Unit in Conservation Sites	Acres Outside Conservation Sites	% of Unit Outside Conservation Sites	Under-represented (U) Overrepresented (O)	
Palo verde-Mixed Cacti Desert Scrub									
415111	**low elev./gentle-flat**	**149,571**	**4.41**	**10,608**	**7**	**138,963**	**93**		
415122		1,203	0.04	210	17	993	83		
415123		1,409	0.04	194	14	1,215	86		
415211		409,960	12.08	84,119	21	325,841	79		
415222		6,774	0.20	1,009	15	5,765	85		
415223		6,213	0.18	1,243	20	4,970	80		
415311	***mid.-high elev./gentle-flat***	***189,300***	***5.58***	***89,821***	***47***	***99,479***	***53***	**O**	
415322		15,549	0.46	3,672	24	11,877	76		
415323		14,967	0.44	5,515	37	9,452	63		
415411		13,862	0.41	2,339	17	11,523	83		
415422		5,904	0.17	568	10	5,336	90		
415423		5,192	0.15	771	15	4,421	85		
Semi-Desert Grassland									
417311		1,586	0.05	559	35	1,027	65		
417411		939	0.03	386	41	553	59		
417422		811	0.02	145	18	666	82		
Sinaloan/Foothills Thornscrub									
418111		101,104	2.98	37,978	38	63,126	62		
418122		17,066	0.50	4,858	28	12,208	72		
418123		8,381	0.25	1,892	23	6,489	77		
418211		211,729	6.24	52,759	25	158,970	75		
418222		39,816	1.17	12,203	31	27,613	69		
418223		32,144	0.95	10,632	33	21,512	67		
418232		186	0.01	45	24	141	76		
418233		159	0.00	28	18	131	82		
418311	**mid.-high elev./gentle-flat**	**17,738**	**0.52**	**479**	**3**	**17,259**	**97**	U	
418322		11,471	0.34	1,720	15	9,751	85		
418323		9,511	0.28	912	10	8,599	90		
418411	**high elev./gentle-flat**	**1,351**	**0.04**	**46**	**3**	**1,305**	**97**	U	
418422		1,423	0.04	549	39	874	61		
418423		940	0.03	98	10	842	90		
subdivision total		**3,392,606**							

Appendix 9. Land Management Status and Approximate Acreage for the 100 Landscape-Scale Conservation Sites

Conservation Site #	Conservation Site Name	State	SITE ACREAGE WITHIN ECOREGION	Bureau of Land Mgmt	National Park Service	U.S. Fish & Wildlife Service	U.S. Forest Service	Dept. of Defense	Reclamation	State Trust Land	State Parks	State Game & Fish	Tribal	Local Park	Nature Conservancy	U.S. Private Lands	MX Private Lands	MX Biosphere Reserve	MX Proposed Protected	Total Acres
1	Rancho El Único	SN	354501	0	0	0	0	0	0	0	0	0	0	0	0	0	175,163	0	175,325	350,488
2	San Esteban Island	SN	10334	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10,334	10,334
3	Bahía de Kino/Isla Tiburón/Sierra Seri	SN	698072	0	0	0	0	0	0	0	0	0	0	0	0	0	398,625	0	297,972	696,597
4	Sierra Bacha/Sierra Del Viejo	SN	1351670	0	0	0	0	0	0	0	0	0	0	0	0	0	1,281,548	0	69,630	1,351,177
5	Cañones De La Pintada and Tetabejo	SN	739177	0	0	0	0	0	0	0	0	0	0	0	0	0	739,177	0	0	739,177
6	Sierra Tordilla/Puerto el Orégano	SN	18643	0	0	0	0	0	0	0	0	0	0	0	0	0	18,643	0	0	18,643
7	Carrizo Plains/Arroyo Bacoachito	SN	667939	0	0	0	0	0	0	0	0	0	0	0	0	0	532,150	0	135,789	667,939
8	Cerro Borrego/San Felipe Desert	BC	2258465	0	0	0	0	0	0	0	0	0	0	0	0	0	2,112,773	0	0	2,257,735
9	Tacna Marsh	AZ	2417	933	0	0	0	0	145	69	0	0	0	0	0	1,532	0	0	0	2,679
10	Colorado River Delta	SN/BC	979633	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,038,212	0	455,525
11	Bouse Dunes	AZ	118282	110,515	0	0	0	0	0	3,230	0	0	3,109	0	0	1,482	0	0	0	118,336
12	Kofa Complex	AZ	1434032	471,079	0	568,353	0	359,596	0	5,368	0	0	17,666	0	0	7,658	0	0	0	1,429,720
13	Pinacate-Organ Pipe-Goldwater Complex	AZ/SN	6147015	136,040	328,960	854,483	0	1,123,387	24,209	29,617	0	0	81,742	0	0	45,495	1,424,988	1,700,049	0	5,748,971
14	Arnett Creek	AZ	18698	0	0	0	15,150	0	0	0	0	0	0	0	0	3,522	0	0	0	18,672
15	Ciénega Creek	AZ	45872	0	2,088	0	0	3,077	0	17,671	0	0	0	4,266	0	23,194	0	0	0	50,296
16	Santa Rita	AZ	152544	2,703	0	0	0	0	0	19,636	0	0	65,267	0	0	63,080	0	0	0	150,686
17	Altar Valley	AZ	86059	68	0	72,192	0	0	0	60,102	0	0	11,680	0	0	13,385	642	0	0	158,069
18	Tortolita Mountains	AZ	53419	1,442	0	0	0	0	0	22,767	0	0	0	503	0	28,688	0	0	0	53,400
19	Sawtooth /Silverbell Mountains	AZ	110579	51,658	0	0	0	0	0	23,966	0	0	17,741	0	0	17,386	0	0	0	110,751
20	Vekol Mountains	AZ	21950	0	0	0	0	0	0	0	0	0	21,651	0	0	299	0	0	0	21,950
21	Salt & Verde Tonto Creek	AZ	356010	0	300	0	200,040	0	390	0	0	0	18,861	0	0	4,502	0	0	0	223,323
22	Magdalena/Río Ascunción	SN	252660	0	0	0	0	0	0	0	0	0	0	0	0	0	243,705	0	8,960	252,665
23	Hassayampa River	AZ	40553	21,129	0	0	0	0	0	6,532	0	0	0	0	1,075	12,289	0	0	0	41,025
24	San Jacinto Foothills	CA	16396	43,651	0	0	0	0	0	0	37,743	58	0	0	0	28,594	0	0	0	110,046
25	Anza Borrego	CA	270006	94,353	0	0	0	0	0	1,171	393,353	0	0	0	0	109,822	0	0	0	598,699
26	Coachella Valley	CA	36839	3,558	0	0	0	0	0	0	0	629	0	0	12,043	24,527	0	0	0	40,757
27	Chocolate Mountains	CA	1145037	534,574	0	30	0	461,071	0	25,647	55	0	0	0	0	119,251	0	0	0	1,140,628
28	Coachella Canal/Black Rail	CA	14819	4,713	0	0	0	0	0	0	0	0	0	0	0	7,127	0	0	0	11,840
29	McCoy Mountains	CA	336866	310,657	0	0	0	0	0	12,095	0	0	0	0	0	10,049	0	0	0	332,801
30	Riverside Mountains	CA	11605	5,373	0	0	0	0	0	643	0	0	3,131	0	0	477	0	0	0	9,624
31	Whipple Mountains	CA/AZ	131495	85,085	0	0	0	0	0	4,772	0	0	3,787	0	0	8,918	0	0	0	102,562
32	Sand Tank-Sauceda Mountain Complex	AZ	636196	133,937	0	0	0	355,114	0	2,093	0	0	141,811	0	0	842	0	0	0	636,196
33	Salton Sea	CA	255397	1,181	0	47,399	0	427	0	0	341	5,068	1,102	0	0	12,156	0	0	0	67,674
34	Joshua Tree	CA	259547	86,082	171,754	0	0	658	0	2,323	0	316	0	0		142,473	0	0	0	403,606
35	Algodones Dunes	CA	291402	274,302	0	0	0	2,196		2,021	0	0	0	0	0	12,885	24	0	0	291,428
36	Palen Dry Lake	CA	3479	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0
37	Central Gulf Coast	SN	192658	2,204	0	0	0	0		0	0	0	0	0	0	1,275	152,877	0	21,540	177,896
38	Colorado River/Río Hardy	AZ/CA/ SN/BC	427495	64,724	0	36,901	0	2,850	587	16,199	18,588	0	80,184	583	0	69,088	111,891	0	0	401,595
39	Sierra de Lopez	SN	20521		0	0	0	0	0	0	0	0	0	0	0	0	20,521	0	0	20,521
40	Cueva del Tigre	SN	1453		0	0	0	0	0	0	0	0	0	0	0	0	1,453	0	0	1,453
41	Sierra La Cobriza	SN	3928		0	0	0	0	0	0	0	0	0	0	0	0	3,928	0	0	3,928

Appendix 9. Land Management Status and Approximate Acreage for the 100 Landscape-Scale Conservation Sites

Conservation Site #	Conservation Site Name	State	SITE ACREAGE WITHIN ECOREGION	Bureau of Land Mgmt	National Park Service	U.S. Fish & Wildlife Service	U.S. Forest Service	Dept. of Defense	Reclamation	State Trust Land	State Parks	State Game & Fish	Tribal	Local Park	Nature Conservancy	U.S. Private Lands	MX Private Lands	MX Biosphere Reserve	MX Proposed Protected	Total Acres
42	Sierra La Jojoba	SN	10484		0	0	0	0	0	0	0	0	0	0	0	0	10,484	0	0	10,484
43	San Pedro Nolasco Island	SN	968		0	0	0	0	0	0	0	0	0	0	0	0	737	0	0	737
44	Río Matape	SN	173647		0	0	0	0	0	0	0	0	0	0	0	0	173,651	0	0	173,651
45	Las Guasimas	SN	1065		0	0	0	0	0	0	0	0	0	0	0	0	1,065	0	0	1,065
46	Cerro Aqualurca	SN	11462		0	0	0	0	0	0	0	0	0	0	0	0	0	0	11,462	11,462
47	La Poza/Southwest Hermosillo	SN	69641		0	0	0	0	0	0	0	0	0	0	0	0	69,641	0	0	69,641
48	South Ures	SN	15585		0	0	0	0	0	0	0	0	0	0	0	0	15,585	0	0	15,585
49	Sierra de Mazatan	SN	90295		0	0	0	0	0	0	0	0	0	0	0	0	79,131	0	31,591	110,722
50	Río Sonora/Río San Miguel	SN	244759		0	0	0	0	0	0	0	0	0	0	0	0	202,424	0	40,612	243,037
51	El Papago	SN	366		0	0	0	0	0	0	0	0	0	0	0	0	367	0	0	367
52	Cañon La Palma	SN	11632		0	0	0	0	0	0	0	0	0	0	0	0	11,633	0	0	11,632
53	Atascosa Mountains	SN	51189		0	0	0	0	0	0	0	0	0	0	0	0	51,190	0	0	51,190
54	Tubutama	SN	23208		0	0	0	0	0	0	0	0	0	0	0	0	23,208	0	0	23,208
55	Sierra el Alamo	SN	28785		0	0	0	0	0	0	0	0	0	0	0	0	28,786	0	0	28,786
56	No Site Name Designated/Adelia obovata	SN	20563		0	0	0	0	0	0	0	0	0	0	0	0	20,563	0	0	20,563
57	Puerto Lobos	SN	333500		0	0	0	0	0	0	0	0	0	0	0	0	239,154	0	0	239,154
58	Altar Valley	SN	374000		0	0	0	0	0	0	0	0	0	0	0	0	374,000	0	0	374,000
59	Quitovac	SN	15176		0	0	0	0	0	0	0	0	0	0	0	0	15,177	0	0	15,177
60	Sierra Cubabi	SN	10032		0	0	0	0	0	0	0	0	0	0	0	0	10,032	0	0	10,032
61	San Simon/Sonoyta Valley	AZ/SN	188027		23	0	0	0	0	0	0	0	78,293	0	0	0	103,360	6,289	0	187,965
62	Ejido Saldada	SN	44986		0	0	0	0	0	0	0	0	0	0	0	0	44,945	41	0	44,986
63	Sunrise Butte/Guadalupe Canyon	AZ/BC	74914		0	0	0	0	0	0	0	0	0	0	0	0	68,001	0	0	68,001
64	Laguna Salada	BC	113058		0	0	0	0	0	0	0	0	0	0	0	0	113,058	0	0	113,058
65	Yuha Basin	CA/BC	83163	71,285	0	0	0	0	0	0	0	0	0	0	0	8,150	11,027	0	0	90,462
67	West Mesa/Superstition Hills	CA	110113	40,948	0	0	0	47,462	0	72	0	0	0	0	0	19,960	0	0	0	108,442
68	San Felipe Creek	CA	21291	8,136	0	0	0	0	0	0	0	1,860	0	0	0	11,295	0	0	0	21,291
69	Ramer Lake	CA	403		0	0	0	0	0	0	0	385	0	0	0	18	0	0	0	403
70	Orocopia Valley	CA	24321	18,754	0	0	0	615	0	877	66	0	0	0	0	3,752	0	0	0	24,064
71	Mecca Hills/Painted Canyon	CA	27484	22,845	0	0	0	0	0	0	0	0	127	0	0	4,563	0	0	0	27,535
72	Whitewater River	CA	74041	8,982	0	0	0	0	0	2	0	0	3,418	0	0	81,174	0	0	0	93,576
73	Danby Playa	CA	61597	53,526	0	0	0	0	0	976	0	0	0	0	0	7,092	0	0	0	61,594
74	Carl's Dunes	CA	4885	3,493	0	0	0	0	0	0	0	0	0	0	0	1,393	0	0	0	4,886
75	Yuma Proving Ground Dunes	AZ	3158		0	0	0	3,158	0	0	0	0	0	0	0	0	0	0	0	3,158
76	Deson Mine	CA	6605	3,637	0	0	0	0	0	199	0	0	0	0	0	2,768	0	0	0	6,604
77	Harcuvar Mountains	AZ	126367	117,377	0	0	0	0	0	7,663	0	0	0	0	0	1,593	0	0	0	126,633
78	Baboquivari Mountains	AZ		7,058	0	200	0	0	0	3,677	0	0	8,185	0	0	1,870	0	0	0	14,659
79	El Tigre Mine	AZ	4219	4,181	0	0	0	0	0	38	0	0	0	0	0	0	0	0	0	4,219
80	Black Pearl	AZ	19307	16,848	0	0	0	0	0	1,282	0	0	0	0	0	1,182	0	0	0	19,312
81	Date Creek	AZ	54390	30,874	0	0	0	0	0	20,995	0	0	0	0	0	2,495	0	0	0	54,364
82	Bill Williams Complex	AZ/CA	167941	185,390	0	5,397	0	2,417	351	59,832	2,294	0	0	0	0	25,810	0	0	0	281,491
83	Agua Fria Watershed	AZ	297496	132,683	0	0	23,786	0	12,011	74,012	0	0	0	7,757	0	46,436	0	0	0	296,685
84	Dixie Mine	AZ	4330	1,352	0	0	0	0	0	43	0	0	0	546	0	2,389	0	0	0	4,330
85	Superstition Mountains	AZ	104813	489	0	0	175,445	0	200	9,884	252	0	0	0	0	2,693	0	0	0	188,963
86	Tonto National Forest	AZ	15175		0	0	16,838	0	0	0	0	0	0	0	0	30	0	0	0	16,868
88	Buckeye Copper Mine	AZ	10703	10,665	0	0	0	0	0	38	0	0	0	0	0	0	0	0	0	10,703
89	La Ciénega	SN	3560		0	0	0	0	0	0	0	0	0	0	0	0	3,560	0	0	3,560

(No site designated for numbers 66, 87, 94, 100)

Appendix 9. Land Management Status and Approximate Acreage for the 100 Landscape-Scale Conservation Sites

Conservation Site #	Conservation Site Name	State	SITE ACREAGE WITHIN ECOREGION	Bureau of Land Mgmt	National Park Service	U.S. Fish & Wildlife Service	U.S. Forest Service	Dept. of Defense	Reclamation	State Trust Land	State Parks	State Game & Fish	Tribal	Local Park	Nature Conservancy	U.S. Private Lands	MX Private Lands	MX Biosphere Reserve	MX Proposed Protected	Total Acres
90	Picacho Peak	AZ	5052		0	0	0	0	0	1,787	2,641	0	0	0	0	624	0	0	0	5,052
91	Unplowed Valley	AZ	101680	35,067	0	0	1,547	150	1,197	48,882	0	0	0	0	0	14,547	0	0	0	101,390
92	Old Mammon Mine	AZ	32811		0	0	0	0	0	0	0	0	32,763	0	0	110	0	0	0	32,873
93	Tucson Mountains	AZ	102076	2,509	15,692	0	0	40	0	14,639	0	0	304	17,395	0	49,108	0	0	0	99,687
95	Sabino Canyon	AZ	6863		0	0	2,526	0	0	0	0	0	0	0	0	5,088	0	0	0	7,614
96	East Tucson Riparian	AZ	7441		316	0	93	0	0	12	0	0	0	0	0	7,019	0	0	0	7,440
97	San Simon Springs/Ciénega	AZ	18806	5,412	0	0	0	0	0	4,291	0	0	0	0	0	9,105	0	0	0	18,808
98	Upper Gila River	AZ	1005101	57,713	820	1,406	0	703	9,687	14,406	0	1,406	145,639	1,313	137	139,466	0	0	0	372,337
99	San Pedro	AZ	402770	44,861	0	0	17,418	0	0	239,954	0	0	18,041	0	7,996	75,437	0	0	0	403,707
101	Ciénega de Saracachi	SN	1322		0	0	0	0	0	0	0	0	0	0	0	0	1,322	0	0	1,322
102	Harquahala Mts.	AZ	44464	41,889	0	0	0	0		2,506	0	0	0	0	0	34	0	0	0	44,429
103	Trout Creek	AZ	25157	42,000	6,683	27,926	32,025	13,074	4,319	20,725	481	148	44,121	1,115	0	12,464	0	0	0	205,080
104	Cerro Prieto Ponds	CA/BC	15605	41,794	6,602	28,864	32,354	13,978	4,364	20,920	616	148	44,536	1,128	61	0	15,605	0	0	15,605
	Total			3,449,729	533,239	1,643,151	517,221	2,389,973	57,460	803,633	456,430	10,019	843,158	34,605	21,312	1,307,661	8,905,813	2,744,592	803,216	23,883,061

Appendix 10. Exotic, Invasive Species of Concern in the Sonoran Desert Ecoregion, by Taxonomic Group.

	Scientific Name	***Common Name***	***Primary Known or Presumed Impacts On Native Fauna & Flora***
Amphibians/Reptiles			
1	*Rana catesbeiana*	Bullfrog	Preys on larvae, young, and adult native fish, frogs, salamanders, and aquatic invertebrates.
2	*Chelydra serpentina*	Snapping turtle	Preys on larvae, young, and adult native fish, frogs, and salamanders.
Invertebrates			
3	*Procambarus* sp. *Oroconectes* sp.	Crayfish	Preys on larvae, young, and adult native fish, frogs, salamanders, and aquatic invertebrates. Also feeds on aquatic plants resulting in significant changes in plant composition and cover.
4		Africanized honey bee	
Fish			
5	*Ameiurus melas*	black bullhead	Prey on larvae, young and adult native fish and aquatic invertebrates.
6	*Ameiurus natalis*	yellow bullhead	Prey on larvae, young and adult native fish and aquatic invertebrates; adult bullhead thought to be primarily piscivorous.
7	*Cypinella lutrensis*	red shiner	Aggressively displace native fish (spikedace, loachminnow, woundfin) from preferred feeding and spawning habitats.
8	*Cyprinus carpio*	carp	Preys on eggs, larvae, young and adult native fish, and aquatic invertebrates; feeding activities uproot aquatic vegetation and increase water turbidity. Broad physiological tolerances to temperature, water chemistry, current velocity, foods and spawning conditions probably lead it to influence most native fish directly or indirectly.
9	*Gambusia affinis*	mosquitofish	Preys on larvae, young and adults of native fish and aquatic invertebrates; native Gila topminnow which occupy similar aquatic habitats are particularly vulnerable.
10	*Ictalurus punctatus*	channel catfish	Preys on larvae, young and adult native fish, frogs, and aquatic invertebrates.
11	*Lepomis cyanellus*	green sunfish	Preys on larvae, young and adult native fish, frogs, and aquatic invertebrates.
12	*Micropterus dolomieui*	smallmouth bass	Preys on larvae, young and adult native fish, frogs, and aquatic invertebrates.
13	*Micropterus salmoides*	largemouth bass	Preys on larvae, young and adult native fish and aquatic invertebrates.
14	*Pimephales promelas*	fathead minnow	Potentially competes with native fish for space and food; feeds on detritus (including native fish eggs) and algae that occur on soft bottoms of pools.
15	*Pilodictis olivaris*	flathead catfish	Preys on larvae, young and adult native fish and aquatic invertebrates; adult flatheads feed principally on fish.
16	*Morone saxatilis*	striped bass	Preys on larvae, young and adult native fish and aquatic invertebrates; adult striped bass feed principally on fish.
17	*Morone chrysops*	white bass	Preys on larvae, young and adult native fish and aquatic invertebrates; adult striped bass feed principally on fish.
18	*Stizostedioun vitrium vitreum*	walleye	Preys on larvae, young and adult native fish and aquatic invertebrates; adult walleye feed principally on fish.
19	*Chaenobryttus gulosus*	warmouth	Preys on larvae, young and adult native fish and aquatic invertebrates.
20	*Pomoxis nigromaculatus*	black crappie	Preys on larvae, young and adult native fish and aquatic invertebrates.

	Scientific Name	***Common Name***	***Primary Known or Presumed Impacts On Native Fauna & Flora***

21	*Dorosoma petenense*	threadfin shad	Potentially competes with native fish for space and food; feeds on bottom material and organic detritus including native fish eggs and planktonic algae and crustaceans.
22	*Ictiobus cyprinellus* *I. niger, and I. bubalus*	bigmouth buffalo, black buffalo, smallmouth buffalo	Potentially competes with native fish for space and food; feeds on algae and crustaceans.
23	*Poecilia latipinna*	sailfin molly	Potentially competes with native fish for space and food; feeds on algae, crustaceans and organic detritus including native fish eggs.
24	*Lepomis macrochirus*	bluegill	Potentially competes with native fish for space and food; feeds on algae, aquatic invertebrates and native fish.
25	*Lepomis microlophus*	redear sunfish	Potentially competes with native fish for space and food; feeds on algae and aquatic invertebrates.
26	*Tilapia mossambica*	Mozambique mouthbrooder	Potentially competes with native fish for space and food; feeds on algae, aquatic plants and invertebrates; larger individuals can feed on native fish.
Mammals			
27		Feral Horses and Burros	Wild horses and burros are protected by federal legislation. Left unmanaged, they can overgraze riparian and upland desert habitats and compete with native mule deer and pronghorn.
Plants *(Family)*			
28	*Bromus catharticus* (Poaceae)		Competes with and displaces native plants, primarily in riparian areas.
29	*Bromus rubens* (Poaceae)	Red brome	Changes fire size and frequency; competes with and displaces native plants; alters soil ecology; alters species composition & richness; alters alpha & beta diversity; alters geomorphological processes and hydrology.
30	*Centaurea melitensis* (Asteraceae)	Malta star-thistle	Competes with and displaces native plants; alters soil ecology.
31	*Chloris virgata* (Poaceae)	Feather fingergrass	Competes with and displaces native plants; locally alters small mammal composition.
32	*Cynodon dactylon var. dactylon* (Poaceae)	Bermuda grass	Competes with and displaces native plants; alters soil ecology (de-oxygenates); alters species composition & richness; alters alpha & beta diversity; alters geomorphological processes and hydrology.
33	*Eragrostis cilianensis* (Poaceae)	Stinking lovegrass	Competes with and displaces native plants.
34	*Eragrostis lehmanniana* (Poaceae)	Lehmann's lovegrass	Changes fire size and frequency; competes with and displaces native plants; alters soil ecology; alters species composition & richness; alters alpha & beta diversity; alters geomorphological processes and hydrology.
35	*Hordeum murinum ssp. glaucum* (Poaceae)		Competes with and displaces native plants; alters species composition & richness; alters alpha & beta diversity; alters geomorphological processes and hydrology.
36	*Panicum antidotale* (Poaceae)	Blue panic	Competes with and displaces native plants.
37	*Pennisetum ciliare = Cenchrus ciliaris* (Poaceae)	Buffelgrass	Changes fire size and frequency; competes with and displaces native plants; lowers native species richness and alpha and beta diversity; alters soil ecology; alters animal composition and abundance; alters geomorphological processes and hydrology.
38	*Pennisetum setaceum* (Poaceae)	Fountain grass	Changes fire size and frequency; competes with and displaces native plants; lowers native species richness and alpha and beta diversity; alters soil ecology; alters animal composition and abundance.
	Scientific Name	***Common Name***	***Primary Known or Presumed Impacts On Native Fauna & Flora***
39	*Polypogon viridis* (Poaceae)	Rabbitsfoot grass	Competes with and displaces native plants.
40	*Schismus arabicus* (Poaceae)	Arabian grass	Changes fire size and frequency; competes with and displaces native plants; alters soil ecology.
41	*Schismus barbatus* (Poaceae)	Mediterranean grass	Changes fire size and frequency; competes with and displaces native plants; alters soil ecology.

42	*Sorghum halapense* (Poaceae)	Johnson grass	Competes with and displaces native plants.
43	*Tamarix ramosissima* (Tamaricaceae)	Tamarisk, salt cedar	Changes fire size and frequency; competes with and displaces native plants; lowers native species richness and density; alters soil ecology; alters species composition; alters alpha & beta diversity; alters geomorphological processes and hydrology.
44	*Mesambryanthemum crystallinum* (Aizoaceae)	Ice plant	Displaces native annuals.
45	*Mesambryanthemum nodiflorum* (Aizoaceae)	Ice plant	Displaces native annuals.
46	*Brassica tournefortii (*Brassicaceae)	Sahara mustard	Competes with or displaces native annuals; interferes with lizard and mammal behavior; may introduce fire to vegetation types that historically did not experience fire; seasonally stabilizes dunes; unknown affects to endangered Sonoran pronghorn.
47	*Sisymbrium irio (*Brassicaceae)	London rocket	Competes with or displaces native annuals.
48	*Chenopodium murale* (Chenopodiaceae)		Competes with and displaces native plants.
49	*Salsola australis* (Chenopodiaceae)	Tumbleweed	Changes fire size and frequency; generally a problem only in disturbed areas.
50	*Melilotus indicus* (Fabaceae)	Sweet clover	Competes with and displaces native plants in riparian areas.
51	*Erodium cicutarium* (Geraniaceae)	Filaree	Competes with or displaces native annuals.
52	*Malva parviflora* (Malvaceae)	Cheeseweed	Competes with or displaces native annuals.

Appendix 11. Summary of Status and Priority Inventory Needs for Ecological Groups in the Sonoran Desert Ecoregion.

High Priority For Research And Inventory

Desert Riparian Woodland

Conservation Criteria met? No. Although baseline numerical criteria were met, the viability of many occurrences needs site-level review. Restoration of riparian systems in the Sonoran Desert is critical.

Urgency for action: High. Given the high concentration of native plants and animals dependent on these habitats extensive restoration is critical.

Inventory/Research Need: It is likely that all major riparian woodland sites to target for restoration are included in this analysis. Identify river systems and reaches where restoration of natural processes is most feasible.

Semi-Desert Grassland

Conservation Criteria met? No. Only six extant examples of these systems were identified. Only one was identified in the Plains of Sonora. Areas identified as grassland and analyzed through the biophysical assessment likely included significant portions of non-native grasses and, in the Arizona Uplands, semi-desert chaparral.

Urgency for action: High. Historic land use, including overgrazing, and seeding of exotic grasses has significantly altered semi-desert grasslands.

Inventory/Research Need: Systematic inventory is needed with emphasis on the Arizona Uplands and Plains of Sonora Subdivisions. Inventory should aid in clarifying questions of classification and feasibility of restoration techniques.

Streams, Seeps, and Sinks

Conservation Criteria met? No.

Urgency for action: High. Work is needed to more clearly understand diversity and conservation needs for aquatic communities of the Sonoran Desert.

Inventory/Research Need: These communities were identified in a total of 10 Conservation Sites. More examples likely exist, but remain undocumented. Identification and documentation should be given high priority as should determination of habitat requirements of aquatic species Targets.

Brittlebush-Ironwood Desert Scrub

Conservation Criteria met? No. Only two examples of this type were identified by experts. Available vegetation maps did not include this type, although historically, it was thought to dominate the Plains of Sonora. Much of the area mapped as mesquite woodland may have been dominated by brittlebush and ironwood prior to significant agricultural development.

Urgency for action: High. Conversion of this type to other uses and extensive woodcutting of Ironwood suggest this type has been much reduced in extent.

Inventory/Research Need: Systematic inventory and evaluation of this type should concentrate on documenting large examples within Conservation Sites.

Medium Priority For Inventory And Research

Interior Riparian Shrubland/Woodland

Conservation Criteria met? No. Although it is likely that these communities are well represented within Conservation Sites, the limited number of examples identified through expert knowledge, and the low resolution of spatial data sets, complicates evaluation of their status.

Urgency for action: Medium. While hydrologic alterations have affected these systems similarly to other riparian types, they are more common across the Ecoregion. With better information we may find that they are well represented in Conservation Sites.

Inventory/Research Need: Inventory of unaltered desert washes within Conservation Sites to clarify their representation in Conservation Sites. Systematic evaluation and description of desert washes would aid in understanding their natural variability, conservation status, threats, and likely conservation strategies.

Mesquite Woodland

Conservation Criteria met? No. While extensive areas mapped as mesquite woodland (representing all major physical gradients) were included within Conservation Sites, mesquite bosques have been altered significantly and are likely under-represented in Conservation Sites.

Urgency for action: Medium. Conservation should be directed at mesquite bosques along riparian corridors in the Plains of Sonora and Arizona Uplands.

Inventory/Research Need: Systematic inventory is needed to identify remaining large and high quality examples, concentrated in the Plains of Sonora and Arizona Uplands or areas where restoration is most feasible.

Palo verde-Mixed cacti Desert Scrub

Conservation Criteria met? Yes. Although threats from development surrounding urbanized portions of the Arizona Uplands are significant, this groups was sufficiently represented in Conservation Sites. Biophysical assessment indicated that the upper elevation transition from this group into adjacent Sinaloan/foothills thornscrub may be under-represented.

Urgency for action: Medium

Inventory/Research Need: Inventory should focus on evaluating quality and functionality of examples represented within Conservation Sites, especially those near urban/agricultural development.

Torchwood-Limberbush Desert Scrub

Conservation Criteria met? No. Sixteen examples of this group were identified by experts; short of the goal of 40. Additional replication is likely needed in the Arizona Uplands. The biophysical assessment highlighted low mountain ranges along the U.S./Mexico border where these communities may be under-represented. However, areas mapped as this cover type were well represented in the Central Gulf Coast, Plains of Sonora, and Lower Colorado Valley.

Urgency for action: Medium

Inventory/Research Need: Inventory in the areas highlighted by the biophysical assessment would aid in understanding variability and distribution in these communities.

Interior Riparian Marsh

Conservation Criteria met? No. Eleven examples of communities within this group were identified; short of the goal of 20. However, it is likely that additional undocumented examples are located within Conservation Sites.

Urgency for action: Medium. Like aquatic communities, all wetland communities in this desert Ecoregion are ecologically significant.

Inventory/Research Need: Inventory should focus within identified Conservation Sites. Research to enhance understanding of hydrologic processes would aid site-level conservation management.

Coastal Marsh

Conservation Criteria met? Yes. Twelve examples, with a baseline goal of 20, were located within conservation sites. It appears that the most/all functional coastal marshes remaining in the ecoregion were included within Conservation Sites. However, additional work is needed to clarify the status and restorability of estuarine marsh systems in the Colorado River delta.

Urgency for action: Medium

Inventory/Research Need: No additional inventory is needed. Research into the hydrologic regimes and restoration techniques for these systems would aid in site-level conservation management.

Coastal Dunes

Conservation Criteria met? Yes. Most coastal dunes occur within Conservation Sites identified in northern Sonora.

Urgency for action: Medium. Coastal development is beginning to encroach upon dune systems.

Inventory/Research Need: Most locations of coastal dunes are known, though the current status is less well known. Sand sources of active dunes within Conservation Sites should be assessed to determine if artificial barriers have been established. Invasive, introduced plant species should be identified and evaluated for feasibility of prevention, control, or eradication.

California Fan Palm Oasis

Conservation Criteria met? Yes. Nearly all (82) known examples of these communities were identified and included within Conservation Sites.

Urgency for action: Medium

Inventory/Research Need: No new inventory is needed at this time. Better understanding of common threats to these communities (hydrologic alterations, fires) would aid in site-level management.

Saltbush Desert Scrub

Conservation Criteria met? No. Only eight examples of these communities were identified by experts. However, where this cover type was mapped in the Lower Colorado River Valley and Central Gulf Coast, a high percentage was captured in Conservation Sites.

Urgency for action: Medium

Inventory/Research Need: Systematic inventory of these communities would help to clarify variability and distribution in the Ecoregion and remaining high quality examples that have not been modified through grazing.

Low Priority For Inventory And Research

Agave-Bursage Desert Scrub

Conservation Criteria met? Yes. This group is primarily found on the Baja peninsula, with limited examples in the Central Gulf Coast Subdivision. No examples were identified by experts, but a high percentage of this type was identified within Conservation Sites through the biophysical assessment.
Urgency for action: Low
Inventory/Research Need: Low

Interior Dunes and Plains

Conservation Criteria met? No. The distribution of active/stabilized desert dunes and desert pavements is highly skewed towards the Lower Colorado River Valley, where they are well represented with Conservation Sites. However, none of these landscapes were identified within Conservation Sites in the Plains of Sonora.
Urgency for action: Low. It is likely that undocumented dune fields and desert pavement exist within Conservation Sites identified for the Plains of Sonora.
Inventory/Research Need: Additional land cover mapping would aid in identifying active dunes, stabilized dunes, and desert pavement areas outside of the Lower Colorado River Valley, particularly in the Plains of Sonora. Sand sources of active dunes within Conservation Sites should be assessed to determine if artificial barriers have been established. Invasive, introduced plant species should be identified and evaluated for feasibility of prevention, control, or eradication.

Bedrock Shore/Sea Cave,

Conservation Criteria met? Yes. It is likely that most occurrences of these uncommon communities are included within Conservation Sites.
Urgency for action: Low. No known threats to these communities.
Inventory/Research Need: Systematic inventory and description of characteristic plants (vascular and non-vascular) and animals. Systematic inventory should shed light on any threats.

Sonora/Mojave Bedrock Outcrop

Conservation Criteria met? No. Although it is likely that a wide range of small-medium sized bedrock outcrops of diverse substrate types have been included within Conservation Sites.
Urgency for action: Low. No known threat to these communities.
Inventory/Research Need: Systematic inventory and description of characteristic plants (vascular and non-vascular) and animals. Development of a detailed surficial geology map for the Ecoregion would be valuable for biophysical assessment. Systematic inventory of these communities should shed light on any threats to sites.

Sonora/Mojave Desert Playa

Conservation Criteria met? No. Although many small playas are likely represented within the largest Conservation Sites on flat topography.

Urgency for action: Low, per comments above.
Inventory/Research Need: Systematic inventory of playa lakebeds throughout the Arizona Uplands, Central Gulf Coast, and Plains of Sonora is of medium priority. Clarifying the plant (vascular and non-vascular) and animal composition among Sonoran Desert playas. Threats to these systems remain unclear but would likely be identified through inventory and research.

Coastal Mangrove Forest

Conservation Criteria met? Yes. All mangrove swamps were included within Conservation Sites.
Urgency for action: Low
Inventory/Research Need: No additional inventory is needed within the Ecoregion. Research into the hydrologic regimes and restoration techniques for these systems would aid in site-level conservation management.

Creosote-Bursage Desert Scrub

Conservation Criteria met? Yes. However, 30 examples were identified by experts. The biophysical assessment further clarified the extent to which these communities were represented indicating that 25% of historic areal extent was represented within Conservation Sites in the Arizona Uplands (Conservation Criteria was 30%). This may reflect extent of urban and agricultural development in low elevation areas of the AZ Uplands. Creosote-bursage communities were well represented in other Sonoran Desert Subdivisions (e.g., 43% of the Lower Colorado River Valley).
Urgency for action: Low
Inventory/Research Need: No additional inventory is needed at this time.

Mojave Desert Shrubland

Conservation Criteria met? No. Three examples of these communities were identified by experts. However, since these communities were not represented on vegetation maps, it is difficult to evaluate the likely extent of Mojave Desert shrubland extending south into this Ecoregion. It is likely that the majority of this type was captured within the Conservation Sites identified in California.
Urgency for action: Low
Inventory/Research Need: No inventory is needed at this time. Classification of these communities would aid in evaluating the variation between examples in the Sonoran Desert and Mojave Desert Ecoregions.

Sinaloan/Foothills Thornscrub

Conservation Criteria met? Yes. Three examples of these communities were identified by experts. This peripheral group was adequately represented in Conservation Sites based on expert input and the biophysical assessment.
Urgency for action: Low
Inventory/Research Need: Systematic inventory, to support classification development, should be conducted across the range of these types. Classification of thornscrub types, as they extend south into adjacent Ecoregions, would aid in clarifying natural variability, conservation status, and management issues.

Interior Chaparral/Encinal

Conservation Criteria met? Yes. Three examples of these communities were identified by experts. This peripheral group was adequately represented in Conservation Sites based on expert input and the biophysical assessment.
Urgency for action: Low
Inventory/Research Need: Systematic inventory would support classification development of these systems. Research into the natural range of variation and fire regimes in these communities would aid in site-level conservation management.