Progress Report to Terra Foundation

Restoration/Resilience Building of Riparian and Wet Meadow Habitats In the Upper Gunnison Basin

Period: January 1, 2014 – October 31, 2014
The Nature Conservancy
with the Gunnison Climate Working Group
October 31, 2014

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The Terra Foundation grant has enabled The Nature Conservancy, with the Gunnison Climate Working Group, to launch the second phase of an innovative climate-informed restoration project: *Restoration/Resilience Building of Riparian and Wet Meadow Habitats in the Upper Gunnison Basin*. This project builds on the best practices and lessons learned from a two-year pilot (demonstration) project and aims to significantly scale up the project across the Gunnison Basin. Below is a summary of key accomplishments to date.

Background

In late 2013, the Gunnison Climate Working Group (GCWG)[1], a public-private partnership working to reduce the impacts of a changing climate in the Gunnison Basin, completed a two-year pilot restoration project to enhance ecosystem resilience of riparian and wet meadow habitats in sagebrush shrublands to help the Gunnison Sage-grouse adapt to a changing climate. These areas are also important habitat for wetland plants and other wildlife species, e.g., neo-tropical migratory birds, mule deer, elk, and provide important forage for domestic livestock. A number of these areas are already compromised by lowered water tables and erosion; these areas are likely to be further altered by drought, invasive species, and erosion from intense runoff events.

In January 2014, The Nature Conservancy, in collaboration with the GCWG, launched the second phase of this riparian restoration/resilience building project to significantly scale up efforts across the Gunnison Basin. The pilot project served as an important demonstration of simple and effective tools for restoring and increasing resilience of wet meadow and riparian ecosystems over 10 stream miles. However, we only touched a fraction of what needs to be restored and enhanced, as there are many incised channels and degraded streams across the basin that would benefit from restoration treatments. The restoration techniques provide significant results that have potential to improve hydrologic and ecologic function over a much larger watershed-wide scale.

[1] 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, 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 Project Team[2], a subset of members of the GCWG, is using innovative yet simple restoration methods, e.g., rock structures, filter dams, plug and pond structures, and drift fences, designed by Bill Zeedyk, Zeedyk Ecological Consulting, to restore hydrologic and ecologic function of streams. Thus far, the team has applied these techniques in drainages on Bureau of Land Management (BLM), US Forest Service (USFS), and Colorado Parks and Wildlife (CPW) lands, as well as private ranches. The structures are intended to raise the water table, connect the channel to the floodplain, and increase wetland plant cover. Early response to structures is quite promising, as the structures are starting to capture sediments and hold/spread water, enabling wetland species to expand.

Summary of Accomplishments

In early 2014, the team convened to develop a vision, goals and objectives for scaling up the project, prioritize places to work in the near-term, develop site selection methods for long-term prioritization of sites, and plan for the field season. The Conservancy also organized several meetings to introduce Audubon to the project team and ranchers and discuss their role in monitoring migratory songbirds and educational school programs.

In the late spring and early summer, the team designed specific treatments for the following priority sites: 1) Chance Gulch; 2) Kezar Basin; 3) West Flat Top at Henkel Road; and 4) West Flat Top above Redden Ranch. In addition, the team identified repair and maintenance work needed at several sites, including Lower Wolf Creek. The team also designed restoration work at Sage Hen Gulch, a priority for 2015 work.

The Conservancy also completed landowner agreements for private lands at Ballantyne and Lypps-Ballantyne State Habitat Areas with assistance by Nathan Seward, CPW. Additionally, we secured contracts for the following: 1) Zeedyk Ecological Consulting and BIO-Logic to design and oversee installation of restoration treatments; 2) BIO-Logic to delineate wetlands and US Army Corps of Engineers 404 permit applications; 3) Colorado Natural Heritage Program (CNHP) to conduct rapid field assessments of new sites and monitor vegetation; 4) Western Colorado Conservation Corps (WCCC) to build rock structures; 5) Wildlands Restoration Volunteers (WRV) to organize a multi-day volunteer event; and 6) Gunnison Gravel for rock supplies and transportation of rock to the sites.

In August, the monitoring team conducted vegetation monitoring along a total of 175 transects that includes representation from all sites and all years (2012-2014). Natural Resources Conservation Service (NRCS) soil scientists installed hydrologic monitoring stations at two sites. BLM installed piezometers at two sites.

Bill Zeedyk led a training in early August to kick-off installation of rock structures for over 40 youth field crews, agency partners, NGOs, community members, volunteers, and local universities. Following the training, restoration experts, with BIO-Logic, BLM, USFS and CPW,

[2] 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), 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).

provided hands-on training and oversight to field crews during the month of August. WRV recruited over 85 volunteers from the Gunnison Basin and across Colorado to build structures over a five day event; team members provided technical expertise and oversight. Restoration experts, working with Stonefly Earthworks, designed and built eight plug and ponds and identified locations for five drift fences. Over the summer, youth field crews, partners, volunteers, and contractors installed restoration structures at the five sites.

Restoration techniques include rock structures, e.g., one rock dams, rock rundowns, laybacks, media lunas, rock baffles, filter dams, Zuni bowls, and low water crossings (Zeedyk and Clothier 2014). Drift fences are also being used to reduce trailing and compaction of wetland soils 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. This method has been effectively used in New Mexico, Texas, and other states.

The team made several presentations to agency partners and at conferences, e.g., Gunnison Basin Gunnison Sage-grouse Strategic Committee, Tamarisk Coalition's Riparian Restoration Conference, USFS Region II Biologists, and Sustaining Colorado's Watersheds. The team organized field tours for federal and state agencies, including the BLM's Natural Resources Branch Chief, CPW's Information Officers and Biologists, Colorado State University (CSU) graduate class, Gunnison Conservation District (GCD), National Fish and Wildlife Foundation (NFWF), NRCS, San Miguel Gunnison Sage-grouse Working Group, TNC's Board of Trustees, Upper Gunnison River Water Conservancy District (UGRWCD), Western State Colorado University (WSCU) and US Army Corps of Engineers. The NRCS and CPW also organized a meeting to recruit new landowners/ranchers for future restoration work.

To raise matching funds, the Conservancy submitted proposals to the BLM, Great Outdoors Colorado (GOCO), NRCS, USFS and UGRWCD. These proposals were approved and to date, we have raised $181,500 for this project.

Finally, the Conservancy hosted a meeting in October with 24 team members, contractors and partners, to review the accomplishments and lessons learned from the 2014 field season, review results of the climate-informed GIS site selection analysis to prioritize sites for long-term restoration treatment, review the results of rapid field assessments, and begin development of a long-term monitoring strategy in collaboration with WSCU.

Details of Project Accomplishments

1. <u>Design and install restoration treatments at 2014 priority sites and plan for 2015 work:</u>
    a. Staked restoration structures, documented type, size, location and objectives for structures, and determined amount of rock supplies needed at the following priority sites for 2014 (numbers are preliminary and will be finalized in November):
        - Chance Gulch (Ballantyne State Habitat Area and BLM): 140 rock structures
        - West Flat Top at Henkel Road USFS: significant expansion and repair/maintenance. 50 rock structures
        - West Flat Top above Redden Ranch USFS: 20-25 rock structures

- Moncrief Ranch, Kezar Basin: 8 plug and ponds and 5 new drift fences.
- Lower Wolf Creek BLM: completed 2 media lunas for Public Lands Day.
- Other sites to be included for 2015 work include: Sage Hen Gulch BLM, Sage Hen and Graflin Gulches (Lypps-Ballantyne State Habitat Area) private lands, Redden Ranch and Wolf Creek Ranch (Kaichen State Habitat Area): repair/maintenance and expansion.

b. Completed agreements with landowners for both Ballantyne State Habitat Area and Lypps-Ballantyne State Habitat Area.
c. Completed a US Army Corps of Engineers Nationwide Permit #27 application jointly for Chance and Sage Hen Gulches, wetland delineation of Redden Ranch, and documented a Clean Water Act 404 exemption under a Memorandum of Understanding for Moncrief Ranch, Kezar Basin.
d. Zeedyk, BLM, CPW, BIO-Logic and USFS directed work by WCCC during the month of August and volunteers during a multi-day volunteer event from Sept. 3-7, including field crew leader training on Sept. 3-4.
e. Summary of work completed:
    - WCCC field crews worked a total of 1,351 hours and built 132 structures (working 40 hour weeks with crews between 6-11 team members) at Chance Gulch and West Flat Top.
    - WRV volunteers worked approximately 1,006 hours and built 60 structures (from small to very large), moved over 81 cubic yards (approximately 100 tons of rock!) at West Flat Top and Chance Gulch.
    - BLM led a group of WSCU students on Public Lands Day to maintain two media lunas at Lower Wolf Creek.
    - CPW led a WSCU class taught by Dr. Jonathan Coop on restoration practices and built 9 rock structures at Chance Gulch.
    - Stonefly Earthworks, with BIO-Logic and Zeedyk Ecological Consulting, completed 8 plug and pond structures at Moncrief Ranch.

2. <u>Rapid field assessment of sites for future work:</u>
    a. CNHP completed rapid field assessment and documentation of sites for potential 2015 work to determine restoration need and priority with BLM, USFS, and CPW.
    b. Sites included Sage Hen Gulch, Sapinero Mesa, Monson Gulch, Willow Creek, Camp Creek and South Parlin.

3. <u>Contracts:</u>
    a. Zeedyk Ecological Consulting: design restoration treatments, train and oversee work of partners, volunteers and field crews.
    b. BIO-Logic: design and implementation of restoration project across all sites, conduct wetland delineation of Redden Ranch for US Army Corps of Engineers 404 permit application, and documentation for a 404 permit exemption under an EPA-DOA and USDA Memorandum of Understanding for Moncrief Ranch.
    c. CNHP: conduct rapid field assessments, provide ecological expertise and complete vegetation monitoring.
    d. WCCC: field crew worked all of August staging rock and building rock structures.

e. WRV: organize a fall multi-day volunteer event, to recruit volunteers, and train field crew leaders, from September 3-7, 2014.
f. Gunnison Gravel: rock supplies and staging.
g. GCD developed contracts for restoration work at Moncrief Ranch, with match from CPW and TNC.

4. Outreach activities, field tours, and/or presentations:
    a. Organized calls and meetings to introduce Audubon's staff to Gunnison County, NRCS, and the UGRWCD, Gunnison Basin Gunnison Sage-grouse Strategic Committee, and local ranchers to discuss role and contributions to the project.
    b. Organized field tour with US Army Corps of Engineers, NFWF, WSCU, UGRWCD, CMC, CPW, CSU, San Miguel Gunnison Sage-grouse Working Group, NRCS, GCD, BLM State Office and Gunnison Field Office, and Gunnison High School.
    c. Gave presentations to the Gunnison Basin Gunnison Sage-grouse Strategic Committee, USFS Rocky Mountain Region II biologists, TNC's Board of Trustees, and the USFS and University of Loja, Ecuador researchers, Tamarisk Coalition's Riparian Restoration Conference, and Sustaining Colorado Watersheds Conference. Planned presentation at upcoming Quivira Coalition annual meeting in NM.
    d. Shared best practices with other Gunnison Sage-grouse working groups, e.g., San Miguel, Crawford, and San Luis Valley.
    e. Organized Public Lands Day with WSCU class to build structures at Lower Wolf Creek (BLM led).

5. Training for youth field crews, partners and community members:
    a. Organized restoration techniques training, including lecture and field tour for 40 participants on Aug. 4-5, 2014.
    b. Participants included: BLM, Colorado Mountain College (CMC), CNHP, CPW, GCD, Gunnison County, Lake Fork Valley Conservancy, National Park Service (NPS), NRCS, San Miguel Gunnison Sage-grouse Working Group, Tamarisk Coalition, Trout Unlimited, UGRWCD, WCCC, WSCU, Youth Conservation Corps, USFS, US Fish and Wildlife Service (USFWS), Wetland Dynamics, LLC.
    c. The training was followed by a hands-on training and oversight of field crews during the month of August by team members.

6. Multi-day volunteer event with WRV:
    a. Held field crew leadership and technical training for prospective crew leaders and provided hands-on training for volunteers over five days in early September.
    b. 86 volunteers contributed over 1,006 hours (equivalent of 136 volunteer days), building 60 structures at two sites.
    c. Groups represented BLM, BIO-Logic, Gunnison High School, WSCU, CMC, WRV, BLB, CPW, UGRWCD, San Miguel Basin Gunnison Sage-grouse Working Group, High Country Conservation Alliance, USFS, community members and others.

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7. Monitoring:
    a. The monitoring team, consisting of CNHP, BLM and USFS, established new vegetation monitoring transects at four sites: Chance Gulch, West Flat Top at Henkel Road, West Flat Top above Redden Ranch, and Moncrief Ranch, Kezar Basin.
    b. Reread vegetation monitoring transects at Wolf Creek, West Flat Top, and Redden Ranch.
    c. Installed eight groundwater wells in Wolf Creek on public and private lands and in Chance Gulch.
    d. Installed two moisture and two temperature sensors in treated and untreated areas of Kezar Basin. BLM purchased 10 piezometers and temperature sensors to measure the degree of saturation within treated areas.
    e. Developed draft strategy for long-term monitoring program and discussed with team at October meeting.

8. Climate-informed site selection analysis to prioritize sites for future restoration treatment.
    a. Developed methods for climate-informed GIS site selection analysis to identify and prioritize stream reaches needing restoration.
    b. Compiled relevant data layers from team members and other sources, and refined GIS analysis with team input.
    c. Held Oct. 16th project team to review, add local knowledge, restoration needs and prioritize sites for future work. Identified 13 priority watersheds for rapid ecological assessments of selected stream reaches to determine restoration need and feasibility.

Funding and Partner Contributions

The Conservancy completed final proposals and agreements with NRCS, USFS, BLM, CPW and GOCO totaling $209,137 to provide direct leverage to the Terra Foundation grant. The Conservancy also secured a small donation from a private donor to be used for this project. Amounts contributed by each party are as follows:

1. NRCS for $75,000[3]
2. USFS: $23,500
3. BLM: $37,500
4. GOCO: $25,000
5. Private donor: $5,000
6. CPW: $43,137.

Other partner contributions towards the project have totaled at least $45,741 and include the following:

1. GCD received a $10,000 grant from the CPW Habitat Partnership Program for expanding restoration work in Moncrief Ranch, Kezar Basin (for reducing conflicts between elk and livestock).
2. CPW contributed $4,900 towards restoration expert Bill Zeedyk's time for work in Kezar Basin.
3. UGRWCD contributed $5,500 toward the procurement of rock supplies.

[3] NRCS has obligated $25,000 in FY 14 with intentions to add $25,000 in funding each year for the next two years.

4. BLM contributed $12,000 to cover the costs of field crews for two weeks (payment directly to the WCCC).
5. BLM secured approximately $5,000 for rock supplies from Rocky Mountain Elk Foundation.
6. BIO-Logic, Inc. contributed $6,441 in travel and services at a discounted rate and Zeedyk Ecological Consulting contributed $1,900 in the form of services at a discounted rate.
7. USFS, BLM and CPW contributed in-kind services of staff time, oversight of field crews, and expertise on the project.
8. USFS hired youth field crews (Youth Corps) for two weeks to stage rock.
9. CPW provided Miller Ranch for out of town volunteers, a UTV for hauling rock, and a 4WD vehicle for the volunteer event.
10. NPS contributed a dump truck for transporting rock to the sites.
11. Gunnison County provided meeting space, landowner contacts and technical assistance.
12. UGRWCD provided meeting space, funding for rock supplies, assistance with recruiting volunteers and outreach activities.

Next Steps

1. Complete construction of five drift fences in Kezar Basin- Moncrief Ranch and plant native seed on the plug and ponds.
2. Complete reports to other funders, i.e., CPW in November 2014, and USFS and BLM in December 2014, including final numbers and types of structures, and analysis of acres and stream miles treated.
3. Analyze and interpret all monitoring data for 2014.
4. Conduct rapid field assessments of potential sites identified at the October team meeting to determine restoration needs and prioritize future work.
5. Finalize the priority sites for restoration work to be completed in 2015-2016, so partners can prepare internal documents and permit applications.
6. Present project methods and results at the Quivira Coalition annual meeting. Submit abstract to submit results to the National Adaptation Forum in 2015.
7. Meet with WRV to begin planning for 2015 volunteer event, building on lessons learned.
8. Develop coordinated strategy for monitoring response to the restoration treatments.
9. Meet with US Army Corps of Engineers, WCCC, and USFWS to discuss future work and/or actions needed if grouse is listed.
10. Complete rock structures at Lower Wolf Creek, Chance Gulch and West Flat Top, and repair and maintain existing structures, at Kaichen State Habitat Area (Wolf Creek) and expand work at Redden Ranch at West Flat Top. Plan 2015 work in Sage Hen Gulch.

References

Zeedyk, B and Clothier, V. 2014. *Let The Water Do The Work: Induced Meandering, an Evolving Method for Restoring Incised Channels*, 2nd edition. Quivira Coalition.

Attachments

1. Project photographs (sites, process, monitoring, outreach, and before and after pictures)
2. Maps:
    a. Overview Map of Priority Sites Treated
    b. Chance Gulch: BLM and Ballantyne State Habitat Area Structures
    c. West Flat Top at Henkel Road USFS Structures
    d. USFS lands above Redden Ranch Structures
    e. Kezar Basin: Moncrief Ranch Structures
3. Fact Sheet: Upper Gunnison Basin Riparian Restoration and Resilience Project

Acknowledgements

Special thanks to the Terra Foundation for making this project possible. Many thanks to the GCWG, 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. 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 and Alison Graff completed the wetland delineations and permit applications. Nathan Seward and Matt Vasquez provided grouse expertise. Renee Rondeau, Gay Austin, and Suzie Parker conducted vegetation monitoring. Teresa Chapman conducted the GIS site selection analysis, with input from Chris Pague, Meg White, Gay Austin, Nathan Seward, Andrew Breibart, Shawn Conner, Matt Vasquez, and Mike Pelletier, and others. Imtiaz Rangwala provided climate expertise. Liz With, Jim Cochran and Nathan Seward provided key private landowner connections. Ken Stahlnecker contributed a dump truck for hauling rock. Shawn Conner, Andrew Breibart and Matt Vasquez provided GPS locations of all structures.

Gay Austin, Andrew Breibart, and Matt Vasquez completed all NEPA requirements for federal lands. Brian Rasmussen, with all 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. Thanks for cooperating landowners (and permittees) Brett Redden, Rufus Wilderson, Wayne Ballantyne and ranch manager Ted Harter for enabling these projects to be completed on private lands and for opening their 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 2014 field season a success. Thanks to Andrew Breibart, Matt Vasquez, Chris Bove, Frank Kugel, Nathan Seward, Jessica Frey, Brooke Vasquez and Liz With for providing matching funds for this project.

Report

This report was written by Betsy Neely, TNC, with review by Renee Rondeau, CNHP, Jim Cochran, Gunnison County, Gay Austin, BLM, and Christina Cheatham, TNC. Luann Rudolph, TNC, provided all financial information. Teresa Chapman, TNC, created the site maps with data provided by Shawn Conner, BIO-Logic, Matt Vasquez, USFS, and Andrew Breibart, BLM. For information or questions, please contact Betsy Neely at bneely@tnc.org.

Restoration/Resilience Building of Riparian and Wet Meadow Habitats
In the Upper Gunnison Basin

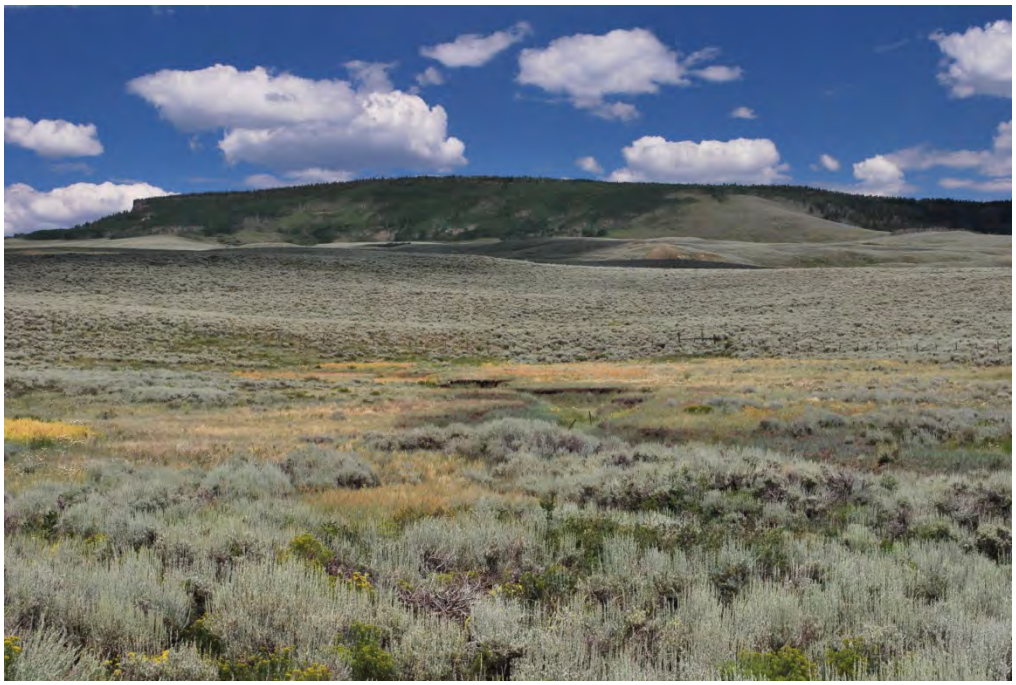
Sites

1. 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.

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.

Process

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

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

Process

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

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

Process

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

10. 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.

Process

11. 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.

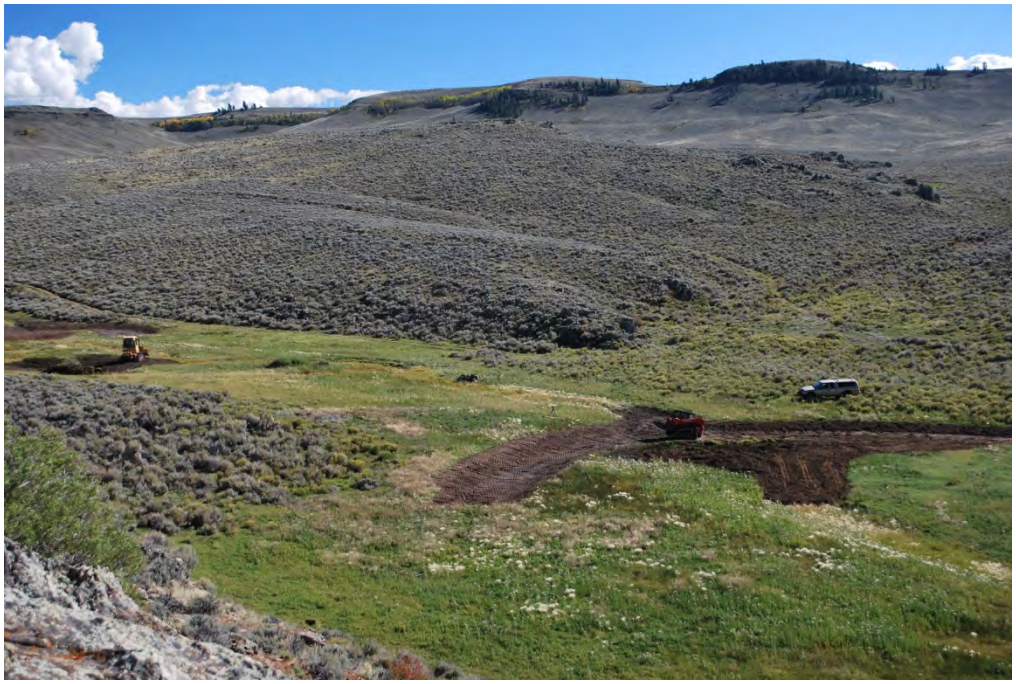
12. Hands-on training by Bill Zeedyk with Western Colorado Conservation Corps youth field crew members and Chayla Rowley, Natural Resources Conservation Service engineer, August 2014.

Process

13. Western Colorado Conservation Corps, Nathan Seward, Colorado Parks and Wildlife, Bill Zeedyk and Shawn Conner, BIO-Logic celebrate completion of a Zuni bowl (below crew) with one rock dam (foreground) at Chance Gulch, August 2014.

14. 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.

Process



15. 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.

16. 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. We plan to build 5 more fences downstream of this site in November 2014.

Volunteer & Outreach Work

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

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

Volunteer & Outreach Work

19. Western State Colorado University Ecological Monitoring class completes a one-rock dam in Chance Gulch, directed by Nathan Seward, Colorado Parks and Wildlife (in background), September 2014.

20. 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.

Volunteer & Outreach Work

21. 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.

22. 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.

Volunteer & Outreach Work

23. Shawn Conner, restoration specialist, BIO-Logic, explains the restoration techniques to the Western Colorado Conservation Corps field crews, US Forest Service, National Park Service and other partners in Chance Gulch, August 2014.

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

Team

25. 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 Reily). With visitor Ian Davidson, NFWF (upper left).

26. Team members and restoration experts Shawn Conner, BIO-Logic, Inc. (left) and Bill Zeedyk, Zeedyk Ecological Consulting discussing placement of rock structures in Chance Gulch.

Before and After

27, 28. 29. Before and after pictures of 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.

2012

2013

2014

Before and After

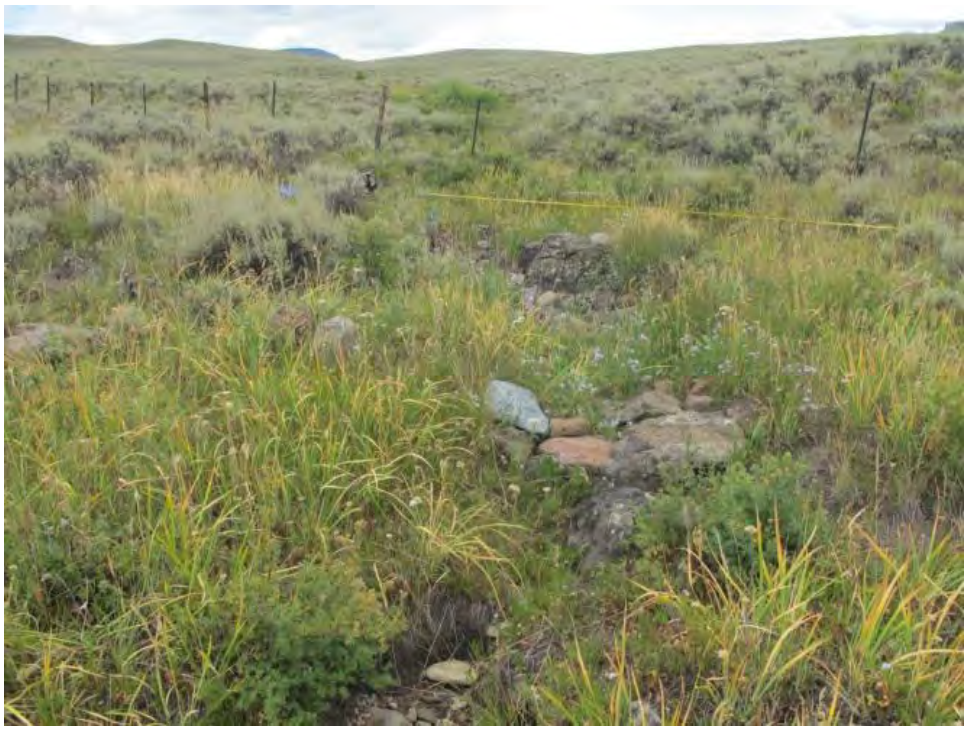
2013

2014

30, 31. Repeat photograph of a meadow with drift fences built in 2013 across a drainage at West Flat Top Mountain on US Forest Service lands. Preliminary results indicate that the fences are effective in diverting cattle from their trail thus reducing trailing and soil compaction.

Before and After

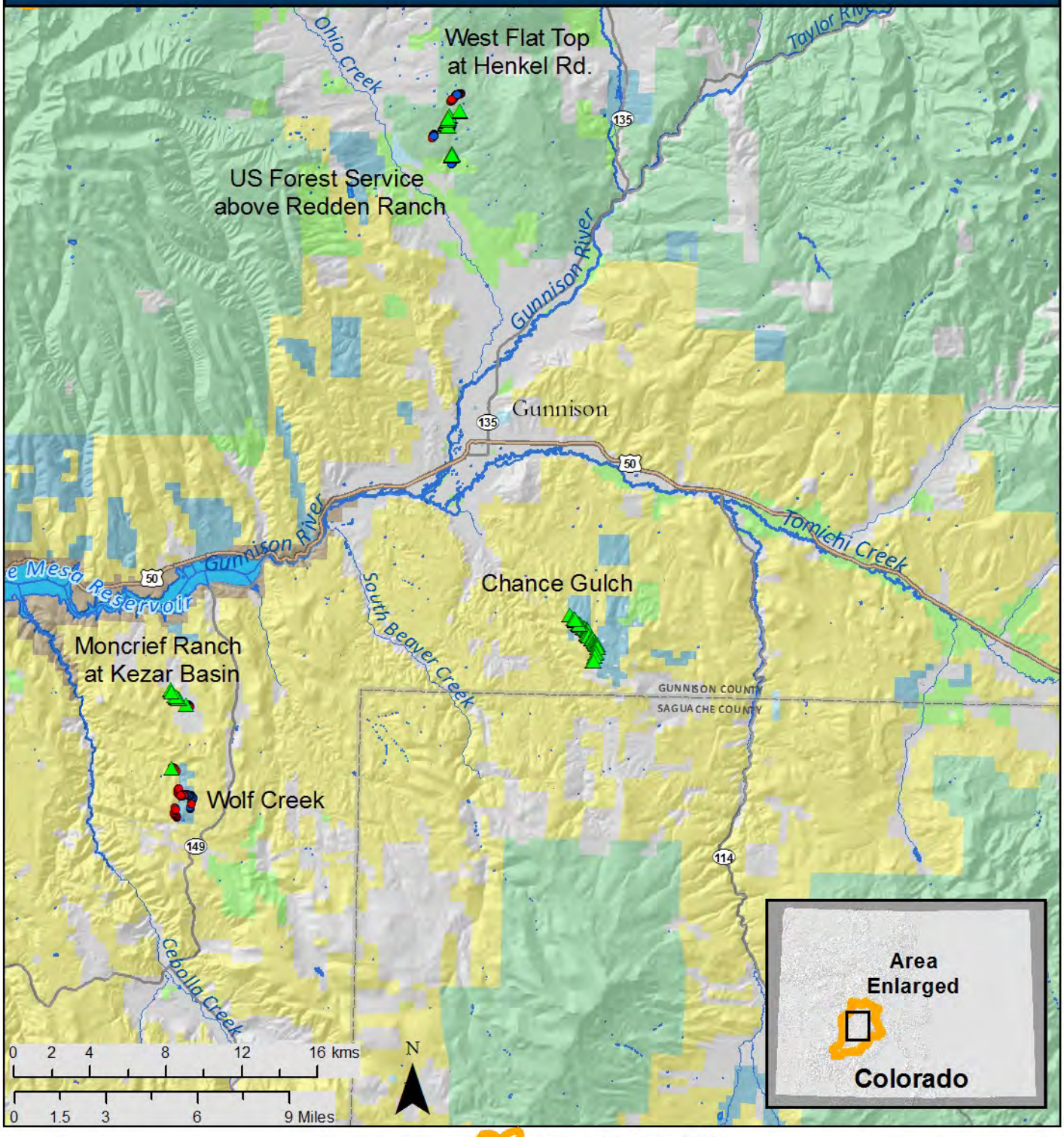
2013



2014

32, 33. 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.

2014 Priority Restoration Sites
Upper Gunnison Basin
The Nature Conservancy and Gunnison Climate Working Group

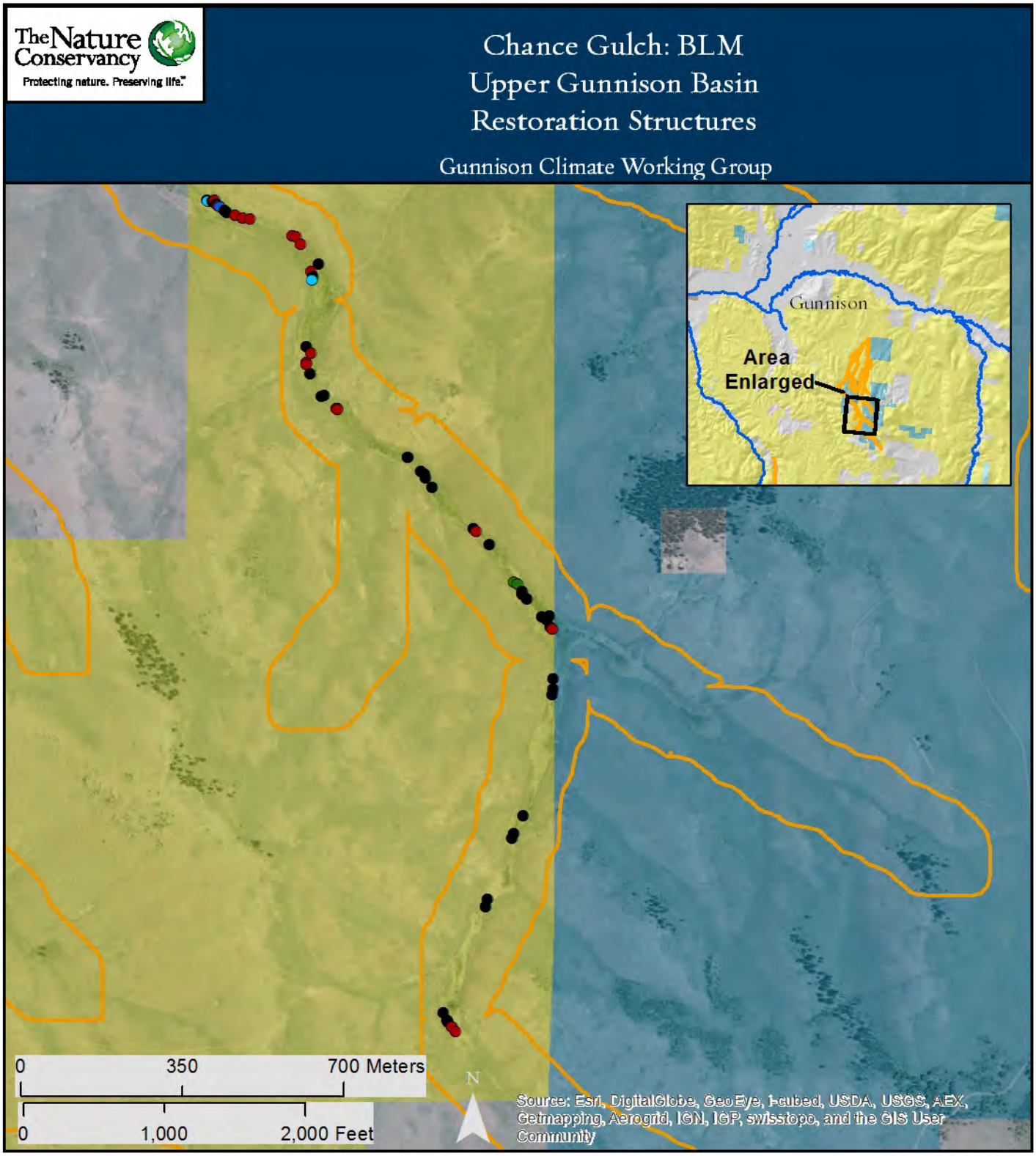


Map by T. Chapman. 10/31/2014
The Nature Conservancy.
Scale: 1:450,000
Sources: Land Ownership: COMaP v8 (CNHP 2010);
Transportation and Counties (ESRI 2010);
Rivers and Streams (NHD 2009).
Map document:
F_CO_GunnisonCC_PriorityWatersheds_Structures.mxd

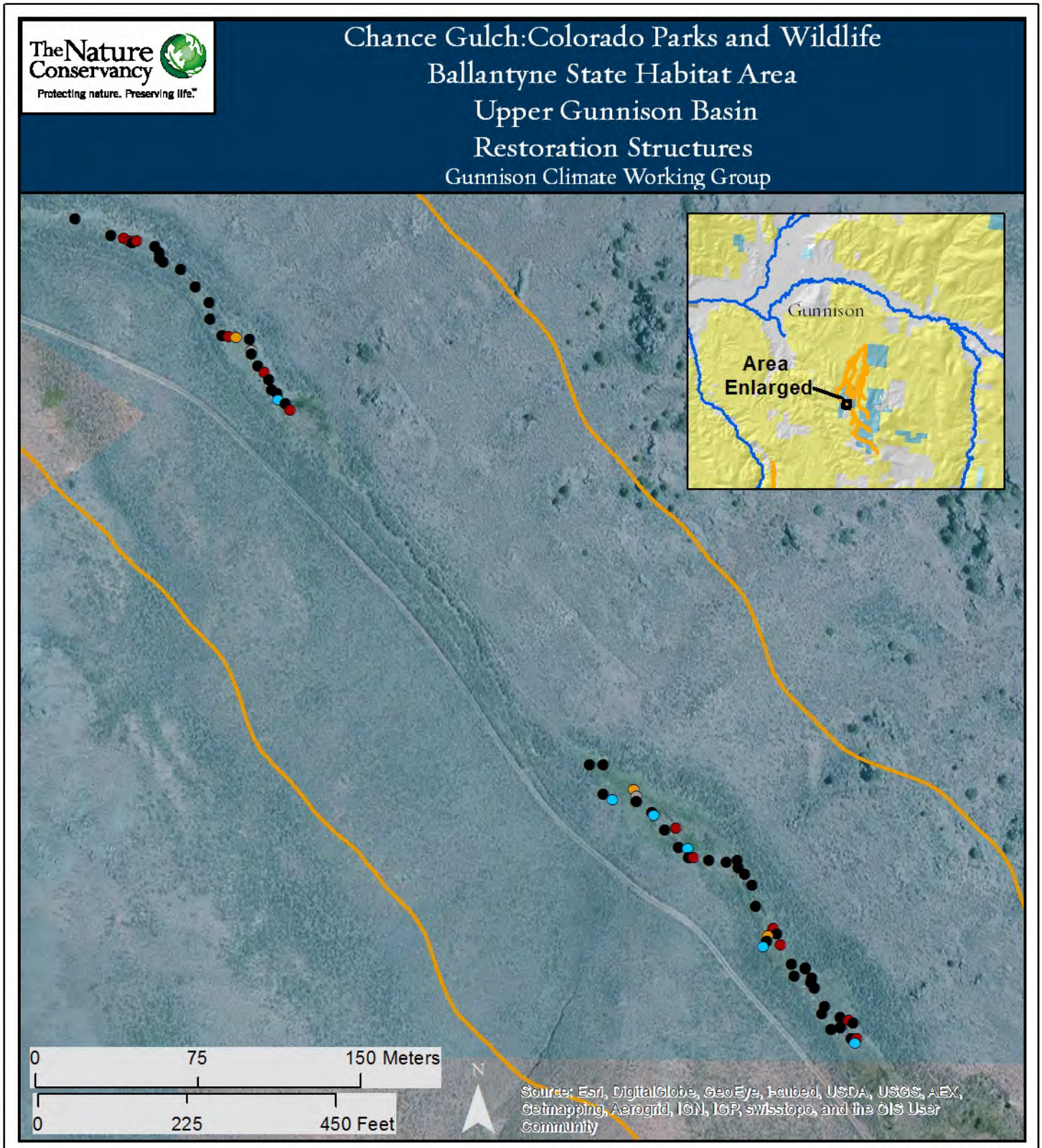
Gunnison Project Area

Restoration Structures
- 2012
- 2013
- 2014

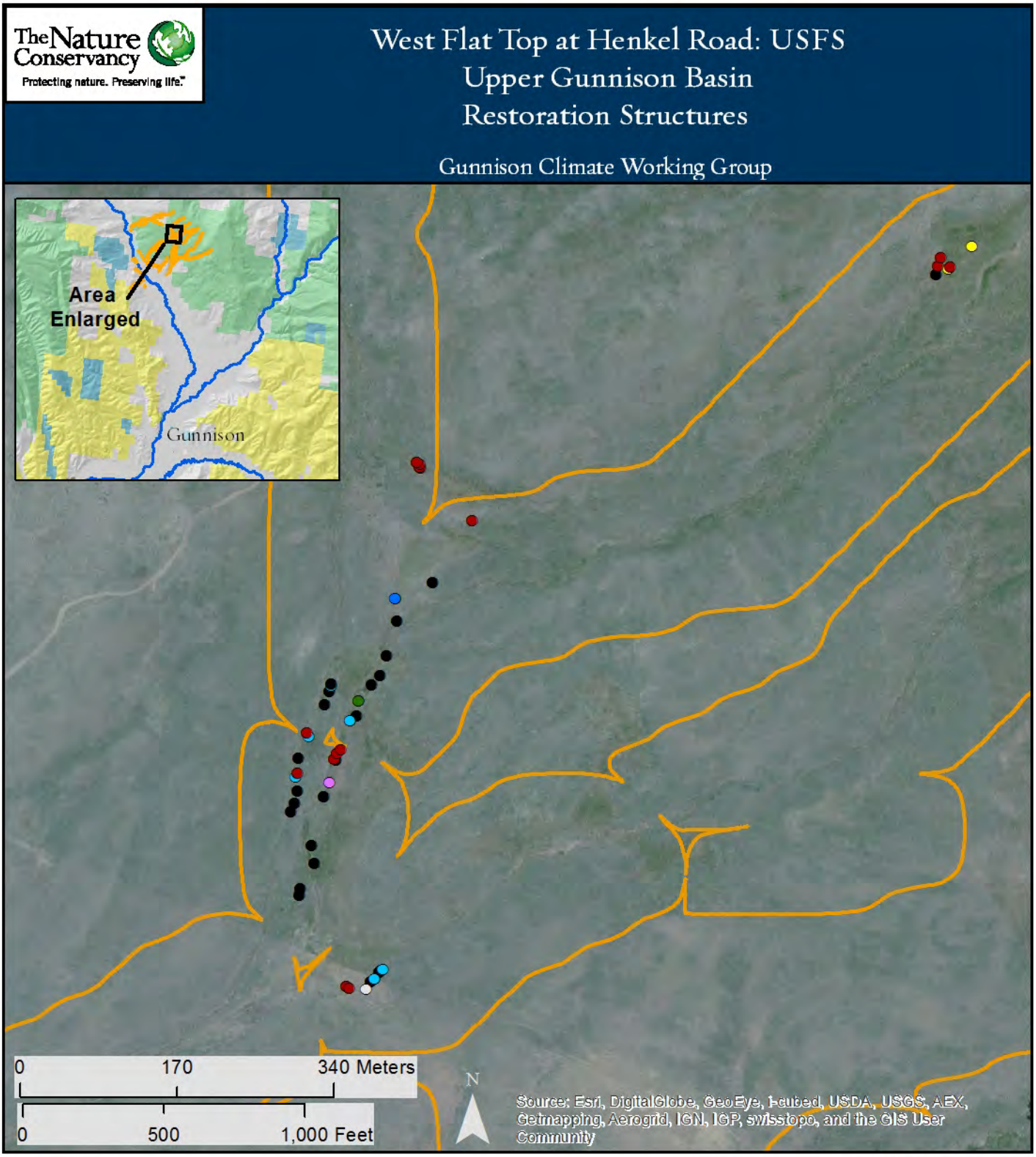
Land Management
- USFS
- BLM
- NPS
- CPW
- State
- Private



Date: 10/28/2014. Map by T. Chapman, The Nature Conservancy.Scale: 1:12,000
Sources: Gunnison Basin Gunnison Sage-grouse Habitat Prioritization Tool (2012).
Map document: 2014_F_Gunnison_ChanceGulchBLM_Structures.mxd



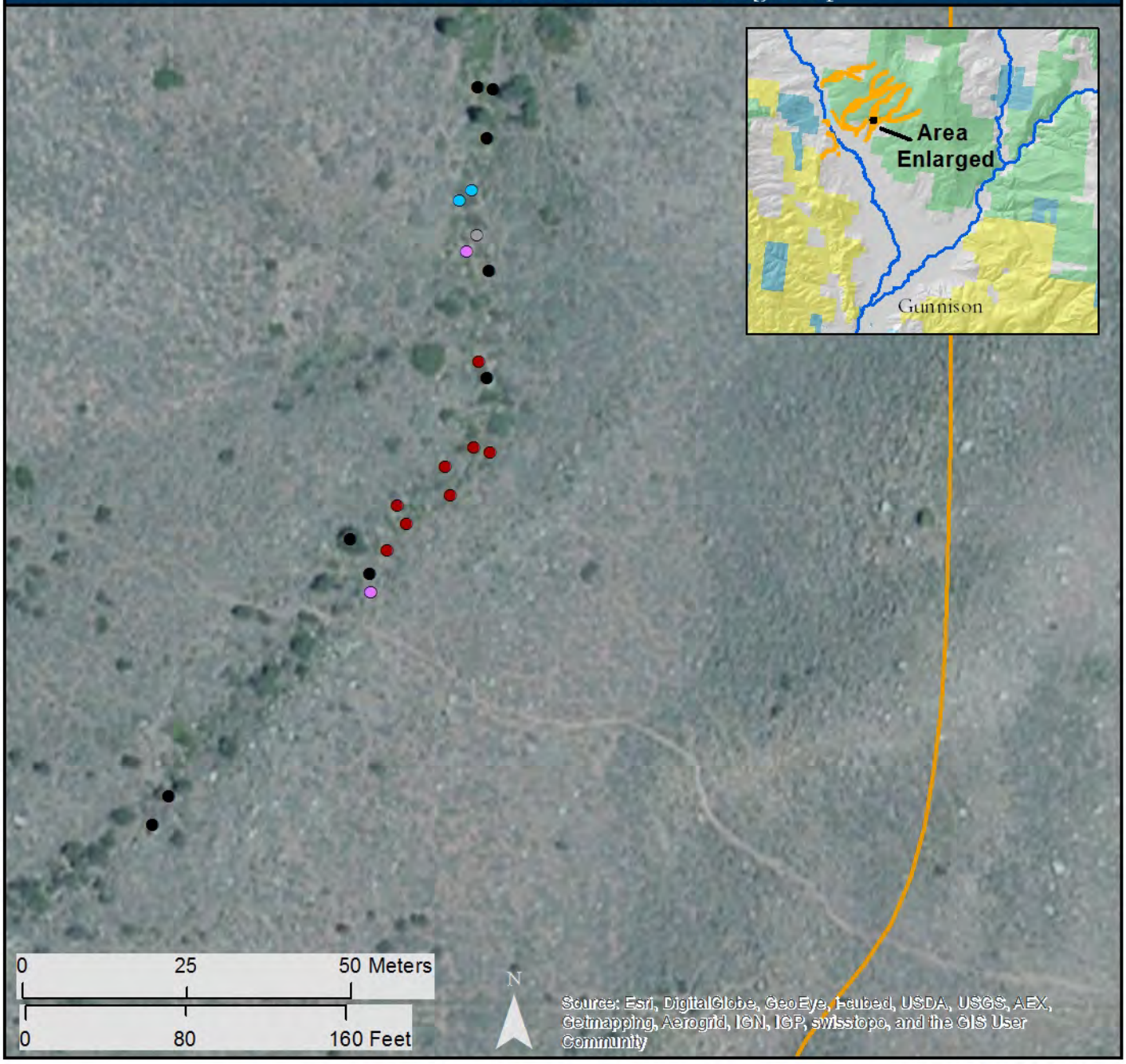
Date: 10/28/2014. Map by T. Chapman, The Nature Conservancy.Scale: 1:7,000
Sources: Gunnison Basin Gunnison Sage-grouse Habitat Prioritization Tool (2012).
Map document: 2014_F_Gunnison_WestFlatTop_Structures.mxd



Date: 10/28/2014. Map by T. Chapman, The Nature Conservancy.Scale: 1:6,000
Sources: Gunnison Basin Gunnison Sage-grouse Habitat Prioritization Tool (2012).
Map document: 2014_F_Gunnison_WestFlatTop_Structures.mxd

US Forest Service above Redden Ranch
Upper Gunnison Basin
Restoration Structures

Gunnison Climate Working Group



Gunnison Sage-Grouse Brood Rearing Habitat

Streams

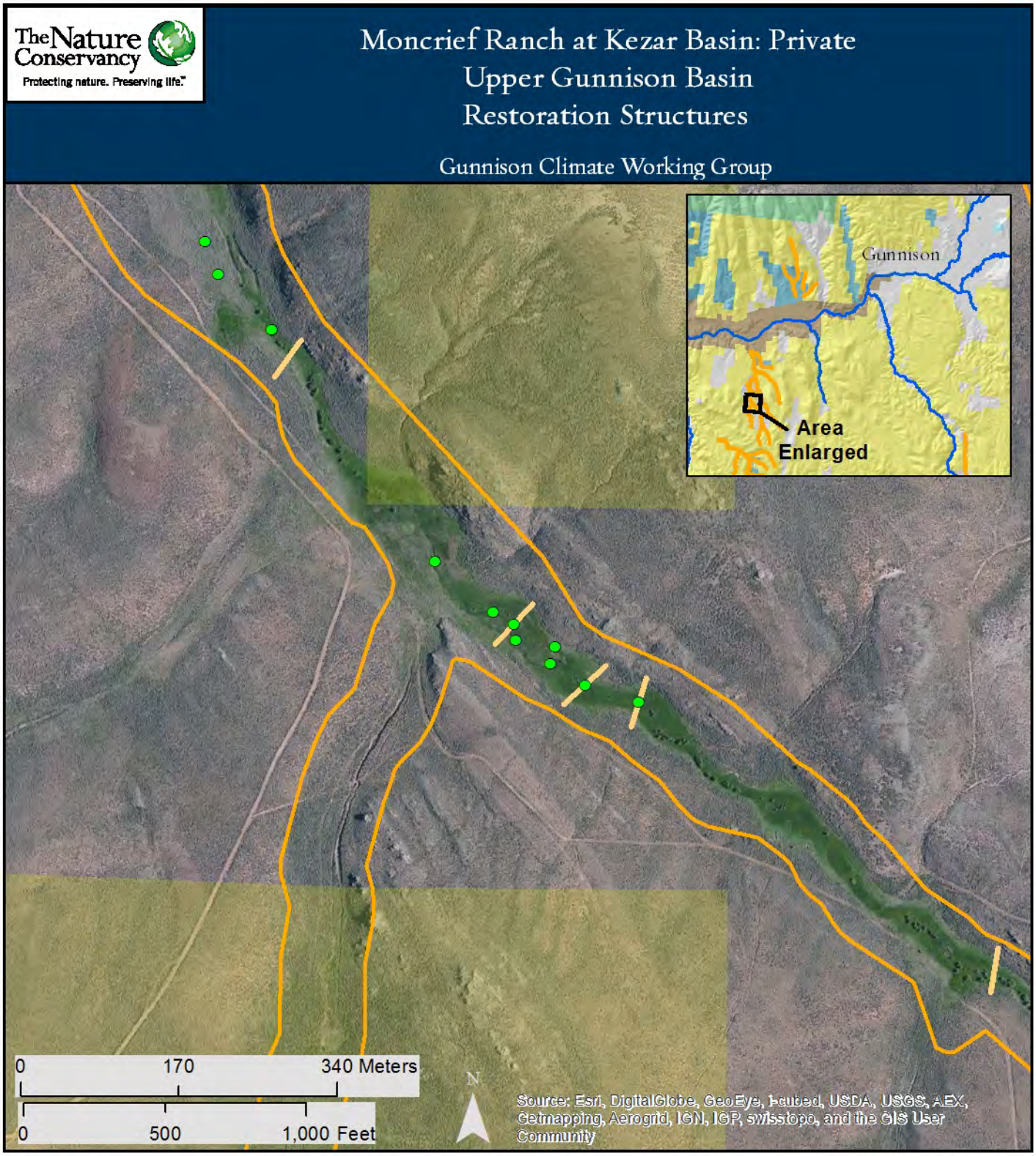
Structures

- Media Luna
- One Rock Dam
- Rock Baffle
- Rock Fill
- Rock Rundown
- Zuni Bowl

Land Management

- USFS
- BLM
- NPS
- CPW
- State
- Private

Date: 10/28/2014. Map by T. Chapman, The Nature Conservancy.Scale: 1:7,000
Sources: Gunnison Basin Gunnison Sage-grouse Habitat Prioritization Tool (2012).
Map document: 2014_F_Gunnison_WestFlatTop_Structures.mxd



Date: 10/28/2014. Map by T. Chapman, The Nature Conservancy.Scale: 1:6,000
Sources: Gunnison Basin Gunnison Sage-grouse Habitat Prioritization Tool (2012).
Map document: 2014_F_Gunnison_KesarBasin_Structures.mxd

Upper Gunnison Basin Riparian Restoration & Resilience Project

A Collaborative Approach to Preparing for Change

The climate of the Southwestern United States is warming and is projected to get warmer in the coming decades. Colorado is experiencing larger and more severe wildfires, prolonged drought, earlier snowmelt, high tree mortality, increases in dust storms, and changes in the timing of plant and animal life cycles. Climate scientists predict more summer heat waves, decreasing late-season snowpack, declines in river flow and soil moisture, and longer and more frequent droughts. These changes put people, plants, animals and their habitats at risk.

Actions are needed to help ecosystems and species cope with a changing climate. The Gunnison Climate Working Group is working to prepare nature and people for change in the Gunnison Basin of Colorado. The measures we take today to build ecosystem resilience will not only benefit natural resources, but will also protect the foundation upon which the Gunnison Basin's agricultural and recreational economies depend.

Gunnison Climate Change Partnership

The Gunnison Climate Working Group is a public-private partnership working to reduce the impacts of climate change on nature and people in the Upper Gunnison Basin. This project is part of a larger effort by the partnership aiming to increase understanding and awareness of the threats posed by climate change, identify and prioritize adaptation strategies, and promote coordinated action to prepare for change across jurisdictional boundaries.

Gunnison's Critically Important Habitats

Wet meadows and riparian areas provide critical brood-rearing habitat for Gunnison Sage-grouse (*Centrocercus minimus*), proposed for listing as endangered under the Endangered Species Act. These habitats are also important for numerous other species, including neo-tropical migratory birds, elk, and mule deer, as well as to ranchers for livestock grazing. A number of wet meadows and riparian areas, already compromised by erosion and lower water tables, are likely to be further altered by drought, invasive species, and high intensity rainstorms associated with a changing climate.

Gunnison Sage-grouse © Noppadol Paothong

A Hands-On Natural Solution

To address these challenges, the partners implemented a two-year demonstration project that used innovative, yet simple, restoration methods to enhance the resilience of riparian and wet meadow habitats. Restoration expert Bill Zeedyk, Zeedyk Ecological Consulting, designed restoration methods, consisting primarily of rock structures. Local partners, agencies, ranchers and universities have been actively engaged, contributing in-kind services, working across agency and property boundaries, and collaborating to achieve common conservation outcomes. Youth field crews, students, ranchers and volunteers built more than 240 rock structures and other treatments along 10 stream miles on three private ranches and two public land sites managed by Bureau of Land Management and US Forest Service.

The team established a vegetation monitoring program to track ecological response and installed groundwater monitoring wells to track water table changes over time. The response to the structures is quite promising, as they are starting to capture sediments and hold/spread water, enabling wet-loving plants to expand and colonize. This work only touched a fraction of what is needed, however, as there are numerous incised channels and degraded streams that would benefit from restoration across the Basin. As a result, the group is working to scale up the project to the whole basin level.

Before and after restoration at Wolf Creek meadow (2012 and 2013) © (left) B. Neely; (right) R. Rondeau

Riparian Restoration: Taking the Project to Scale

Building on best practices and lessons learned from the two-year demonstration project, the partners launched a new three-year effort in early 2014 to accomplish significant watershed-scale restoration in the Gunnison Basin.

The goals of the second phase of the project are to: 1) increase ecosystem resilience to climate change by restoring hydrologic function of priority wet meadow and riparian habitats 2) build a sustainable and enduring program to increase restoration across the basin; 3) ensure scientific rigor of project; 4) develop and evaluate cost-effective tools, methods, and planning; and 5) share best practices and lessons learned to encourage application of restoration methods within and outside of the basin.

This project is an exciting demonstration of how diverse groups can collaborate on important conservation efforts to prepare for change.

Rock Structure at Wolf Creek meadow © B. Neely

For More Information:

www.conservationgateway.org/ConservationByGeography/NorthAmerica/UnitedStates/Colorado/science/climate/gunnison/Pages/default.aspx

Gunnison Climate Working Group

Bureau of Land Management
Colorado Natural Heritage Program
Colorado Parks and Wildlife
Gunnison County
Gunnison County Stockgrowers Association
Lake Fork Valley Conservancy
National Center for Atmospheric Research
National Park Service
Natural Resources Conservation Service
Rocky Mountain Biological Laboratory
The Nature Conservancy
Trout Unlimited
US Fish and Wildlife Service
US Forest Service
Upper Gunnison River Water Conservancy District
Western State Colorado University
Western Water Assessment, University of Colorado

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