Wet Meadows and Riparian Restoration, Water Attenuation and Climate Change Resiliency Project

Final Report

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Introduction

High Country Conservation Advocates (HCCA) is an environmental advocacy organization that collaborates with local stakeholders and policymakers, applies sound science, educates, and upholds the environmental laws affecting our community. Our mission is to protect the health and natural beauty of the land, rivers and wildlife in and around Gunnison County now and for future generations. Part of fulfilling this mission is to support and partner with local groups to implement compatible stewardship projects in our basin. Our work ensures these iconic public lands, waters, and wildlife will be healthy for generations to come.

The Gunnison Basin Wet Meadows Project is an ongoing effort with broad public support to rehabilitate and sustain resilient ecosystems. Project areas are better able to withstand drought and climate change by attenuating water across the landscape and by restoring historically wet areas to riparian sanctuaries.

In the Upper Gunnison Basin the semi-arid climate of the sagebrush ecosystem is interspersed with wet meadows and riparian areas providing critically important habitat and water. The project sites selected as wet meadows projects are in a sagebrush ecosystem with intermittent, ephemeral and perennial streambeds, meadows, swales (glacial tarns), and small islands of aspen and cottonwood trees within some stream channels. Plant composition along stream channels and in meadows includes sedges, willow, rabbitbrush and potentilla (cinquefoil). Stream channels, meadows, and many swales have eroded channels, headcuts, soil loss and drying out of soils causing grass, forb and riparian plant die-off. These areas have lowered water tables and encroaching upland plants, especially sagebrush.

These impacts were caused by historical uses including travel routes that affect hydrological flow, as well as livestock and big game trailing through these sensitive areas. This resulted in less productive plant growth and forage availability, and less water on the landscape. With the Zeedyk-style riparian and wet meadow restoration techniques, water availability and retention, grass, forb, and wetland species diversity and extent increases, causing the less productive sagebrush and other upland vegetation to die back.

HCCA's role in this endeavor continue two distinctive and equally important responsibilities. First and foremost we engaged and mobilized a diverse volunteer stewardship team. We did this by strengthening relationships with local educational institutions, regional restoration based non-profits, and our local community. The second role was that of preparing our volunteer stewardship events to deliver a high quality service.

HCCA appreciates the support of the Colorado Water Conservation Board to fund our proposal in partnership with the Upper Gunnison River Water Conservation District (UGRWCD), United States Forest Service (USFS), Bureau of Land Management (BLM), Colorado Parks and Wildlife (CPW), Wildland Restoration Volunteers (WRV), National Fish and Wildlife Service (NFWS), Gunnison Conservation District (GCD), Natural Resource Conservation Service (NRCS), the Town of Crested Butte, and Western Colorado University (WCU) to restore and protect sagebrush ecosystems, streams and watershed health in the Upper Colorado River Basin. We are pleased to report on the successful 2022 - 2023 implementation seasons below.

Background

The Wet Meadows and riparian restoration, water attenuation, and climate change resiliency project came to fruition while discussing needs with our local land management agency personnel. Two distinct projects with similar benefits were identified with both using low-tech restoration based processes to affect positive change in the natural hydrology of wetland systems.

Our team selected 6 distinct sites across the Upper Gunnison Watershed for site specific restoration processes as well as an educational site visit event to kick off the volunteer season. While developing and implementing our planned restoration events we were able to engage 112 volunteers for a total of 633 volunteer hours.

Larger Wet Meadow Project Background

The Wet Meadow Restoration Resiliency Building Project (WMRRB) grew out of the Gunnison Climate Working Group (GCWG), public-private partnership preparing for change in the Gunnison Basin. The WMRRB Project has been working since 2012 to enhance ecosystem resilience of riparian areas and wet meadows by restoring hydrologic and ecologic function to help the Gunnison sage-grouse and other wildlife species, as well as ranchers who depend on these habitats for their livelihoods, adapt to a changing climate.

Overall, the goal is to build ecological and social resilience in the Gunnison Basin through voluntary, collaborative conservation. The specific focus is on wet meadows and riparian areas, which occupy a small proportion of the sagebrush ecosystem yet provide critically important habitat for many species. These mesic areas, in an otherwise semi-arid climate, are vital to the life cycle of the federally threatened Gunnison sage-grouse by providing important brood-rearing habitat for grouse to raise their young chicks. These meadows also provide important food and cover for insects, pollinators, neo-tropical migratory birds, mule deer, elk, and forage for domestic livestock.

Wet meadows and riparian areas also serve as natural sponges to hold water in the soil, slowly releasing it after runoff events which ensures continued base flows and maintenance of water tables throughout the growing season. Holding water in these systems later into the summer season and during droughts benefits plants, wildlife, and ranchers. Many riparian areas and wet meadows in sagebrush ecosystems have been degraded by erosion and past land uses, resulting in incised gullies and lowered water tables. Intense episodic droughts, such as the ones in 2002 and 2018 have exacerbated these problems. As our global temperatures continue to rise, droughts and intense runoff events that increase erosion are likely to become more frequent. If these already uncommon habitats degrade further, the many plants and animals that depend on them, including the Gunnison sage-grouse (Jones, 2021), will suffer.

The specific CWCB project objectives were : 1) disperse flows more widely across floodplain surfaces to maximize infiltration and slow runoff 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; 4) slow sediment transport and aggrade unstable gullies; and 5) increase health, vigor, and density of riparian/wetland vegetation, such as native sedges, rushes, grasses, and forbs. Accomplishing these objectives improved watershed health and water quality, as well as habitat conditions. By enhancing the resilience of riparian and wet meadows habitats within the sagebrush ecosystems in the Gunnison Basin they will persist and thrive during drought periods. While these mesic habitats comprise a small percentage of the landscape, they are disproportionately important to big game, Gunnison sage-grouse, neo-tropical migratory birds, and amphibians.

Methods

Wet Meadow Restoration Resiliency Building Project

In 2017, The Nature Conservancy (TNC) developed a landscape-scale model to help prioritize stream reaches for restoration. The model assessed restoration needs (how degraded the site is), the restoration potential (how much water is available) of the site, and the potential benefits to Gunnison sage-grouse. This model identified 32 HUC 12 watersheds, 541 stream reaches, encompassing 764 acres of degraded wet meadow on 271 stream miles in the Gunnison Basin. Restoration techniques used in this project included grade control structures (one rock dams, log mats, sod plugs, BDAs, wicker weirs and low water crossings), flow dispersal structures (low water crossings, plug and ponds, BDAs and wicker weirs) and headcut control structures (Zuni bowls, rock rundowns, laybacks and log and fabric structures) following methods of Zeedyk and Clothier (2014) and Wheaton et al (2019). Most of the structures were made of rock and vegetation, but several other techniques were used depending on site conditions. The Wet Meadows and Riparian Restoration, Water Attenuation, and Climate Change Resiliency Project was implemented in stages with some adaptive management to on the ground conditions as needed. The four tasks below span the volunteer management cycle from site planning to implementation and monitoring. The methodology aligns with what is used by our partners in the larger Gunnison Basin Wet Meadows

Project, headed by UGRWCD and which these projects are a part of. Required permitting was completed in kind for each project location by our agency partners.

Task 1 - Localized Site Review & Design

When this grant was submitted, we had general project locations in mind that we selected with the help of our partners. Four of the sites were existing project areas that needed additional work (Black Sage Pass on USFS land, Upper Willow Creek on BLM land, and both Centennial and Miller Ranch SWA's being on CPW land). Site review and design for the 2022 and 2023 seasons was completed by Shawn Connor at Bio-Logic. Shawn is a landscape architect and restoration specialist and was instrumental in proper site selection, review, and design. Additional site review and design was completed by Cheryl Cwelich at the UGRWCD, Dan Olson at NRCS (Powderhorn Riparian Restoration Project), and Alli Del Gizzi at Arable Earth (Slate River Riparian Restoration Project).

Task 2 - Volunteer coordination, training, and project construction

The heart of this overall project is volunteer participation. To coordinate volunteers, HCCA partnered with the USFS, CPW, UGRWCD, WCU, and Wildland Restoration Volunteers (WRV). HCCA led the coordination and implementation of environmental restoration projects while providing opportunities for community members to get involved with stewarding our shared public lands. Before each volunteer project, HCCA and project partners provided volunteer education about objectives and structure design.

<u>Black Sage Pass</u>
Local HCCA volunteers joined volunteers from WRV to spend a day in this eastern part of Gunnison County partnering with the USFS to improve wildlife habitat (including Gunnison Sage-grouse). Volunteers strategically placed rock and woody debris to effectively treat head cuts forming in the meadows on site.

09/03/2022
Accomplishments: HCCA & WRV crews constructed 9 one rock dams, 2 rock mulch structures, 12 rock rundowns, 1 layback, and 1 baffle
Total HCCA Volunteers: 10
Total HCCA Volunteer Hours: 70

<u>Miller Ranch State Wildlife Area</u>
Volunteers from HCCA joined other volunteers from WRV over the 2022 Labor Day weekend to learn or sharpen their skills in wet meadow restoration. The worksites on Miller Ranch offer an expansive view of the Ohio Creek Valley. This project was one of the premier community building stewardship events of the season. Volunteers enjoyed sharing meals and fellowship while stewarding their public lands. Each day began with a project overview, training exercises, and educational components. Once the crews were assembled and assigned project locations the group problem solving and teamwork began. Crews of around 5 people would spend as much time needed on their rock structures, solicit feedback from project

leaders, and then leapfrog other crews on their way to the next site- sharing stories and knowledge while passing by.

9/4/2022 & 9/5/2022
Accomplishments: HCCA & WRV crews constructed 8 one rock dams, 6 rock mulch structures, 8 rock rundowns, 1 layback, and 1 media luna
Total HCCA Volunteers: 11
Total Volunteer Hours: 77

Upper Willow Creek
Volunteers celebrated National Public Lands Day over the course of 2 days by implementing wet meadow restoration structures along Upper Willow Creek, near Gunnison. BLM hydrologist, Andrew Breibart provided the project location background and goals associated with the restoration site. Volunteers understood that participating in this stewardship event and implementing structures help to "wet the sponge" of mesic and wet meadows, allowing water to stay on the landscape longer in the season, supporting the health and resiliency of our local landscape and community. These hand-built structures also increase vegetation growth in the arid sagebrush steppe landscape, supporting the Gunnison Sage-grouse and many other species. Many of the volunteers who participated live in Gunnison, and attend Western Colorado University but had never been to this area so close to town.

9/23/2022 & 9/24/2022
Accomplishments: 21 wet meadow restoration structures implemented by HCCA volunteers
Total HCCA Volunteers: 30
Total Volunteer Hours: 180

Powderhorn Riparian Restoration Project
HCCA partnered with NRCS, NFWS, UGRWCD, NFWS, and GCD, to restore a degrading riparian system in southern Gunnison County. This project was identified by NRCS and UGRWCD in the winter of 2022 as being a potential project for HCCA volunteers.

The goal of this project was to restore a degrading and incising system along the confluence of Cebolla and Powderhorn Creeks. By hand-building 16 restoration structures, 15 volunteers helped add complexity back to the stream while also encouraging natural meandering to reconnect the floodplain. Along with restoring hydrologic function, this intervention will also promote habitat diversity and improve riparian vegetation.

Volunteers received both an introduction to restoration ecology and practical experience building low-tech process-based restoration (LT-PBR) structures including beaver dam analogues, post assisted log structures, and other woody material structures. LT-PBR is the practice of using simple, low unit-cost, structural additions to mimic ecological functions and promote healthy riparian-specific processes.

7/26/2023 & 7/27/2023

Accomplishments: HCCA crews were joined in the field by the 2023 UGRWCD seasonal crew to implement 16 LT-PBR structures (6 Beaver Dam Analogues, 7 Mid-channel Post Assisted Log Structures, and 3 Bank-attached Post Assisted Log Structures) along 1,600 feet of stream.
Total HCCA Volunteers: 15
Total Volunteer Hours: 85

Slate River Riparian Protection and Youth Education Project

From September 11th through September 15th, staff members from the Town of Crested Butte and Arable Earth, LLC implemented several process-based restoration structures using natural materials to attenuate water across the property. On September 16, HCCA recruited and welcomed 17 volunteers to the site for an educational workday. Of the 17 volunteers, 5 were students from Crested Butte Community School, and 6 were students at Western Colorado University.

Volunteers harvested and planted approximately 500 local willow stakes along 350 feet of wetland near the newly constructed attenuation structures. The extra slash from willow clippings was utilized as fill material for attenuation structures. “Dressing” the attenuation structures with willow slash will lower the energy and velocity of future high speed runoffs or periods of heavy precipitation. This will recharge the floodplain.

Many lasting benefits will be realized from this unique project. Our volunteer efforts will improve and expand the existing willow complex, stabilize areas where attenuation structures were built, and improve wildlife habitat and forage. The project will also benefit recreationalists on the heavily utilized river corridor and on the Deli Trail by improving the resiliency of the river banks and flood plain. It will benefit the public by offering a zone of relief for flood waters. Big game that utilize the property in the spring and fall to migrate up and down valley will benefit from this improvement. This project and associated monitoring will also provide a template for potential restoration projects on adjacent wetlands in the immediate area.

9/16/2023
Accomplishments: 500 willow locally harvested and planted along 350 feet of wetland area.
Total HCCA Volunteers: 17
Total Volunteer Hours: 85

Centennial State Wildlife Area

HCCA partnered with CPW and UGRWCD for our final stewardship of the season to restore a critical wet meadow system in the sagebrush shrublands, strengthening the resiliency of our local environment. 16 volunteers used innovative, yet simple, restoration methods, specifically small rock structures to raise the water table to support plants and insects needed by wildlife (including the Gunnison Sage-grouse).

After learning about process-based restoration methods and Gunnison-Sage Grouse ecology, volunteers successfully implemented 9 Zeedyk rock structures which will “rewet the sponge” within these meadows by retaining seasonal flow and spreading it throughout the landscape. By strategically placing rocks,

volunteers helped to restore sheet flow of water within the system. As the rocks are placed, sediment will hold in the system longer–encouraging new plant and insect life to flourish. Taller vegetation acts as cover for nesting Gunnison Sage-Grouse hens, and can provide nutrient-abundant habitat. This is crucial to the survival of the threatened Gunnison Sage-Grouse and countless other species in arid sage country.

10/21/2023
Accomplishments: 9 Zeedyk structures
Total HCCA Volunteers: 16
Total Volunteer Hours: 96

Task 3 - Monitoring

Monitoring of selected project sites is ongoing. Fortunately the areas of work are often near or adjacent to previous years' work. During implementation we are able to not only monitor the site, we are also utilizing the sites for tours showing volunteers and other partners the progress and how the habitat conditions improve from year to year. When bringing volunteers to the project area we often start with an education component that showcases the structures used along with how and why they positively affect the landscape. This process highlights erosion structures, revegetation efforts and earthen dams since they are often the techniques that volunteers will be utilizing.

Task 4 - Administration, contracting, permit compliance

All administration, contracting and permit compliance was coordinated in-house by HCCA and in conjunction with our local partners and stakeholders as needed.

Results
At the completion of this grant, HCCA engaged a total of 112 local volunteers. Volunteers included individuals from Gunnison and Crested Butte, students from WCU, and others who traveled from other parts of the state to participate in the low-tech restoration opportunities provided. The community education component of this project proved to be a pull factor for volunteers to participate and learn about public land-based climate change and drought resiliency projects. Faculty from WCU planned class field trips and assignments around our volunteer workdays.

Major Volunteer Accomplishments

Date	Event	Volunteers	Hours	Accomplishments
9/2/2022	Tour Day	13	52	Educational Event
9/3/2022	Wet Meadow Restoration - Black Sage Pass	10	70	25 Zeedyk structures
9/4/2022	Wet Meadow Restoration - Miller Ranch SWA	2	14	12 Zeedyk structures

9/5/2022	Wet Meadow Restoration - Miller Ranch SWA	9	63	12 Zeedyk structures
9/23/2022	Wet Meadow Restoration - Upper Willow Creek	7	42	7 Zeedyk structures
9/24/2022	Wet Meadow Restoration - Upper Willow Creek	23	138	14 Zeedyk structures
7/26/2023	Riparian Restoration - Cebolla Creek	5	35	9 LT-PBR Structures
7/27/2023	Riparian Restoration - Powderhorn Creek	10	50	7 LT-PBR Structures
9/16/2023	Riparian Restoration - Slate River	17	85	500 willows planted
10/21/2023	Wet Meadow Restoration - Centennial SWA	16	84	9 Zeedyk Structures
	Total	**112 Volunteers**	**633 Hours**	**79 Zeedyk Structures 16 LT-PBR Structures 500 Willows**

Conclusions and Discussion

All objectives were met. Project monitoring is ongoing and performed by our agency and contractor partners as well as the UGRWCD. HCCA has provided high quality volunteer coordination support for Gunnison County restoration projects since 2019. Moving forward, HCCA will no longer take the lead on coordinating volunteers as the UGRWCD is growing internal capacity to complete on-the-ground projects with their seasonal crew.

Actual Expense Budget

	Task Description	**Grand Funding Request**	**Cash Match**	**In-Kind Match**	**Total Match**
1	Localized Site Review and Design	$5,000	$0	$5,000	$5,000
2	Volunteer Coordination, training, and project construction	$20,000	$21,300	$15,825	$37,125
3	Monitoring	$0	$0	$1,000	$1,000
4	Administration, contracting, permits	$5,000	$6,700	$0	$6,700
	Total	**$30,000**	**$28,000**	**$21,825**	**$49,825**

Appendix

Photos

Flat Top Tour Day

Black Sage Pass

Miller Ranch State Wildlife Area

Uper Willow Creek

Powderhorn Creek

Slate River

Centennial State Wildlife Area

References

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