Southern Plains Land Trust

GAINING GROUND FOR PRAIRIE WILDLIFE

Prairie Stream Restoration in the Lower Arkansas River Basin

Final Report

Prepared for:

Colorado Watershed Restoration Program

Attn: Andrea Harbin Monahan

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Southern Plains Land Trust

Grant Amount: $27,200

Prepared by: Nicole J. Rosmarino, Executive Director

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Introduction

This project amplified a longer-term effort by the Southern Plains Land Trust (SPLT) to restore streams on our shortgrass prairie preserves in southeastern Colorado. SPLT has undertaken active riparian restoration efforts on our main preserves in Bent County since 2017. This includes removing tamarisk, planting cottonwoods and willows, and installing structures to reverse stream bank erosion. The grant of $27,200 from the Colorado Water Conservation Board's (CWCB's) Colorado Watershed Restoration Program helped us to advance this work in 2021 and 2022 by working with Volunteers for Outdoor Colorado to install natural rock and log structures in streams within our Raven's Nest and Heartland Ranch Nature Preserves.

Background

When SPLT purchases land to create nature preserves, the stream areas are often in degraded condition, with riparian forests either entirely absent or much reduced due to previous land uses. While we see immediate beneficial effects from removing cattle, including the growth of herbaceous cover within streams, more active intervention is necessary to restore the riparian forests.

Previous planning

The project is based on plans developed through a previous Great Outdoors Colorado-funded riparian restoration project. The Ducks Unlimited plan reviews conditions on Heartland Ranch and Raven's Nest and provides blueprints for pilot sites for riparian restoration. It also includes recommendations for installing low impact erosion control structures in stream, wetland, or mesic areas on the property when those areas exhibiting channel degradation, straightening, or down-cutting. The plan developed by expert SPLT supporters, called "Soil Erosion Issues at the Heartland Ranch and Raven's Nest Nature Preserves" also reviews conditions on these preserves and recommendations and diagrams for low-impact erosion control approaches. This project implemented measures such as one-rock dams and other "Zeedyk" structures, that slow but do not impede or regulate stream flow. The DU plan can be found here and SPLT's erosion control plan can be found here.

Project goals and objectives

SPLT objectives for riparian restoration on both the Raven's Nest and Heartland Ranch properties include:

- channel stabilization for both ephemeral and intermittent streams (through erosion control structures, revegetation, and protecting stream channels from livestock)
- riparian revegetation (through cottonwood and willow plantings, and their protection from livestock)
- habitat improvement (through the re-establishment of more natural streams and a riparian forest)
- natural hazard reduction (through the moderation of an extremely flashy stream system)
- flood mitigation (through the moderation of an extremely flashy stream system)
- water supply delivery improvement (through the moderation of an extremely flashy stream system)
- fish migration improvement (through the moderation of an extremely flashy stream system)
- upland erosion migration (through erosion control structures)

Overall, we aim to prevent and redress erosion-driven damage to water resources and increase riparian habitat function through establishment of more diverse riparian and wetland plant communities on the targeted reaches of streams on SPLT-owned properties. Damage on the properties from past livestock grazing, public roads, and other practices creating erosion has led to changes in hydrology, leading to significant reductions in available surface and ground water available for native vegetation and the wildlife this vegetation supports.

Supporting community engagement through volunteerism was another overarching objective of the project. With pressure on natural resources in Colorado increasing from factors such as population growth and climate change, the importance of creating an ethic of stewardship in Colorado's citizens has never been more important. In addition to being a cost-effective way of achieving the tasks outlined, engaging volunteers in active restoration projects provides a direct link for people in both the local area and from around Colorado to help conserve their state's water and wildlife habitat resources. By partnering with Volunteers for Outdoor Colorado (VOC), whose annual volunteer engagement reaches thousands of people, SPLT's goal was to tap into a statewide network and introduce people we would otherwise be unable to reach to the important riparian restoration being done on our preserves.

Site summary

There are two properties involved in this project: SPLT's Raven's Nest and Heartland Ranch Nature Preserves. On Raven's Nest, the focus is on Rule Creek and its tributary, Penrose Draw, which flow into the Arkansas River at John Martin Reservoir. Five miles of Rule Creek flow on the Raven's Nest property, at least two of which are perennial, a rarity in the shortgrass prairie. On Heartland Ranch Nature Preserve, the restoration targets are tributaries to Mud Creek that meet the Arkansas River downstream of John Martin. With a recent expansion of this preserve, there are now 57 stream miles within its borders.

The main sites targeted for erosion control structures were:

- Site 1: Penrose Draw on Raven's Nest Nature Preserve
- Site 2: Rule Creek on Raven's Nest Nature Preserve
- Site 3: Shelton Creek on Heartland Ranch Nature Preserve
- Site 4: West Mud Creek on Heartland Ranch Nature Preserve

In addition, we planted cottonwoods, willows, and sumacs throughout riparian areas on Raven's Nest and Heartland Ranch Nature Preserve, with support from this grant.

Methods

This grant was used to fund 4 VOC events on Raven's Nest and Heartland Ranch in which we installed erosion control structures and planted sumacs. CWCB funding paid for VOC's services ($24,000) and a portion of SPLT staff time preparing and implementing the VOC events ($3,200).

This project was implemented according to the tasks outlined in our proposal:

Task 1 - Contracted Volunteer Project Planning and Management Services. SPLT engaged VOC to recruit, plan, and manage 4 volunteer projects totaling two days each to accomplish several of the tasks outlined below. The primary objectives of VOC projects were erosion control structures and plantings.

Task 2 - Low Impact Erosion Control Structure Installation. Our approach was to install low-impact erosion control structures in stream channels and other riparian areas to slow water movement in this flashy stream system, benefitting natural hydrology and spurring growth of native vegetation. Structures included one rock dams, zuni bowls, media lunas, and log dams. Rocks and logs used to build the structures were sourced on site and transported to work areas ahead of volunteer projects or sourced by volunteers themselves where rock outcroppings were in close proximity to where structures were installed.

Task 3 – Cottonwood & Willow Plantings Along Streams. We planted cottonwoods and coyote willows in select locations on both Heartland Ranch and Raven's Nest, as originally planned. We also planted skunkbush sumac, based on guidance from Colorado Parks and Wildlife. We selected sites based on soil structure, moisture, and other relevant factors in order to maximize chances of success.

Task 4 – Perimeter Fencing to Protect Riparian Areas. In order to protect plantings and riparian areas in general from grazing by trespassing cattle, we replaced perimeter fencing and repaired along property boundaries on our preserves where needed. We also installed small enclosures around existing cottonwoods in order to protect them from browsing.

Task 5 – Removal/Treatment of Tamarisk by Youth Corps. We partnered with Mile High Youth Corps for three weeks of chainsaw and pesticide crew to remove tamarisk on both the Raven's Nest and Heartland Ranch nature preserve properties. Tamarisk was removed by cutting with chainsaws or hand tools. Herbicides were immediately painted on the stumps to prevent regeneration.

Results

Through this grant, we held the 4 VOC events we intended. SPLT and VOC first planned the entire project together as well as coordinating in earnest prior to each event weekend (Task 1). The 4 events were largely focused on erosion control structures (Task 2) because of the need for large numbers of people to make this project element achievable. Through these VOC weekends and also separately by SPLT staff and CPW, we planted trees and shrubs along riparian areas (Task 3). Through separate grant funding, we replaced or repaired problematic perimeter fencing that had allowed livestock trespass and installed exclosures around cottonwoods (Task 4, RESTORE Colorado funding) and removed and treated tamarisk with a crew from the Mile High Youth Corps (Task 5, Great Outdoors Colorado funding).

More specifically, we were able to install 103 erosion control structures (Table 1). This effort was complemented by other volunteer events on SPLT preserves outside of the VOC weekend, in which we

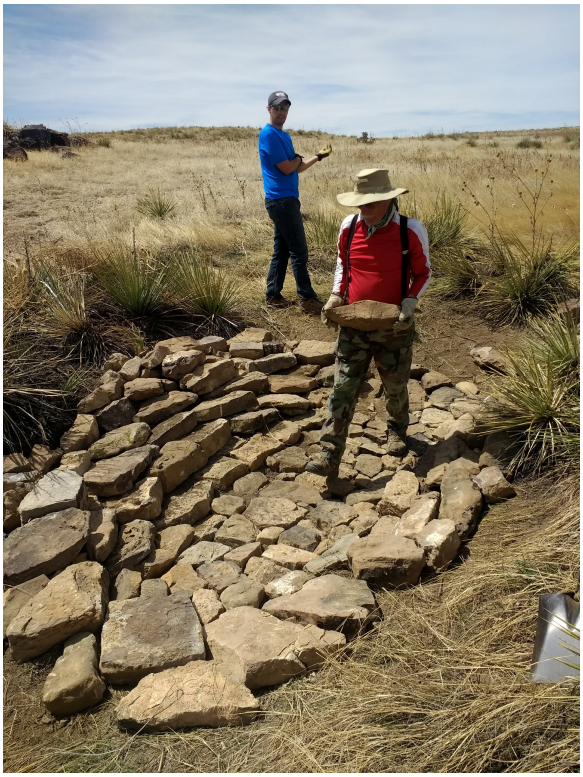
have built an additional 20 structures. Between VOC weekends and SPLT staff time, we planted a total of 500 willows and cottonwoods, and 400 sumacs. The timing of the VOC weekends was not optimal for tree and shrub planting, and SPLT observed low rates of success for plantings in 2021. We therefore prioritized erosion control structures in 2022.

Table 1. Erosion Control Structures Installed Through VOC Events at SPLT Preserves

Date	Sites	Number of Structures	Description*
April 2021	1	16	ORD, ML, Zuni
Oct 2021	3	47	32 ORD and ML, 15 log
April 2022	1, 2	26	19 ORD, 4 ML, 3 Zuni
Oct 2022	4	14	11 ORD, 2 ML, 1 Zuni
Total		103	

*ORD=one-rock dam, ML=media luna, log=log dams, Zuni=Zuni bowl

Here are examples of our structures:



Zuni bowl

Media luna

Log dam

One-rock dam

One-rock dam

Conclusions and Discussion

We fully executed Task 1 (project planning and management). We over-performed on Task 2, by installing 103 structures versus the 75 structures originally intended. We planted 900 trees and shrubs (Task 3), falling short of our original goal of 1500. This was due to our decision in 2022 to pivot away from plantings because of low survival and to focus on erosion control. We are nearly complete on our Task 4 of perimeter

fencing, but that is a separately funded project under RESTORE Colorado. Our Task 5 of tamarisk removal, also separately funded, is complete.

We are committed to long-term monitoring and maintenance of these structures. In fact, we repaired 6 structures in 2022 in Penrose Draw and 2 in West Mud Creek that had been harmed by an extreme flooding event.

The first main lesson learned was that plantings had very low survival rates. The conditions were extremely dry in 2021, which led to very few (less than 5%) of the trees and shrubs surviving. We decided in 2022 that the best approach was to focus on erosion control structures to work, over time, to enhance conditions for natural cottonwood and willow regeneration.

The second lesson learned was that significantly more staff time was necessary than the original budget. This was largely due to the need to supply materials at each dam site for volunteers prior to each event. In total, staff hauled rocks and logs to prepare sites for approximately 160 hours, spent 80 hours during the VOC events, and and spent an additional 40 hours in planning. This works out to $3800 more of a match for SPLT time than originally proposed.

We believe this project will be continually beneficial, and we have obtained some funding to continue the work. Overall, the use of volunteers has been very effective in creating more structures than staff alone could have. It may be that the use of contractors would also help accelerate the pace of structure installation. With the 57 stream miles currently within the borders of Heartland Ranch alone, we could scale up this work with more support.

Actual Expense Budget

COLORADO
Colorado Water Conservation Board
Department of Natural Resources

Colorado Water Conservation Board

Watershed Restoration Program Grant
Budget and Schedule

Prepared Date: 11/16/2022
Name of Applicant: Southern Plains Land Trust
Name of Water Project: Prairie Stream Restoration in the Lower Arkansas River Basin
Project Start Date: 2/15/2021
Project End Date: 1/31/2023

Task No.	Task Description	Task Start Date	Task End Date	Grant Funding Request	Match Funding	Total
1	Project Planning & Management	2/15/2021	10/15/2022	$5,800.00	$73,670.38	$79,470
2	Low Impact Erosion Control Structures Installed	2/15/2021	10/15/2022	$10,800.00	$3,800	$14,600
3	Cottonwood and Willow Saplings Planted	2/15/2021	5/31/2022	$10,600.00	$5,000	$15,600
4	Perimeter Fencing	2/1/2021	12/31/2021	$0.00	$50,000	$50,000
5	Removal/Treatment of Tamarisk by Youth Corps	2/1/2021	12/31/2021	$0.00	$35,850	$35,850
			Total	$27,200	$168,320	$195,520

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Appendix

Several photo galleries from the VOC weekend events are online:

- April 2021, Penrose Draw on Raven's Nest Nature Preserve
- April 2022, Penrose Draw and Rule Creek on Raven's Nest Nature Preserve
- Oct 2022, West Mud Creek on Heartland Ranch Nature Preserve