



*Enhancing Ecosystem Resilience of Riparian/Wetland Habitats in the
Upper Gunnison Basin, Colorado*

**Final Report
Colorado Parks and Wildlife
Colorado Wetlands for Wildlife Program**

**By
The Nature Conservancy and the
Gunnison Climate Working Group
December 15, 2014**



***Enhancing Ecosystem Resilience of Riparian/Wetland Habitats
in the Upper Gunnison Basin, Colorado***
Colorado Wetlands for Wildlife Program Project #593
Purchase Order #1300000249
Period: October 19, 2012 – December 15, 2014
Date of Final Project Completion: December 15, 2014
**The Nature Conservancy and the
Gunnison Climate Working Group**

Project Summary:

In 2014, the Project Team¹, a subset of Gunnison Climate Working Group² (GCWG), completed the third year of a restoration project to enhance resilience of riparian and wet meadow habitats in the Gunnison Basin to help the Gunnison Sage-grouse (*Centrocercus minimus*) adapt to a changing climate. These areas are also important habitat for other wildlife species, e.g., neo-tropical migratory birds, mule deer, and elk. Already compromised by lowered water tables and erosion, many of these areas are likely to be further impacted by drought, invasive species, and erosion from intense runoff events.

To address these impacts, the team used innovative yet simple restoration methods, e.g., rock structures, plug and ponds and drift fences, to improve hydrologic and ecological function of wet meadows and riparian areas managed by Bureau of Land Management (BLM), US Forest Service (USFS), Colorado Parks and Wildlife (CPW), and private ranchers. Restoration ecologist Bill Zeedyk designed the treatments to raise the water table, reduce erosion, connect the channel to the floodplain, and increase wetland plant cover. Field crews, volunteers, and contractors built a total of 476 structures to restore 68 acres along 14.5 stream miles at five priority sites from 2012-2014. The structures are already starting to capture sediments and hold/spread water, enabling wetland species to expand.

This project serves as an important demonstration of simple and effective tools for restoring and increasing resilience of wet meadow and riparian habitats. The techniques provide significant results that have potential to improve hydrologic function over a much larger area. The team is currently working to scale-up the project across the basin, as there are many incised channels and degraded streams that would benefit from similar treatments.

Background and Objectives:

This project is part of a larger effort of the GCWG, a collaboration of 18 local, state and federal agencies, private organizations, academic institutions, and private landowners, working across jurisdictional boundaries to: 1) increase understanding and awareness of the effects of climate change on nature and people; 2) develop and prioritize adaptation strategies; and 3) promote coordinated action in the Upper Gunnison River Basin.

¹ **Project Team Members:** Gay Austin (BLM-Gunnison Field Office), Andrew Breibart (BLM-Gunnison Field Office), Chris Bove (NRCS), Teresa Chapman (TNC), Jim Cochran (Gunnison County), Jonathan Coop (WSCU), Frank Kugel (UGRWCD), Pat Magee (WSCU), Betsy Neely (TNC), Chris Pague (TNC), Suzie Parker (USFS), Imtiaz Rangwala (WWA), Renee Rondeau (CNHP), Nathan Seward (CPW), Ken Stahlnecker (NPS), Matt Vasquez (USFS), Liz With (NRCS), Shawn Conner (BIO-Logic, Inc.), and Bill Zeedyk (Zeedyk Ecological Consulting).

² **Gunnison Climate Working Group Members:** Bureau of Land Management-Gunnison Field Office, Colorado Natural Heritage Program; Colorado Parks and Wildlife, Gunnison County, Gunnison County Stockgrowers Association, Gunnison Conservation District, Lake Fork Valley Conservancy, National Center for Atmospheric Research, National Park Service, Natural Resources Conservation Service, Rocky Mountain Biological Lab, The Nature Conservancy, Trout Unlimited, Upper Gunnison River Water Conservancy District, US Fish and Wildlife Service, US Forest Service, Western State Colorado University, and Western Water Assessment.

The CPW Colorado Wildlife for Wetlands Program funded this restoration and resilience building project to achieve the following objectives:

1. Restore and enhance resilience of priority brood-rearing habitat—riparian/wet meadow habitat—to enhance the adaptive capacity of the Gunnison Sage-grouse and other wildlife species (e.g., deer and elk winter range);
2. Establish a repeatable project that can be exported throughout the basin;
3. Establish an economical monitoring program to measure vegetation/species and/or water table response; and
4. Share tools and methods with others working to restore impacted watersheds and/or conserve vulnerable riparian areas within sagebrush shrublands to help bolster climate adaptation efforts (i.e., demonstration site).

For the purposes of this project, the team defined key attributes of resilient wet meadow/riparian systems as: 1) a properly functioning hydrology; 2) a stream channel that is connected to its floodplain; 3) stream banks that retain moisture and reduce erosion during flood events; and 4) a native and diverse wetland species composition. By reducing existing stressors such as channel incision, accelerated erosion and livestock trailing, the team aimed to increase the water storage from surface water flows and raise water tables. Improving the overall function of the system and health of the riparian vegetation will help the system adapt to projected impacts of a changing climate.

The technical objectives of this project were to:

1. Disperse flows more widely across floodplain surfaces to maximize infiltration and increase bank storage during flood events;
2. Stabilize eroded wet meadow soils to control head-cutting and reduce gully expansion thereby retaining bank storage and extending base flows;
3. Expand the size, extent and distribution of riparian/wetland sites; and
4. Increase health, vigor and density of riparian/wetland vegetation, such as native sedges, rushes, wet-loving grasses and forbs.

Habitat Treatments and Supplies:

Restoration techniques used in this project included grade control structures (one rock dams, log mats, sod dams and low water crossings), flow dispersal structures (media lunas, low water crossings, plug and ponds, filter dams and drift fences) and headcut control structures (Zuni bowls, rock rundowns, laybacks and log and fabric structures) following methods of Zeedyk and Clothier (2014). Most of the structures were made of rock, but several other techniques were used depending on site conditions. Drift fences were used to reduce trailing and soil compaction by livestock and wildlife. Plug and ponds (or plug and spread), built with a bulldozer and skid steer, were constructed to counteract the effects of channel incision and restore hydrologic connectivity with adjacent wet meadows. The team also worked with equipment operators to build several low water crossings, re-grade roads to harvest water (Chance Gulch), and move a road outside of a wet meadow (CPW Kaichen State Habitat Area) using Zeedyk's methods for low-standard rural roads (2006). See Table 1 for a summary of the numbers and types of structures used in this project.

Table 1. Summary of restoration structures completed at each site by landownership.

Site	Chance Gulch	Chance Gulch	Moncrief Ranch at Kezar Basin	West Flat Top at Redden Ranch	West Flat Top at Redden Ranch	West Flat Top at Henkel Rd	Wolf Creek	Wolf Creek	Total
Land-owner	Ballantyne State Habitat Area	BLM	Private	Private	USFS	USFS	Kaichen State Habitat Area	BLM	
Structure Type									
Drift Fence			8			2			10
Filter Dam						1			1
Flow Splitter							1		1
Lay Back	1					2		2	5
Log and Fabric						2			2
Low water Crossing		1					1	1	3
Media Luna		1			1	2	4	3	11
One Rock Dam	47	38		42	9	70	41	32	279
Plug and Pond			8						8
Rock Baffle					1	3			4
Rock Fill					1				1
Rock Mulch	3					1			4
Rock Rundown	17	20		8	8	41	8	3	105
Sod Dam	1	2		2			1	1	7
Steel Dam							3		3
Worm Ditch	2					3			5
Zuni Bowl	6	2		3	1	9	1	2	24
Other					1	2			
Total	77	64	16	55	22	138	60	44	476

Note: some structures were hybrids between two or more different structures. In these cases, only the first name of the structure was used for this summary.

Supplies: Gunnison Gravel and Earthmoving provided approximately 631 cubic yards of granitic rock for building rock structures over the three years. Where access prevented transporting rock, the team used different restoration techniques or field crews and volunteers gathered local rock (see Table 3). In several cases, the team did not use all delivered rock; we plan to use remaining rock to expand, repair or maintain structures in future years. Smaller rock (<7 inches) was used to build three low water crossings at Wolf Creek and Chance Gulch. In addition, the team used techniques using other materials, such as plug and ponds, drift fences, and sod dams at several sites (e.g., Moncrief Ranch and West Flat Top). See Table 2 below for a summary of amount of rock used by site and by year.

Table 2. Total amount of rock in cubic yards provided by Gunnison Gravel and Earthmoving; most rock was between 6-18 inches granite; smaller rock was used for low water crossings (<7 inches). Conversion: approximately 1 cubic yard = 1.2-1.3 tons for 6-18 inch rock.

Site	2012	2013	2014	Total cubic yards
Chance Ballantyne State Habitat Area			94	94
Chance BLM			116 +28 (for low water crossing)	144
Moncrief Ranch				0
West Flat Top at Redden Ranch	62 (75 tons)			62
West Flat Top Redden Ranch USFS			Gathered local rock	0
West Flat Top at Henkel Road		45	62	107
Wolf Creek Kaichen State Habitat Area	100 (120 tons)	42 (<7 inches for low water crossing)		142
Wolf Creek BLM		82 (10-12 cubic yards not used) Low water crossing (covered above)		82
Total over 3 Years	162	169	290	631

Project Stream Miles and Habitat Acres:

Over the three year period, the team installed a total of 476 structures, treating 14.5 stream miles and approximately 68 wetland and riparian acres across five sites on four private ranches (including two CPW State Habitat Areas), USFS and BLM lands. The team estimates that the treatments enhanced approximately 585 acres of Gunnison-sage grouse brood-rearing habitat (defined by a 50 m buffer on either side of channel). See methods and Table 3 below. The work is summarized below by major phases of this project.

1. In December 2013, the team completed Phase One (pilot or demonstration) of this project, including the design and installation of 247 restoration structures over a two year period on 22.4 acres along 10.2 stream miles at five sites:
 - a. Three private ranches (West Flat Top at Redden Ranch, Wolf Creek/Kaichen State Habitat Area, and Moncrief Ranch, Kezar Basin)
 - b. Two public lands sites (Wolf Creek BLM and West Flat Top at Henkel Road USFS).

2. In 2014, the team launched Phase Two of the project – a three year effort to significantly scale up the project. The team installed 229 restoration structures on 45.6 acres over 4.3 stream miles at five priority sites:
 - a. Two private ranches (CPW Ballantyne State Habitat Area and Moncrief Ranch in Kezar Basin)
 - b. Three public lands sites (Chance Gulch BLM, West Flat Top at Henkel Road USFS and West Flat Top above Redden Ranch USFS).

Methods for Estimating Habitat Acres:

The initial goal was based on a broad definition of brood rearing habitat for Gunnison Sage-grouse, including wet meadow, riparian areas, as well as adjacent sagebrush habitat believed to benefit from increased water retention. Thus our estimate of restored habitat included wet meadows, riparian areas and brood-rearing habitat for Gunnison Sage-grouse conservation success and likely to benefit from the restoration structures. The team calculated actual wetland riparian habitat and enhanced brood rearing habitat separately to distinguish the direct influence of the restoration structures on wetland species and the indirect effects on nearby sagebrush habitat.

The team developed two simple models to measure the extent of treated riparian and sagebrush habitat. To estimate the area of treated riparian extent, we used existing delineated GIS riparian areas from CPW. To estimate the area of enhanced brood-rearing habitat (including nearby sagebrush), we used a simple model of buffering riparian areas and streams by 50 m based on guidelines in the Gunnison Sage-grouse Conservation Plan (1997), Connelly et al. (2000), Gunnison Sage-grouse Range-wide Conservation Plan (2005), and Gunnison Sage-grouse Habitat Prioritization Tool (2012). See Table 3 below for results.

The wet meadow and riparian habitat was delineated by combining the CPW Riparian and Wetland Mapping Data GIS polygons (<http://ndis.nrel.colostate.edu/ftp/index.html>) with a 3 m buffered stream centerline. CPW riparian boundaries were mapped by photo-interpretation of 1998-1999 National Aerial Photography Program (NAPP) 1m resolution imagery with color and near infrared bands at a scale of 1:24,000. Riparian areas measuring less than 25 meters (75 ft.) in width were not recorded as polygons in the CPW Riparian data. Therefore, we either digitized stream centerlines using Google Earth 1meter aerial imagery and buffered these centerlines to an average 3 meter width based off visual estimation of riparian vegetation from the stream or used existing CPW or National Hydrography Dataset (NHD) stream center lines. Inaccuracies in the CPW and NHD stream centerlines were visually corrected and hand digitized.

CPW riparian polygons within 50 meters (150 ft.) of the stream centerlines were selected. The buffered stream centerlines were merged with the selected CPW riparian polygons to create a riparian habitat that ranged from 3 meters to 50 meters in width. This habitat was buffered 50 m to delineate the area of total sage grouse brood-rearing habitat potentially affected.

It is important to note that wet meadows vary in topography and size, and the area restored is likely to increase as the structures store more water over time. The team will continue to improve methods to estimate acres benefited by this project.

Table 3. Summary of restored stream length, estimates of restored/enhanced wet meadow area, and estimates of total restored area over this three-year project at five priority sites in the Upper Gunnison Basin.

Site	Landowner	2012-2013 # of Structures	2014 # of Structures	Restored Stream Length Miles (2012- 2013)	Restored Stream Length Miles (2014)	Restored Wet Meadow Habitat Acres (2012- 2013)	Restored Wet Meadow Habitat Acres (2014)	Total Restored Acres 2012- 2013 (50m buffer)	Total Restored Acres 2014 (50m buffer)
Chance Gulch	Ballantyne State Habitat Area (Private)		77		0.6		3.3		33.3
Chance Gulch	BLM		64		1.4		11.9		71
Moncrief Ranch at Kezar Basin	Private	3	13	0.3	1.1	0.7	16.1	12	59.1
West Flat Top at Redden Ranch	Private	55		1.2		1		78.3	
West Flat Top at Redden Ranch	USFS		22		0.1		0.23		5.6
West Flat Top at Henkel Rd	USFS	85	53	2.6	1.1	4.2	14.1	169	50.2
Wolf Creek	Kaichen State Habitat Area (Private)	60		3		6.8		57.3	
Wolf Creek	BLM	44		3.1		9.7		49.3	
Totals		247	229	10.2	4.3	22.4	45.63	365.9	219.2

Related Activities to Meet Objectives:

The team completed numerous activities to meet the broader objectives of this project, outlined below:

1. Preparation and Permits: The team conducted rapid field assessments to assess habitat conditions, prioritize work, and identify restoration needs. They then designed treatments, staked structure locations, and identified supplies needed. Bio-Environs, BIO-Logic and BLM completed the following:
 - a. Wetland delineations and US Army Corps of Engineers Nationwide Permit #27 applications for Wolf Creek, Chance Gulch and Sage Hen Gulch
 - b. Nationwide Permit #18 for Redden Ranch and wetland delineation and a new request for preliminary jurisdictional determination for restoration expansion at Redden Ranch
 - c. Memorandum documenting compliance of Moncrief Ranch project with NRCS Conservation Practice Standards for Wetland Restoration for an exemption from EPA's Clean Water Act Compliance.
 - d. BLM and USFS staff completed NEPA requirements on public lands.
2. To share tools and methods with others and to establish repeatable methods that can be applied across the basin, the team completed the following:
 - a. Conducted outreach activities including field tours for many groups, including BLM, Colorado Mountain College, CPW, Colorado State University, Gunnison Basin Gunnison Sage-grouse Strategic Committee, Gunnison Conservation District, National Fish and Wildlife Foundation, Natural Resources Conservation Service, San Miguel Gunnison Sage-grouse Working Group, TNC Board of Trustees, Upper Gunnison River Water Conservancy District, US Army Corps of Engineers, USFS, and Western State Colorado University.
 - b. Made presentations at numerous meetings, including the Tamarisk Coalition Riparian Restoration Conference, Colorado Water Workshop, Colorado Wildlife Society, Mountain Climate Research Conference, National Adaptation Forum, Quivira Coalition Conference, Southern Rockies LCC, Sustaining Colorado's Watersheds Conference, and Western State Colorado University.
 - c. Conducted trainings, both lecture and hands-on, to kick-off installation of rock structures for 25-40 participants/year representing youth field crews, agency partners, volunteers, other Sage-grouse working groups, and Western State Colorado University.
 - d. Provided hands-on training and technical oversight of the field crews, e.g., Western Colorado Conservation Corps, Youth Conservation Corps, and TNC's Fire Use Module.
 - e. Provided technical oversight for the Wildlands Restoration Volunteers' five-day volunteer event and crew leader training in 2014 to over 85 volunteers (1,006 volunteer hours). CPW generously provided Miller Ranch for staging volunteers. BLM oversaw the maintenance of two media lunas at Lower Wolf Creek as part of Public Lands Day.
 - f. Posted a project fact sheet, reports and presentations about the project on the www.conservationgateway.org at the following link: [Gunnison Basin Reports](#).
3. To establish an economical monitoring program, the team:
 - a. Monitored vegetation using the Line Point Intercept method and permanent photographs. The team established 138 monitoring transects and approximately 420 photo-points across all sites; they increased efficiencies in 2014 by using an iPad to record data in the field. The team is currently working on analyses for completion by January 2015.
 - b. Established water table depth monitoring at Wolf Creek, Chance Gulch, and Kezar Basin.
 - c. Installed two time lapse cameras in Lower Wolf Creek.
 - d. Initiated a strategic plan for guiding future research and monitoring treatment response on plants, animals and soil moisture.
4. To prioritize future work, the team conducted rapid field assessments of new sites and conducted a climate-informed GIS site selection analysis to prioritize sites for future restoration treatment.

Project Modifications:

There were two changes to the original scope of this project. First, the team initially set a target of restoring approximately 500-800 acres based on a broader definition of brood-rearing habitat, including wetlands, riparian areas and adjacent sagebrush slopes. Using this broader definition, the project enhanced approximately 585 total acres, including an estimated 68 acres of riparian and wetland acres. The lower wetland acres is due to several reasons: 1) we focused on higher elevation sites along smaller streams with narrower floodplains based on the premise that the Gunnison Sage-grouse is expected to shift to higher elevations in response to climate change; 2) we emphasized the demonstration and outreach aspects of this project; and 3) we focused more on innovative restoration practices as opposed to reaching a specific targeted acreage. TNC discussed this issue with Brian Sullivan and Nathan Seward, CPW, and obtained approval for the adjusted restored acres.

Secondly, the original Purchase Order for this project did not allow TNC to use funds to pay on-site contractors (due to internal policies). Therefore, TNC covered these expenses (approximately \$26,000) internally. The remaining CPW funding was used for TNC staff time in planning and coordinating the 2014 restoration field season and selecting priority sites for future work with partners. Finally, CPW and TNC extended the length of this grant through June 30, 2015 to accommodate these changes. TNC completed obligations for this award in December 2014; therefore with this report we are closing this grant.

Pre- and post-project land ownership scenario and the length and expiration date of management agreements:

TNC developed landowner agreements for the following private lands (with length and expiration dates):

1. Ballantyne State Habitat Area: May 1, 2014-December 31, 2016
2. Lypps-Ballantyne State Habitat Area: May 1, 2014 to December 2016
3. Kaichen State Habitat Area at Wolf Creek: August 8, 2012 to August 31, 2015
4. Moncrief Ranch: Aug. 1, 2013 through August 31, 2015
5. Redden Ranch: September 7, 2012 to August 31, 2015.

Detailed financial contributions:

A detailed budget of expenditures is presented in Table 4 at the end of this report. All matching funds for this grant were provided by the Wildlife Conservation Society Climate Adaptation Fund. Funding from this CPW Wetlands Program grant ends with the completion of this report in 2014, but the Project Team will continue to expand the work to other drainages across the Gunnison Basin over the next two years and beyond.

Next Steps:

Restoration and increasing resilience of riparian areas and wet meadows in sagebrush shrublands in the Upper Gunnison Basin will take many years. Based on strong partner interest and promising early results to the structures, we have raised funding from a private foundation and participating agency partners to help expand the project over a three year period (starting in early 2014). Specific next steps include, but are not limited to, the following:

1. Analyze, interpret and report on monitoring results for 2014 by January 2015.
2. Revisit structures at all sites to identify repair and maintenance needs; complete planned structures at Chance Gulch and Lower Wolf Creek. Repair and maintain structures needing additional work, with minor expansions of structures, e.g., at CPW Kaichen State Habitat Area and Redden Ranch at West Flat Top Mountain.

3. Complete design and install treatments at new sites, including Lypps-Ballantyne State Habitat Area (Sage Hen Gulch), BLM managed areas of Sage Hen Gulch, USFS lands above Redden Ranch and a new drainage at West Flat Top Mountain in 2015.
4. Finalize prioritization of sites and prepare for 2015-2016 work; conduct rapid field assessments of potential sites to confirm restoration needs and priorities.
5. Develop a strategic plan for monitoring treatment response on plants, animals and soil moisture with Western State Colorado University and project team (in progress).

Appendices:

A. Maps showing final project boundaries, wetland boundaries, other water features, and structures:

1. Priority Restoration Sites: 2012-2014
2. Chance Gulch: Ballantyne State Habitat Area
3. Chance Gulch: Bureau of Land Management
4. Moncrief Ranch, Kezar Basin: Private
5. West Flat Top at Henkel Road: US Forest Service
6. West Flat Top at Henkel Road (Exclosure): US Forest Service
7. West Flat Top at Henkel Road: US Forest Service
8. West Flat Top Redden Ranch: US Forest Service
9. West Flat Top: Redden Ranch: Private
10. Wolf Creek: Lower Wolf Creek: Bureau of Land Management
11. Wolf Creek: Upper Wolf Creek, East Fork and Middle Fork
12. Wolf Creek: West Fork: Bureau of Land Management

B. Project Photographs (including sites, process, outreach, and selected pre-and post-project photographs)

C. Digital Maps: GIS polygons (shapefiles) of the project boundary and wetland boundaries (to be sent separately).

Acknowledgements:

Special thanks to Brian Sullivan and the CPW Wetlands Program for making this project possible and to Nathan Seward, CPW, for sponsoring this project. Many thanks to the Gunnison Climate Working Group, the project team members and contractors for their many contributions. Bill Zeedyk and Shawn Conner provided extensive restoration expertise, design and oversight. Jim Cochran and Frank Kugel hosted team meetings. Bill Zeedyk, Andrew Breibart, Shawn Conner, Nathan Seward and Matt Vasquez led youth field crews and volunteers to build structures. Renee Rondeau, Gay Austin, Nathan Seward and Andrew Breibart conducted rapid field assessments. Gay Austin, Tim Lapello, Lynn Cudlip and Alison Graff completed the wetland delineations and permit applications. Carrie Sheata reviewed and approved the wetland permit applications. Nathan Seward, Matt Vasquez and Pat Magee provided grouse expertise. Renee Rondeau, Gay Austin, Suzie Parker and Wendy Brown conducted vegetation monitoring. Teresa Chapman and Jamie Robertson conducted the GIS site selection analysis, with input from Renee Rondeau, Chris Pague, Meg White, Gay Austin, Nathan Seward, Andrew Breibart, Shawn Conner, Matt Vasquez, and Mike Pelletier, and others. Mike Pelletier provided Gunnison Sage-grouse Habitat Prioritization Tool data. Imtiaz Rangwala provided climate expertise. Teresa Chapman conducted GIS analyses to estimate acres treated. Jim Cochran, Nathan Seward and Liz With provided key private landowner connections. Ken Stahlnecker contributed a dump truck for hauling rock. Shawn Conner, Andrew Breibart, Renee Rondeau and Matt Vasquez provided GPS locations of structures. Jim Cochran

and Ken Stahlnecker served as liaisons with the Gunnison Basin Gunnison Sage-grouse Strategic Committee.

Gay Austin, Andrew Breibart, and Matt Vasquez completed all NEPA requirements for federal lands. Jeff Roberts and Matt Jennings provided and trained the Conservation Corps field crews. Brian Rasmussen, with team members, organized the multi-day volunteer event. Nathan Seward provided the Miller Ranch during the volunteer event. Liz With and Andrew Breibart installed soil moisture monitors. Luann Rudolph oversaw all grants, contracts, and finances.

Special thanks for cooperating landowners Brett Redden, Rufus Wilderson, Wayne Ballantyne, ranch manager Ted Harter, and permittees for enabling these projects to be completed on private lands and for opening their lands (or leased lands) to team members and visitors. Thanks to all team members for sharing expertise, assisting with outreach events, and contributing many hours towards making the project a success. Thanks to Andrew Breibart, Chris Bove, Frank Kugel, Nathan Seward, George Sibley, Jessica Frey, Brooke Vasquez, Matt Vasquez, and Liz With for securing additional financial contributions to this project. Finally, thanks to other funders, including Wildlife Conservation Society, BLM-Gunnison Field Office, Great Outdoors Colorado, Natural Resources Conservation Service, Rocky Mountain Bird Observatory, Rocky Mountain Elk Foundation, Terra Foundation, Upper Gunnison River Water Conservancy District and US Forest Service.

Report:

This report was written by Betsy Neely, TNC, with project team input and review. Luann Rudolph provided grant and financial information. Teresa Chapman, TNC, developed the tables and GIS maps. For information or questions, please contact Betsy Neely at bneely@tnc.org.

Cover Photograph:

Western Colorado Conservation Corps celebrate the completion of a Zuni bowl and one rock dam at Chance Gulch BLM, with Bill Zeedyk, Nathan Seward and Shawn Conner. By Andrew Breibart, BLM Gunnison Field Office.

References:

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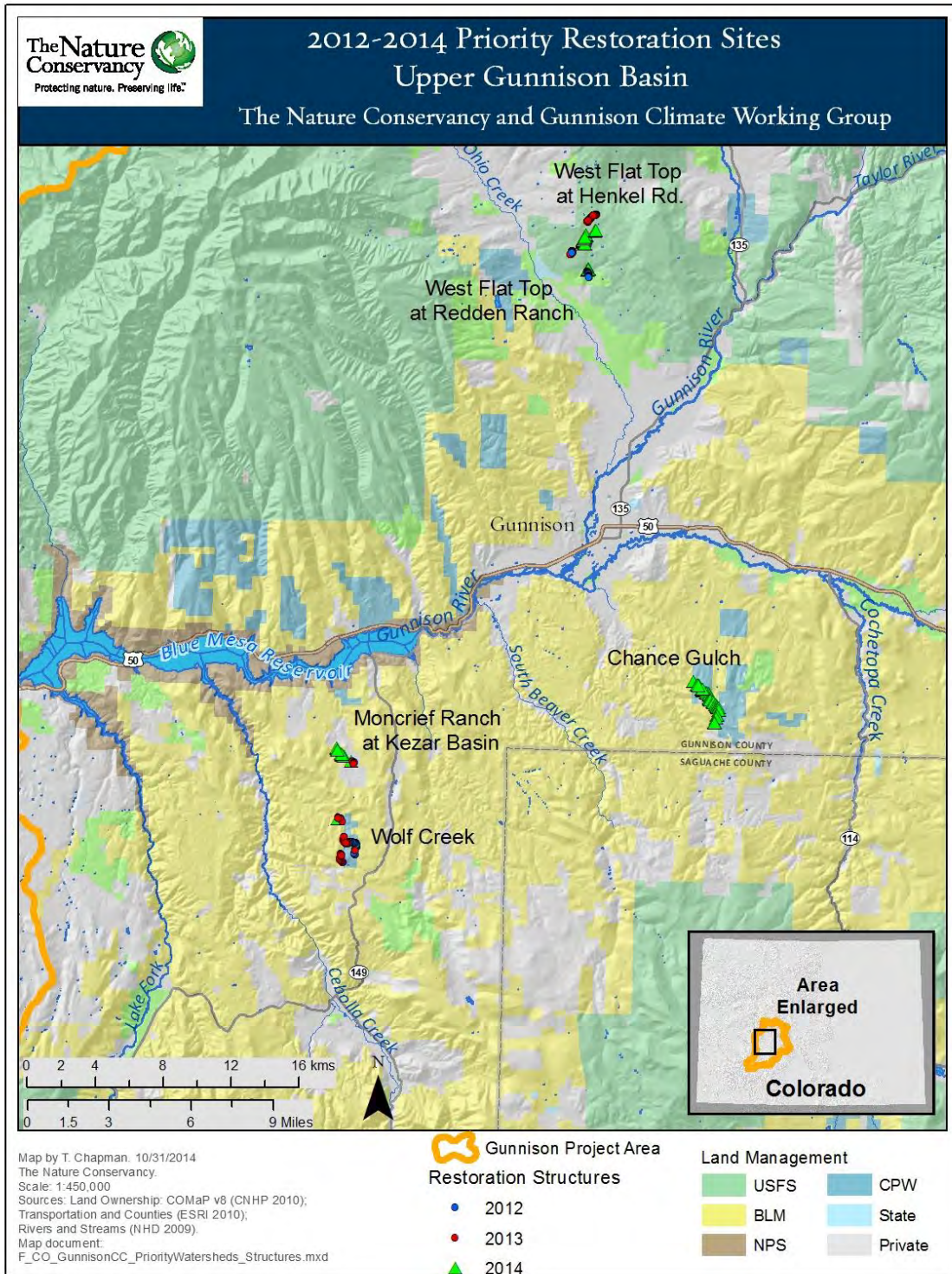
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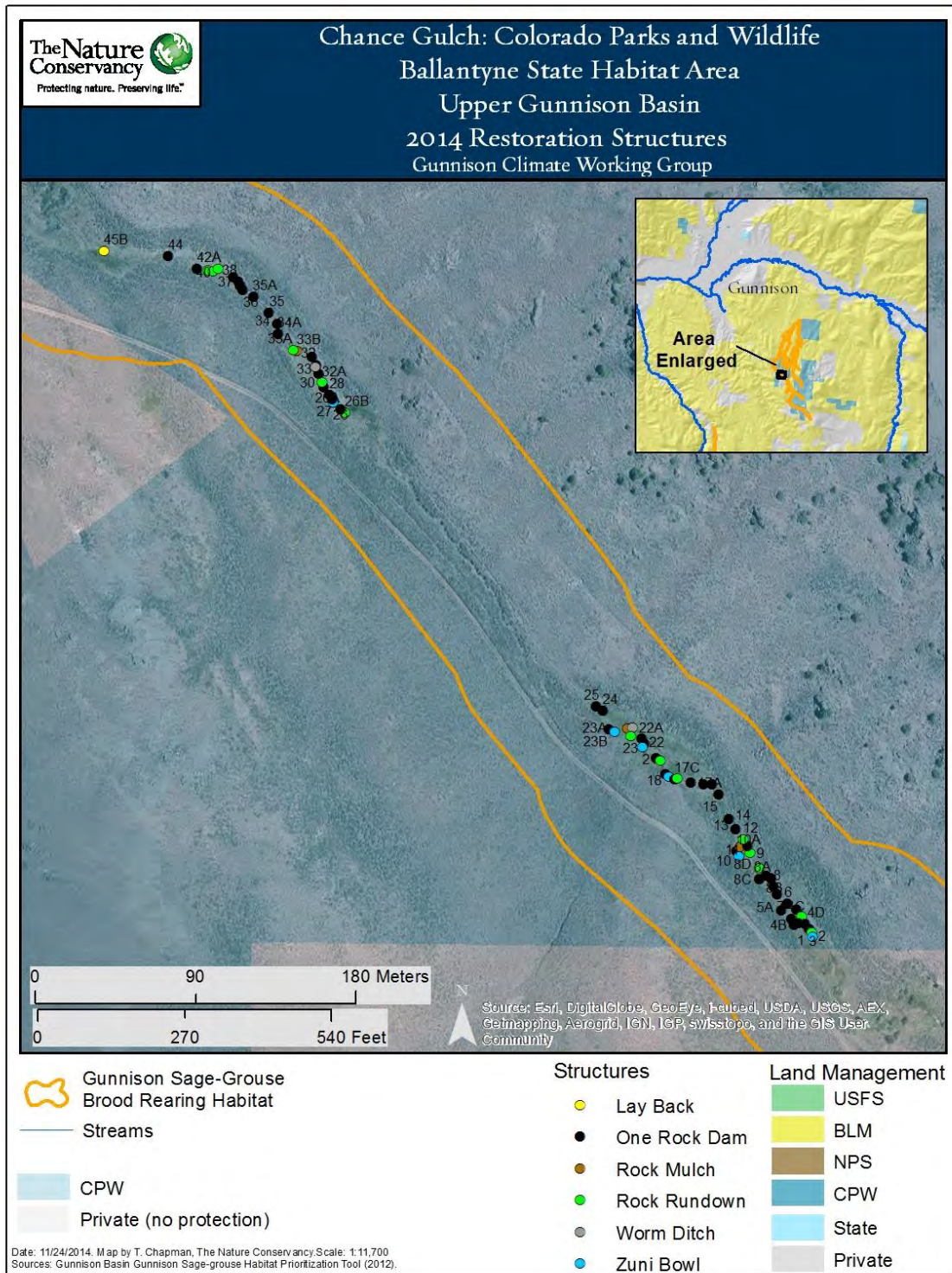
Table 4. Final Total Project Budget for *Enhancing Resilience of Riparian/Wet Meadow Habitats in the Upper Gunnison Basin, Colorado.*

	CPW Purchase Order			Leveraged Funds (Wildlife Conservation Society)			Total Project Budget		
	Budget	Expenses	Balance	Budget	Expenses	Balance	Budget	Expenses	Balance
Personnel - Salary	\$8,450.70	\$31,121.60	-\$22,670.90	\$58,806.34	\$58,806.34	\$0.00	\$67,257.04	\$89,927.94	-\$22,670.90
Personnel - Fringe	\$3,549.30	\$12,448.63	-\$8,899.33	\$24,698.66	\$24,698.66	\$0.00	\$28,247.96	\$37,147.29	-\$8,899.33
Travel	\$0.00	\$0.00	\$0.00	\$6,950.00	\$6,950.00	\$0.00	\$6,950.00	\$6,950.00	\$0.00
Supplies	\$38,000.00	\$954.18	\$37,045.82	\$6,195.00	\$6,195.00	\$0.00	\$44,195.00	\$7,149.18	\$37,045.82
Contracts	\$0.00	\$5,108.00	-\$5,108.00	\$62,833.00	\$62,833.00	\$0.00	\$62,833.00	\$67,941.00	-\$5,108.00
Construction	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Communications	\$0.00	\$367.60	-\$367.60	\$0.00	\$0.00	\$0.00	\$0.00	\$367.60	-\$367.60
Occupancy	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Other Expenses	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
TOTAL DIRECT EXPENSES	\$50,000.00	\$50,000.01	-\$0.01	\$159,483.00	\$159,483.00	\$0.00	\$209,483.00	\$209,483.01	-\$0.01
Indirect Expenses (7% for CPW)	\$3,500.00	\$3,499.99	\$0.01	\$5,417.00	\$5,417.00	\$0.00	\$8,917.00	\$8,916.99	\$0.01
TOTAL EXPENSES	\$53,500.00	\$53,500.00	\$0.00	\$164,900.00	\$164,900.00	\$0.00	\$218,400.00	\$218,400.00	\$0.00

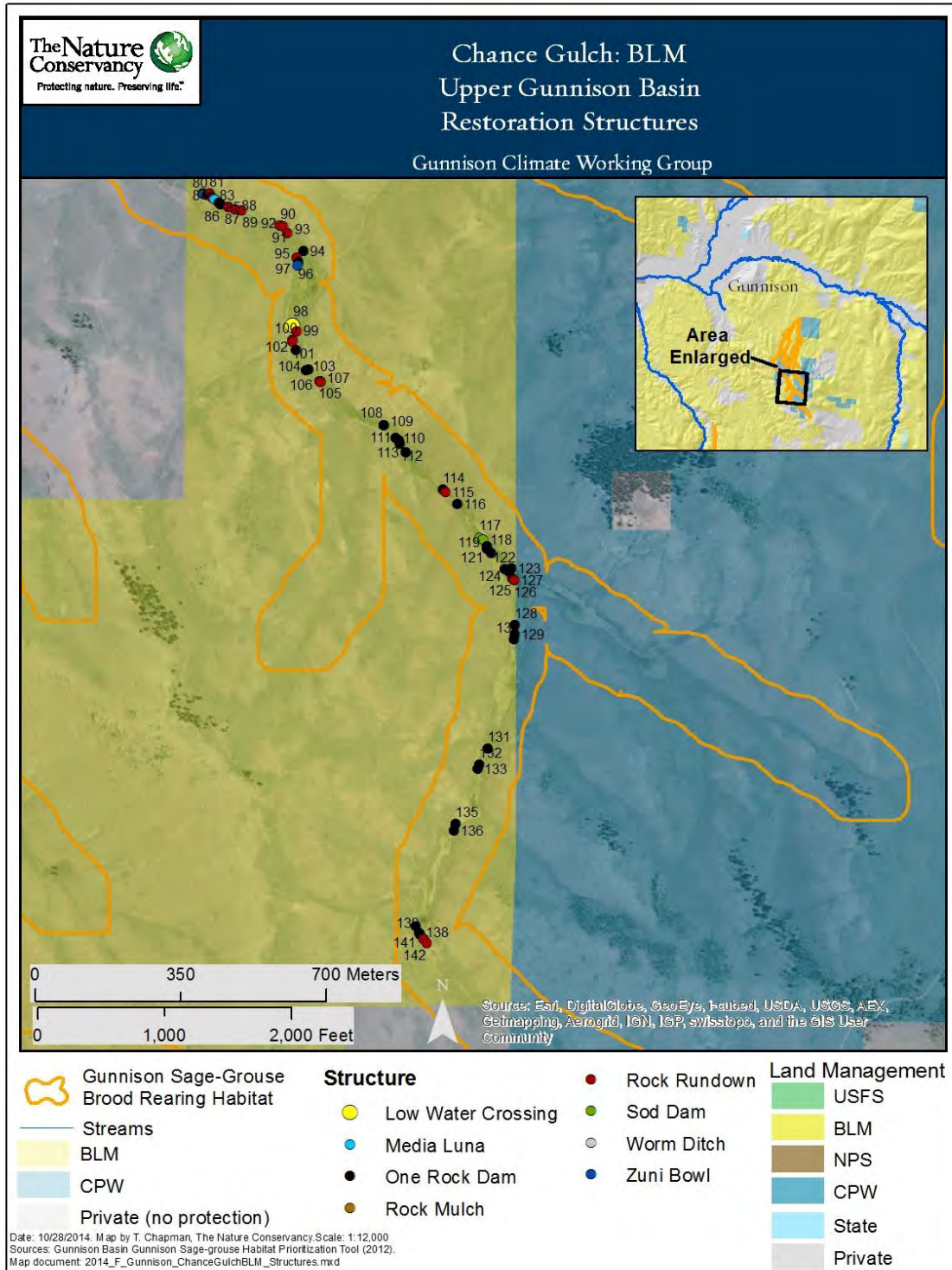
APPENDIX A: MAPS:
Map 1. Priority Restoration Sites 2012-2014



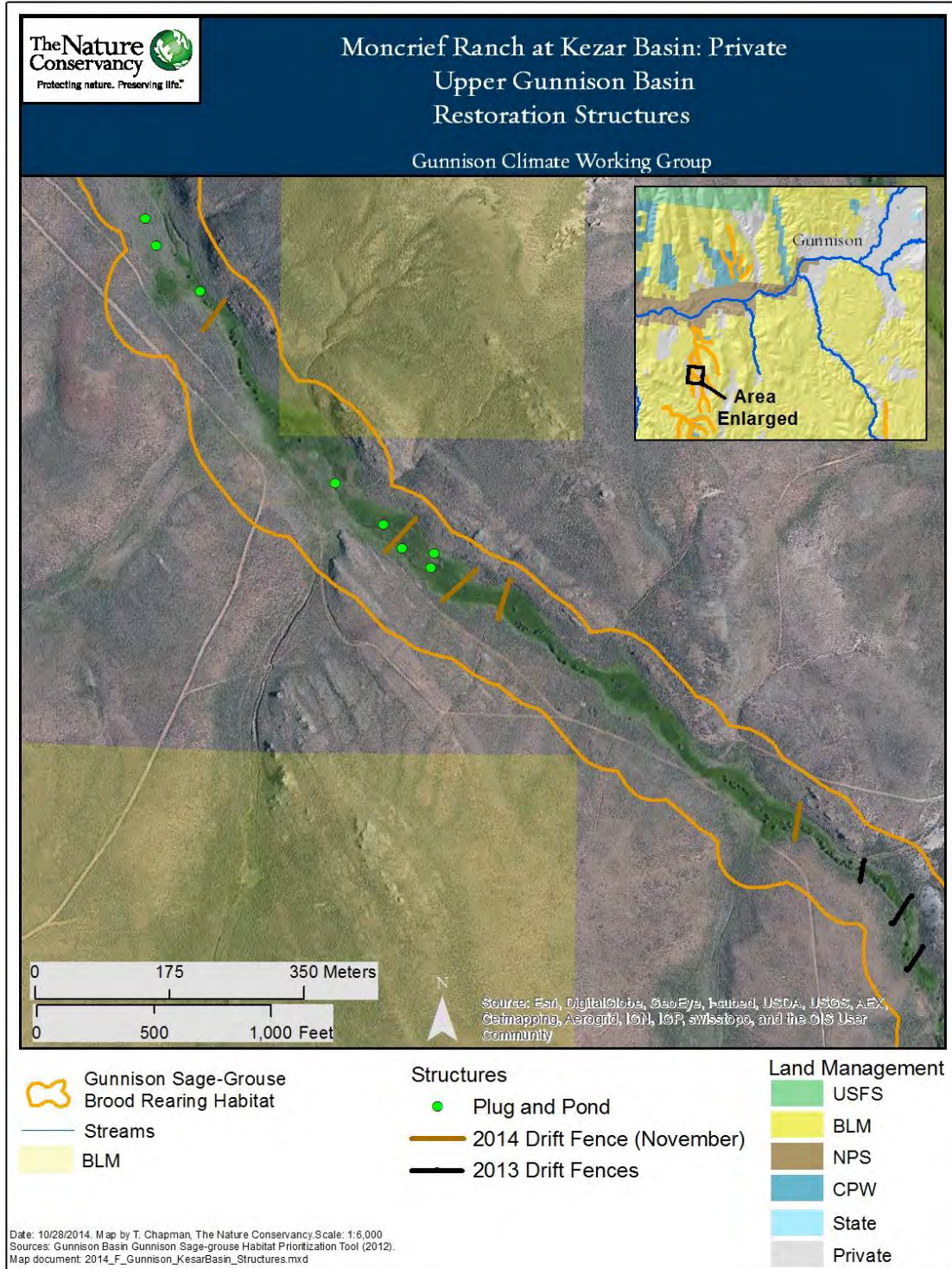
Map 2. Chance Gulch: Ballantyne State Habitat Area



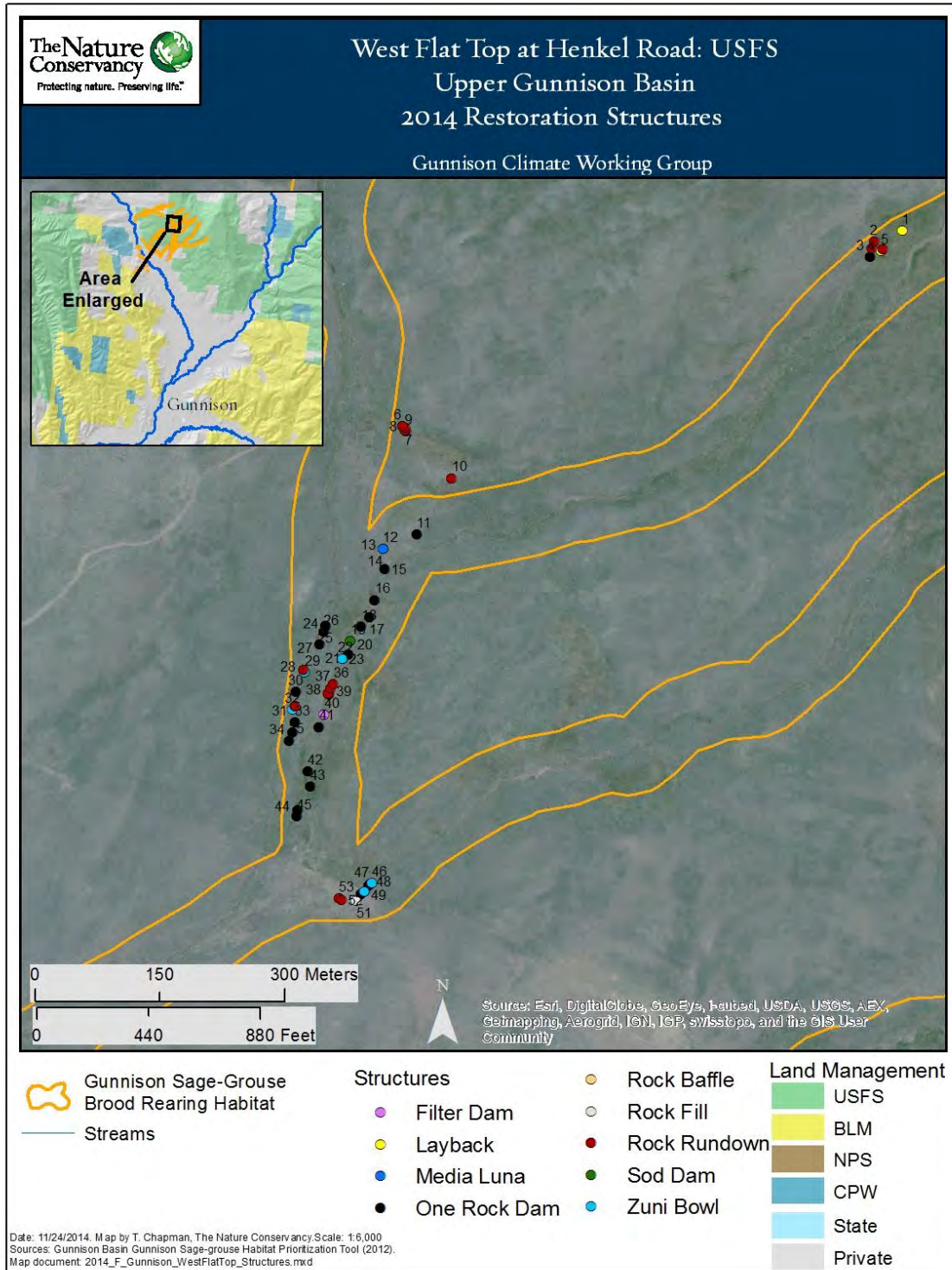
Map 3. Chance Gulch: Bureau of Land Management



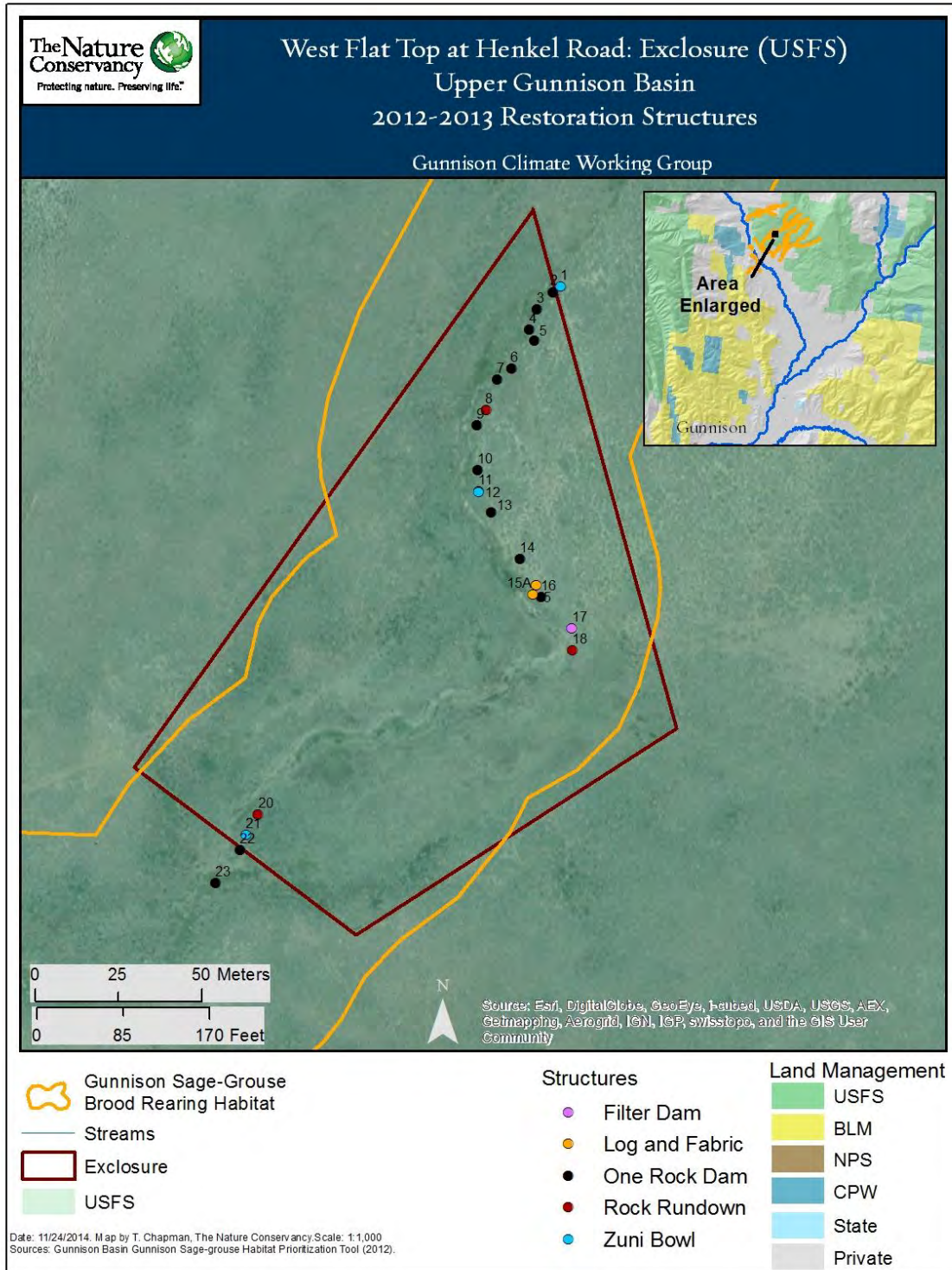
Map 4. Moncrief Ranch, Kezar Basin (Private)



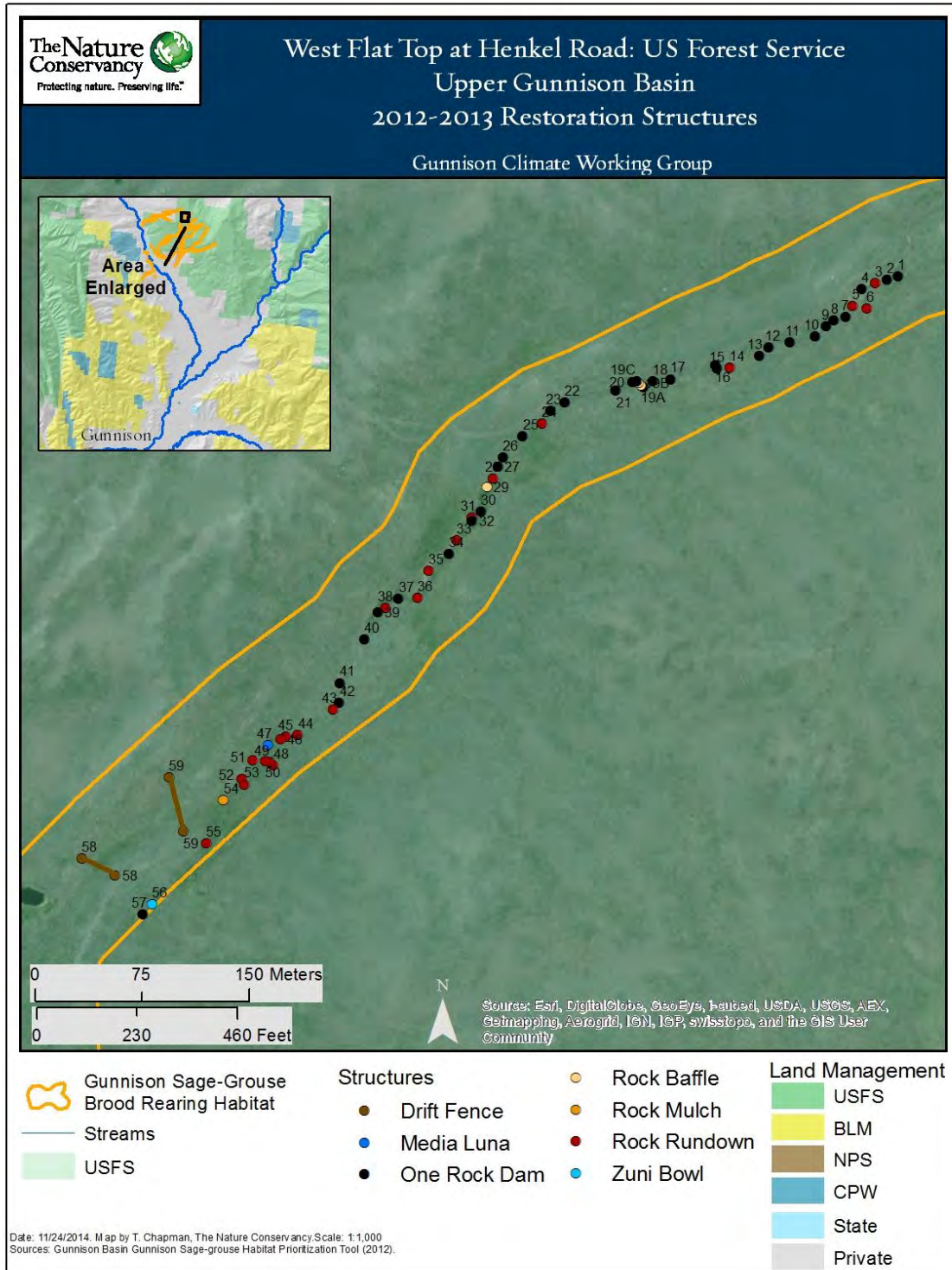
Map 5. West Flat Top at Henkel Road: US Forest Service (2014)



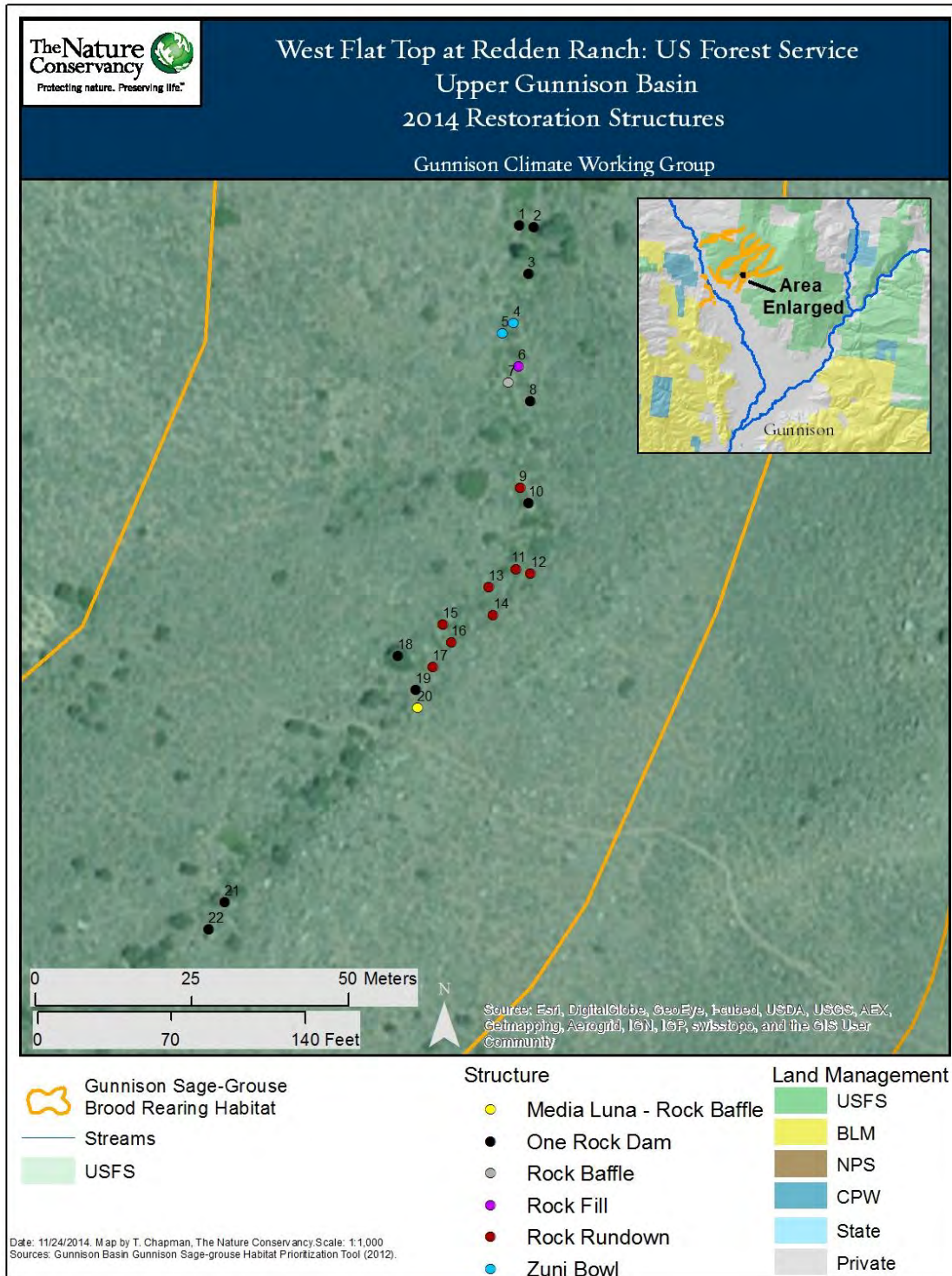
Map 6. West Flat Top at Henkel Road (Exclosure): US Forest Service



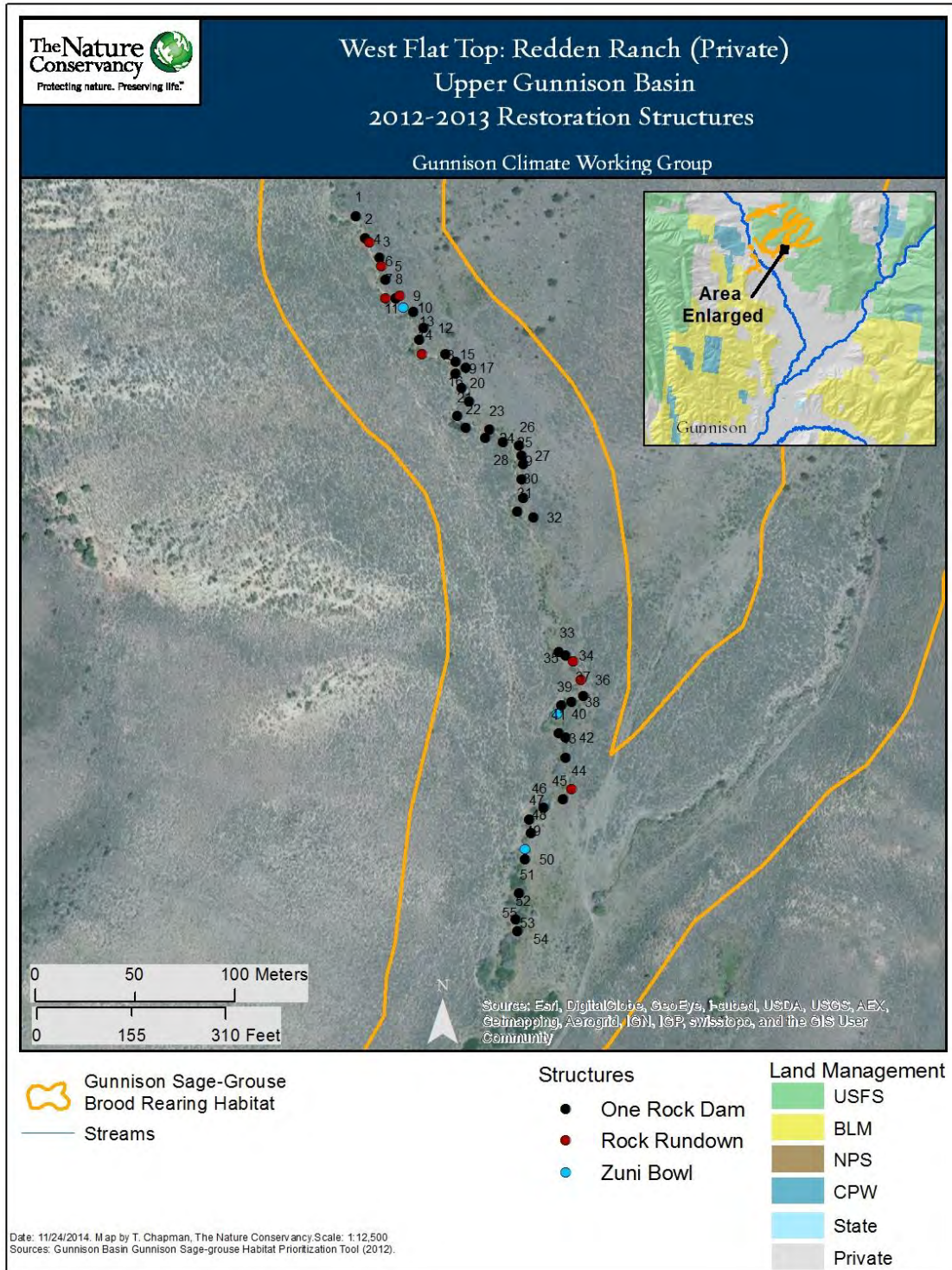
Map 7. West Flat Top at Henkel Road: US Forest Service (2013)



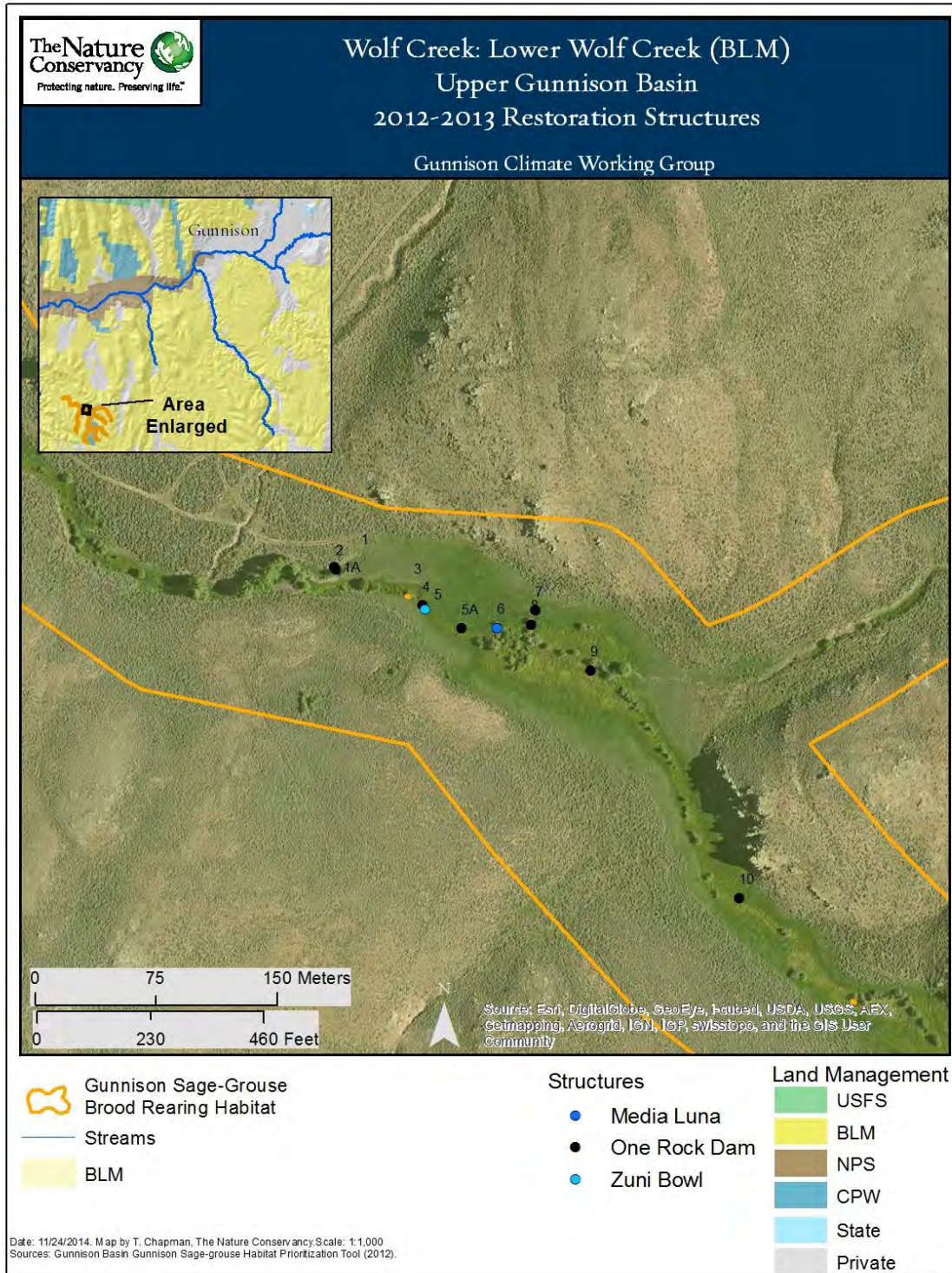
Map 8. West Flat Top at Redden Ranch: US Forest Service



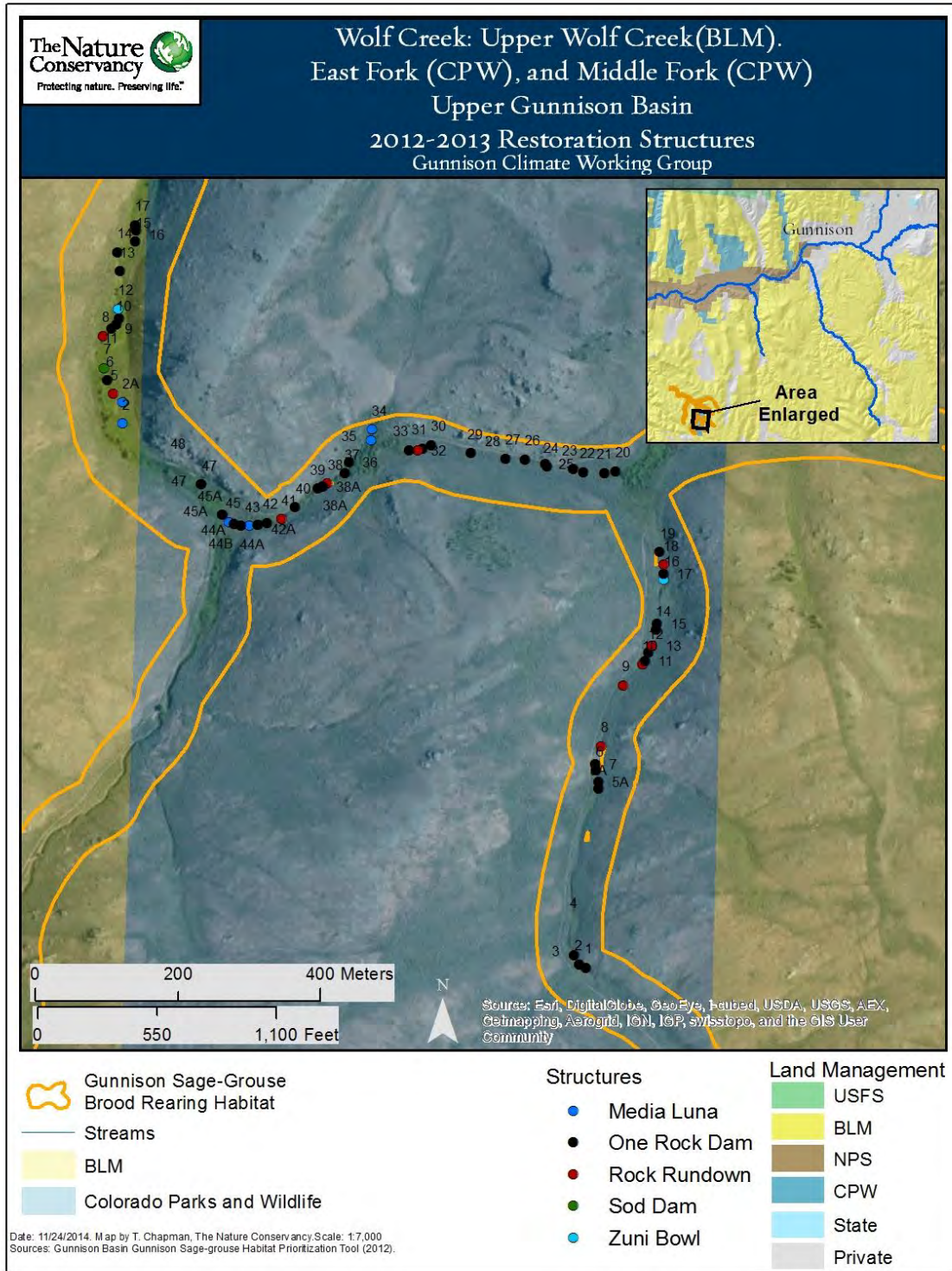
Map 9. West Flat Top at Redden Ranch: Redden Ranch (Private)



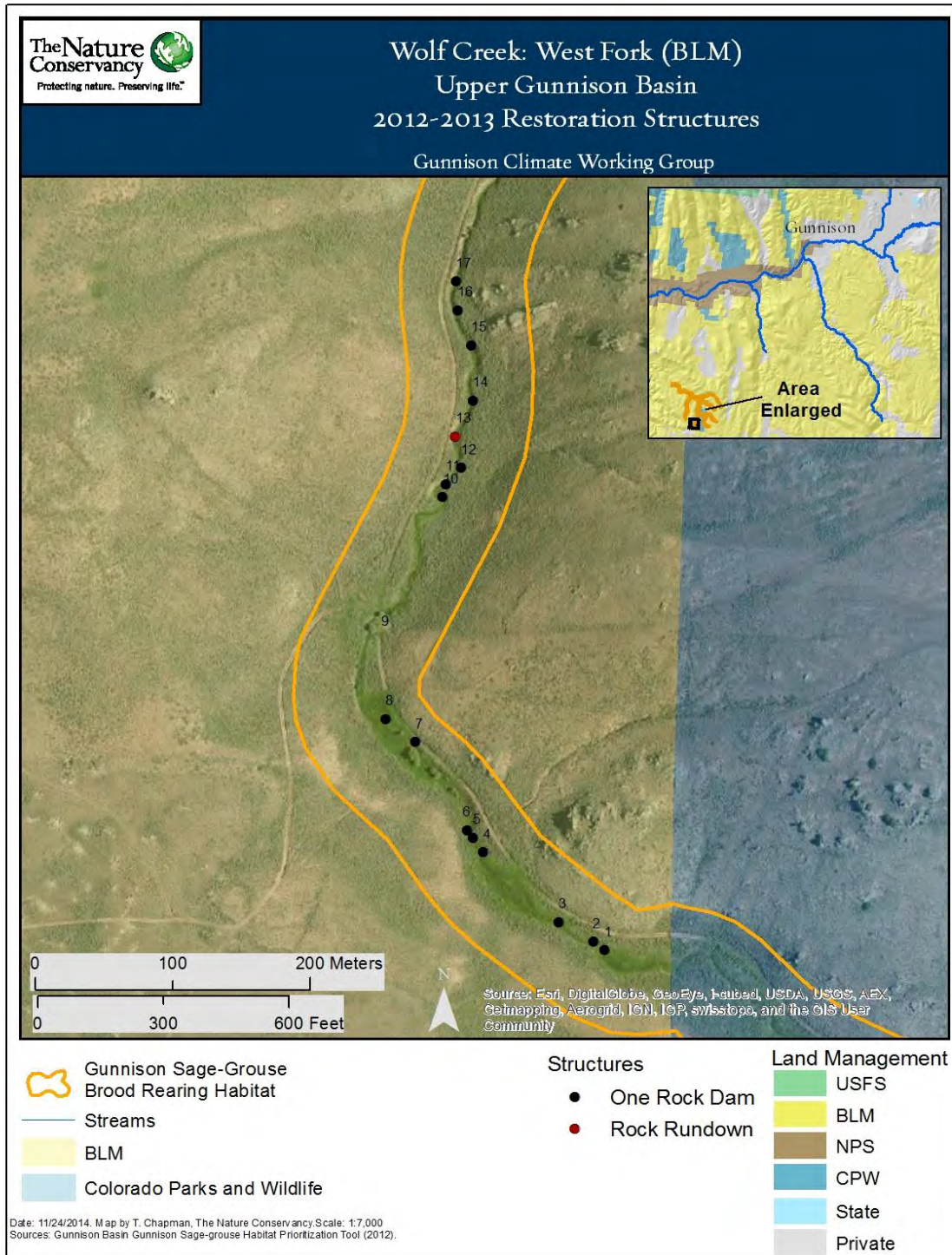
Map 10. Wolf Creek: Lower Wolf Creek (BLM)



Map 11. Wolf Creek: Upper Wolf Creek (BLM), East Fork and Middle Fork (private lands: Wolf Creek Ranch, CPW Kaichen State Habitat Area).



Map 12. Wolf Creek: West Fork (BLM)



**APPENDIX B: Enhancing Ecosystem Resilience of Riparian/Wet Meadow Habitats
In the Upper Gunnison Basin**

Restoration Sites: Upper Gunnison Basin (2012-2014)



1. CPW Ballantyne State Habitat Area, Chance Gulch, tributary of Tomichi Creek, Gunnison County.



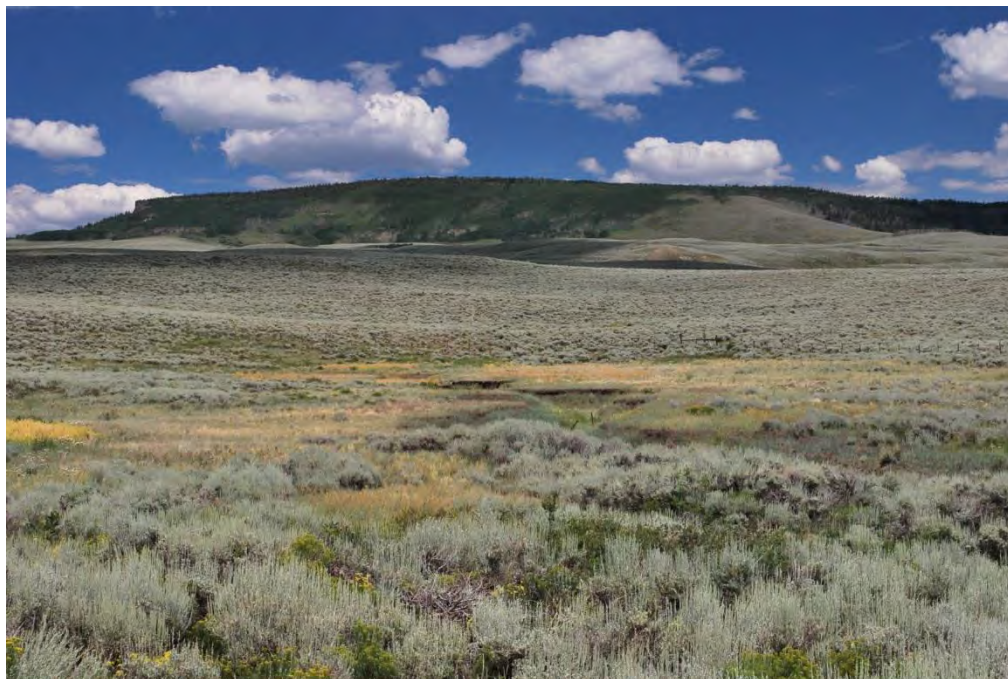
2. Moncrief Ranch, Kezar Basin, along West Smith Creek, a tributary of Cebolla Creek, south of Blue Mesa Reservoir.

**APPENDIX B: Enhancing Ecosystem Resilience of Riparian/Wet Meadow Habitats
In the Upper Gunnison Basin**

Restoration Sites



3. Alluvial fan above unnamed tributary of Ohio Creek, West Flat Top Mountain, US Forest Service lands above Redden Ranch, August 2014.



4. West Flat Top Mountain at Henkel Road, US Forest Service lands.

**APPENDIX B: Enhancing Ecosystem Resilience of Riparian/Wet Meadow Habitats
In the Upper Gunnison Basin**

Restoration Sites



5. Kaichen State Habitat Area, Wolf Creek, tributary of Cebolla Creek (photo by Claudia Strijek).



6. Redden Ranch, West Flat Top Mountain, unnamed tributary to Ohio Creek.

**APPENDIX B: Enhancing Ecosystem Resilience of Riparian/Wet Meadow Habitats
In the Upper Gunnison Basin**

Assessing Restoration Needs & Staking Structures



7. Bill Zeedyk evaluating restoration needs to address a head cut at Chance Gulch with BLM, WRV, NRCS and BIO-logic, June 2014



8. Ben Stratton, hydrologist, and Suzie Parker, biologist, US Forest Service, stake location for a one rock dam rock structure at West Flat Top Mountain, June 2014.

**APPENDIX B: Enhancing Ecosystem Resilience of Riparian/Wet Meadow Habitats
In the Upper Gunnison Basin**

Hauling Rock to Restoration Sites & Low Water Crossing



9. Gunnison Gravel delivering rock to staging area at Chance Gulch, July 2014.



10. Gunnison Gravel front-end loader builds a low water crossing at Chance Gulch, August 2014.

**APPENDIX B: Enhancing Ecosystem Resilience of Riparian/Wet Meadow Habitats
In the Upper Gunnison Basin**

Monitoring Vegetation Response



11. Gay Austin, Bureau of Land Management, reads vegetation transect, while Wendy Brown, local volunteer, inputs data onto iPad in Chance Gulch, August 2014.



12. Renee Rondeau, Colorado Natural Heritage Program, and Gay Austin, Bureau of Land Management, identify a plant during the vegetation monitoring at Chance Gulch, August 2014.

APPENDIX B: Enhancing Ecosystem Resilience of Riparian/Wet Meadow Habitats
In the Upper Gunnison Basin

Field Tour and Training for Partners & Field Crews



13. Bill Zeedyk, restoration expert, leads field tour of Wolf Creek for representatives of Western State Colorado University, Upper Gunnison River Water Conservancy District, and others as part of training to kick off the field season, August 2014.



14. Hands-on training by Bill Zeedyk with Western Colorado Conservation Corps youth field crew members and Chayla Rowley, Natural Resources Conservation Service engineer, August 2014.

**APPENDIX B: Enhancing Ecosystem Resilience of Riparian/Wet Meadow Habitats
In the Upper Gunnison Basin**

WCCC Completes Rock Structures



15. Western Colorado Conservation Corps, Nathan Seward, CPW, Bill Zeedyk and Shawn Conner celebrate completion of a Zuni bowl (center) with one rock dam (foreground) at Chance Gulch, August 2014. Photo: Andrew Breibart, BLM.



16. Western Colorado Conservation Corps field crew complete one rock dam structure at West Flat Top Mountain on US Forest Service lands above Redden Ranch, consisting of locally collected volcanic rock, August 2014.

**APPENDIX B: Enhancing Ecosystem Resilience of Riparian/Wet Meadow Habitats
In the Upper Gunnison Basin**

Other Restoration Techniques



17. Stonefly Earthworks builds a “double bay plug and pond” structure at Moncrief Ranch, Kezar Basin, to rewet a meadow and reduce invasive species. NRCS planted native seed on the disturbed soil, September 2014.



18. Ted Harter, Ranch Manager, Moncrief Ranch, inspects a drift fence, a line of fence placed across the stream channel, to reduce trailing and soil compaction by livestock and wildlife.

**APPENDIX B: Enhancing Ecosystem Resilience of Riparian/Wet Meadow Habitats
In the Upper Gunnison Basin**

Community Multi-Day Volunteer Event



19. Gunnison High School Biology Class students and teachers build a one rock dam at Chance Gulch, Wildlands Restoration Volunteer event, September 2014.



20. Wildlands Restoration Volunteers Crew Leader Mark Flower hauls rock with help of volunteers on West Flat Top Mountain, US Forest Service lands, September 2014.

**APPENDIX B: Enhancing Ecosystem Resilience of Riparian/Wet Meadow Habitats
In the Upper Gunnison Basin**

Community Multi-Day Volunteer Event



21. Western State Colorado University Ecological Monitoring class completes a one-rock dam in Chance Gulch, directed by Nathan Seward, CPW (in background).



22. Wildlands Restoration Volunteer Crew Leader Clayton BonDurant (low center) and volunteers complete Zuni bowl to control a head cut on West Flat Top Mountain on US Forest Service lands, September 2014.

APPENDIX B: Enhancing Ecosystem Resilience of Riparian/Wet Meadow Habitats
In the Upper Gunnison Basin

Community Multi-Day Volunteer Event & Outreach



23. Bill Zeedyk explains the function of a one rock dam, a grade control structure, to volunteers and partners at West Flat Top Mountain during the Wildlands Restoration Volunteer five-day volunteer event, September 2014.



24. Andrew Breibart, BLM hydrologist, leads a field tour of Chance Gulch restoration structures for Western State Colorado University Masters of Environmental Management students, August 2014.

APPENDIX B: Enhancing Ecosystem Resilience of Riparian/Wet Meadow Habitats
In the Upper Gunnison Basin

Outreach Activities



25. Shawn Conner, BIO-Logic, explains the restoration techniques to the Western Colorado Conservation Corps field crews, US Forest Service, National Park Service and other partners at West Flat Top above Redden Ranch, USFS. August 2014.



26. Bill Zeedyk and Liz With-NRCS lead field tour of Kezar Basin for Colorado State University graduate students, NRCS and the Gunnison Conservation District.

**APPENDIX B: Enhancing Ecosystem Resilience of Riparian/Wet Meadow Habitats
In the Upper Gunnison Basin**

Team Members & Restoration Experts



27. Project team (from lower left): Andrew Breibart-BLM, Jim Cochran-Gunnison County, Matt Vasquez-USFS, Renee Rondeau: CNHP, Betsy Neely-TNC, Gay Austin-BLM and Nathan Seward-CPW (with daughter Reilly). With Ian Davidson, NFWF (upper left). Photo by Luann Rudolph, TNC.



28. Restoration experts Shawn Conner, BIO-Logic, Inc. and Bill Zeedyk, Zeedyk Ecological Consulting discussing placement of rock structures in Chance Gulch.

APPENDIX B: Enhancing Ecosystem Resilience of Riparian/Wet Meadow Habitats
In the Upper Gunnison Basin

Before and After Photographs



29, 20, 31. Before and after pictures of Kaichen State Habitat Area, Wolf Creek Ranch meadow showing building of media luna, one year later and two years later. The media luna was effective in spreading water across a drying meadow, increasing native wetland plants such as beaked sedge, and reducing invasive species such as Canada thistle. Photographs by Renee Rondeau, CNHP and Betsy Neely, TNC.

2012



2013



2014

**APPENDIX B: Enhancing Ecosystem Resilience of Riparian/Wet Meadow Habitats
In the Upper Gunnison Basin**

Before and After Photographs



32, 33, 34. Photographs taken about 100 yards below a media luna, Kaichen State Habitat Area, Wolf Creek Ranch, along Wolf Creek, an intermittent tributary of Cebolla Creek. Photographs by Renee Rondeau, CNHP.

2012: Sedges were limited to far left (top)



2013: Sedges have increased towards the right (middle)



2014: Sedges have increased all the way to the right and standing water was approximately one inch deep or deeper throughout the area (bottom)

APPENDIX B: Enhancing Ecosystem Resilience of Riparian/Wet Meadow Habitats
In the Upper Gunnison Basin

Before and After Photographs



2013



2014

35, 36. Repeat photograph of a meadow with drift fences built in 2013 across a meadow at West Flat Top on USFS lands. Preliminary results indicate that the fences are effective in diverting cattle from their trail, reducing trailing and soil compaction. Renee Rondeau, CNHP.

APPENDIX B: Enhancing Ecosystem Resilience of Riparian/Wet Meadow Habitats
In the Upper Gunnison Basin

Before and After Photographs



2013



2014

37, 38. Picture taken shortly after installation and one year later showing positive response to a Zuni bowl (above near fence), built to control a head cut, and a one rock dam (below), built to capture sediment to raise the bed of the channel, and recruit vegetation on West Flat Top Mountain on US Forest Service lands. Photographs by Renee Rondeau, CNHP.

APPENDIX B: Enhancing Ecosystem Resilience of Riparian/Wet Meadow Habitats
In the Upper Gunnison Basin

Before and After Photographs



2013



2014

39-40. Control (transect placed above treatment area) on BLM lands at Wolf Creek, a tributary to Cebolla Creek. Photographs by Renee Rondeau, CNHP.

APPENDIX B: Enhancing Ecosystem Resilience of Riparian/Wet Meadow Habitats
In the Upper Gunnison Basin

Before and After Photographs



2012



2013

41-42, Redden Ranch: One rock dam before installation and one year later. Note the grasses are filling in above and within the structures. Photographs by Renee Rondeau, CNHP.