COLORADO
Colorado Water Conservation Board
Department of Natural Resources

Colorado Water Conservation Board

Water Plan

Water Project Summary

Name of Applicant	National Forest Foundaton	
Name of Water Project	Project-01862 Trail Creek Wetland Restoration Project - Phase 2	
Grant Request Amount		**$133,400.00**
Primary Category		$112,400.00
Watershed Restoration & Recreation		
Additional Funding Category		$21,000.00
Engagement & Innovation Activities		
Total Applicant Match		**$163,500.00**
Applicant Cash Match		$119,000.00
Applicant In-Kind Match		$44,500.00
Total Other Sources of Funding		**$329,125.00**
National Forest Foundation		$149,625.00
NFF/Gunnison County Stewardship Fund		$16,000.00
Upper Gunnison River Watershed Conservancy District		$3,000.00
Colorado Parks & Wildlife		$103,000.00
Defenders of Wildlife		$5,000.00
Western Colorado University		$8,000.00
U.S. Forest Service		$20,500.00
Volunteer Contribution		$24,000.00
Total Project Cost		**$626,025.00**

Applicant & Grantee Information

Name of Grantee: National Forest Foundaton
Mailing Address: Building 27, Suite 3, Fort Missoula Road Missoula Montana 59804
FEIN: 521,786,332

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Position/Title:
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Phone:

Description of Grantee/Applicant

No description provided

Type of Eligible Entity

- ☐ Public (Government)
- ☐ Public (District)
- ☐ Public (Municipality)
- ☐ Ditch Company
- ☐ Private Incorporated
- ☐ Private Individual, Partnership, or Sole Proprietor
- ■ Non-governmental Organization
- ☐ Covered Entity
- ☐ Other

Category of Water Project

- ☐ Agricultural Projects
  Developing communications materials that specifically work with and educate the agricultural community on headwater restoration, identifying the state of the science of this type of work to assist agricultural users among others.
- ☐ Conservation & Land Use Planning
  Activities and projects that implement long-term strategies for conservation, land use, and drought planning.
- ■ Engagement & Innovation Activities
  Activities and projects that support water education, outreach, and innovation efforts. Please fill out the Supplemental Application on the website.
- ■ Watershed Restoration & Recreation
  Projects that promote watershed health, environmental health, and recreation.
- ☐ Water Storage & Supply
  Projects that facilitate the development of additional storage, artificial aquifer recharge, and dredging existing reservoirs to restore the reservoirs' full decreed capacity and Multi-beneficial projects and those projects identified in basin implementation plans to address the water supply and demand gap.

Location of Water Project

Latitude	0.385451
Longitude	0.106374
Lat Long Flag	Stream location: Coordinates based on general location on stream
Water Source	Trail Creek, a headwaters stream of the Taylor Reservoir, Taylor River, and the Gunnison River.
Basins	Gunnison
Counties	Gunnison
Districts	62-Upper Gunnison River

Water Project Overview

Major Water Use Type	Environmental

Subcategory	Planning (e.g. watershed)
Scheduled Start Date - Design	3/1/2022
Scheduled Start Date - Construction	6/15/2022

Description

The Taylor Park Wetland Restoration Project, Phase 2 (hereinafter “Project”) is an ongoing collaborative effort with broad community support to restore stream, riparian, and wetland habitat in the headwaters of the Gunnison River, on the Grand Mesa Uncompahgre and Gunnison (GMUG) National Forest.

The project is part of a long-term, multi-phase effort to increase the health and quality of our water resources above Taylor Reservoir. The project will work to restore riverscape health using low-tech process-based restoration (LTPBR) principles and treatments. LTBR treatments are simple, low unit-cost, structural additions to riverscapes to mimic natural processes to reverse legacy stressors and recover the ecological functions of riparian and wetland ecosystems. The project’s long term plan addresses ten years worth of projects to achieve our watershed health goals (see 10-year plan attachment).

In Phase 1 of the project partners built over 60 LTPBR structures along 0.3 miles of stream corridor on Trail Creek, improving conditions over an estimated 10-12 riverscape acres. Our goal for Phase 2 of the project is to 1) reconnect and restore 115 acres of riparian and wetland habitat on 2.7 miles of stream corridor 2) regain the wildlife habitat and human benefits of these ecosystems.

We are now pursuing funding for Phase 2 of the project to complete work in the Trail Creek drainage and collect data to support three to five years of shelf ready sub-projects. The project budget for this grant will specifically support contracted services with restoration practitioners for restoration treatment implementation; project monitoring, studies, and reporting; volunteer coordination and community engagement; and project management.

Measurable Results

	New Storage Created (acre-feet)
	New Annual Water Supplies Developed or Conserved (acre-feet), Consumptive or Nonconsumptive
	Existing Storage Preserved or Enhanced (acre-feet)
	New Storage Created (acre-feet)
14,256	Length of Stream Restored or Protected (linear feet)
	Efficiency Savings (dollars/year)
	Efficiency Savings (acre-feet/year)
115	Area of Restored or Preserved Habitat (acres)
	Quantity of Water Shared through Alternative Transfer Mechanisms or water sharing agreement (acre-feet)
	Number of Coloradans Impacted by Incorporating Water-Saving Actions into Land Use Planning
120	Number of Coloradans Impacted by Engagement Activity

Water Project Justification

Prior to human disturbance, Trail Creek was a broad valley-wide wetland complex, naturally maintained by beavers. The North American Beaver is an aquatic ecosystem engineer and keystone species that was once ubiquitous in the riverscapes of Taylor Park and other headwaters riverscapes. But after the near-extirpation of the species during the 19th century fur trade—and then following almost two centuries of subsequent riparian land use and suppression of beaver populations—most of the natural stream-wetland corridors in these areas have become incised, simplified, and dried up. While sporadic beaver colonies occasionally reside along Trail Creek and other tributaries, approximately 90% of wetlands have become degraded in their absence. Degradation of this sort is responsible for a severe loss of wetland, poor riverscape health, diminished watershed resilience, and a concomitant loss of the important habitat, hydrological benefits, and ecosystem services that these systems would normally provide when healthy.

The strategies employed by the project fit soundly within the Colorado Water Plan because the project’s goal is

the restoration of critical wetland and riparian habitats. This project meets numerous goals articulated in Colorado's Water Plan (please see the attachment for the specific goals and how this project relates).
Phase 2 of this project will restore natural stream-wetland conditions to the valley bottom of the Trail Creek drainage over two years. LTPBR treatments restore a stream's structural complexity by mimicking the natural processes of beaver dams (beaver dam analogs), sod root mass (sod speed bumps), and wood accumulation (woody material structures). In Phase 1 of the Trail Creek project, restoration practitioners, contractors, and volunteers worked together to build 32 beaver dam analogs (BDAs), 12 sod speed bump structures, and 18 woody material structures (mostly PALS – post-assisted log structures) along approximately 0.3-miles of riverscape corridor, improving an estimated 10-12 acres of riverscape. Phase 2 will extend treatments up- and downstream with the aim of restoring the full 3.0 miles (127 acres) over time.
Riparian and wetland habitats that make up riverscapes are critically important to wildlife and support groundwater supplies. The Gunnison Basin Implementation Plan (GBIP) primary goal is to "Protect existing water uses in the Gunnison Basin." A complementary goal #5 is to "protect environmental and recreational water uses." This project meets both the primary and complementary goal by protecting and enhancing existing wetland areas and restoring historic wetland areas to buffer against climate change and to attenuate the flow of water across the landscape for slow release during the dryer months of the year.
This project also meets GBIP goal # 6 "Maintain or, where necessary, improve water quality throughout the Gunnison Basin." This project involves building LTPBR structures in incised headwater drainages. These restoration treatments influence hydrology and geomorphic processes, elevate water tables, increase channel-floodplain connectivity, promote riparian area recovery, reduce peak flows, and increase sediment retention. By restoring these habitats and reversing the cycle of degradation we will be able to prevent additional lowering of the groundwater table.
This project also addresses GBIP complementary goal # 9, "create and maintain active, relevant and comprehensive public education, outreach and stewardship processes involving water resources…" This project is a partnership effort among federal and state land management agencies, the local university, non-profits, and community members in the Gunnison Valley. The project also includes opportunities for volunteers locally and from across the state to come and participate in implementation of LTPBR treatments. In 2021 Phase 1 was supported by approximately 430 volunteer hours by various partners and community members. High County Conservation Advocates will lead volunteer engagement efforts.
Finally, this project will meet the objectives of the Upper Gunnison River Water Conservancy District's planning process which has an overarching goal to "protect existing uses while improving watershed health." For all of the reasons articulated above, this project supports the goals of Colorado's Water Plan and the Gunnison Basin Implementation Plan.

Related Studies

In preparation for the Grand Mesa, Uncompahgre, and Gunnison (GMUG) National Forest - Forest Plan Revision process, the USFS completed an assessment of overall watershed health for GMUG forest lands. This assessment found that of the 235 watersheds on the GMUG, 76 watersheds (approximately one- third of watersheds) are functioning at risk ("Class 2" watersheds). The watershed ratings show that many of our watersheds are experiencing degradation of their physical and biological processes. Specific findings included: 77% of GMUG watersheds are either in fair or poor condition with regards to large woody debris availability for aquatic habitat; 55% of GMUG watersheds are either in fair or poor condition with regards to channel shape and function; 149 watersheds (64%) are rated as "poor" and 22 (9%) as fair for native species. The project is complementary to the award winning Gunnison Basin Wet Meadows Project which also seeks to rehabilitate and sustain historically wet areas.

Taxpayer Bill of Rights

We are not aware of any TABOR issues that affect our application.

Budget and Schedule

This Statement of Work shall be accompanied by a combined Budget and Schedule that reflects the Tasks identified in the Statement of Work and shall be submitted to CWCB in excel format.

Reporting Requirements

Progress Reports: The applicant shall provide the CWCB a progress report every 6 months, beginning from the date of issuance of a purchase order, or the execution of a contract. The progress report shall describe the status of the tasks identified in the statement of work, including a description of any major issues that have occurred and any corrective action taken to address these issues.

Final Report: At completion of the project, the applicant shall provide the CWCB a Final Report on the applicant's letterhead that: (1) Summarizes the project and how the project was completed. (2) Describes any obstacles encountered, and how these obstacles were overcome. (3) Confirms that all matching commitments have been fulfilled. (4) Includes photographs, summaries of meetings and engineering reports/designs. The CWCB will pay out the last 10% of the budget when the Final Report is completed to the satisfaction of CWCB staff. Once the Final Report has been accepted, and final payment has been issued, the purchase order or grant will be closed without any further payment.

Payment

Payment will be made based on actual expenditures and must include invoices for all work completed. The request for payment must include a description of the work accomplished by task, an estimate of the percent completion for individual tasks and the entire Project in relation to the percentage of budget spent, identification of any major issues, and proposed or implemented corrective actions. Costs incurred prior to the effective date of this contract are not reimbursable. The last 10% of the entire grant will be paid out when the final deliverable has been received. All products, data and information developed as a result of this contract must be provided to as part of the project documentation.

Performance Measures

Performance measures for this contract shall include the following: (a) Performance standards and evaluation: Grantee will produce detailed deliverables for each task as specified. Grantee shall maintain receipts for all project expenses and documentation of the minimum in-kind contributions (if applicable) per the budget in the Budget & Schedule Exhibit B. Per Water Plan Grant Guidelines, the CWCB will pay out the last 10% of the budget when the Final Report is completed to the satisfaction of CWCB staff. Once the Final Report has been accepted, and final payment has been issued, the purchase order or grant will be closed without any further payment. (b) Accountability: Per Water Plan Grant Guidelines full documentation of project progress must be submitted with each invoice for reimbursement. Grantee must confirm that all grant conditions have been complied with on each invoice. In addition, per Water Plan Grant Guidelines, Progress Reports must be submitted at least once every 6 months. A Final Report must be submitted and approved before final project payment. (c) Monitoring Requirements: Grantee is responsible for ongoing monitoring of project progress per Exhibit A. Progress shall be detailed in each invoice and in each Progress Report, as detailed above. Additional inspections or field consultations will be arranged as may be necessary. (d) Noncompliance Resolution: Payment will be withheld if grantee is not current on all grant conditions. Flagrant disregard for grant conditions will result in a stop work order and cancellation of the Grant Agreement.

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Introduction & Purpose

Colorado's Water Plan calls for an outreach, education, public engagement, and innovation grant fund in Chapter 9.5.

The overall goal of the Engagement & Innovation Grant Fund is to enhance Colorado's water communication, outreach, education, and public engagement efforts; advance Colorado's water supply planning process; and support a statewide water innovation ecosystem.

The grant fund aims to engage the public to promote well-informed community discourse regarding balanced water solutions statewide. The grant fund aims to support water innovation in Colorado. The grant fund prioritizes measuring and evaluating the success of programs, projects, and initiatives. The grant fund prioritizes efforts designed using research, data, and best practices. The grant fund prioritizes a commitment to collaboration and community engagement. The grant fund will support local and statewide efforts.

The grant fund is divided into two tracks: engagement and innovation. The Engagement Track supports education, outreach, communication, and public participation efforts related to water. The Innovation Track supports efforts that advance the water innovation ecosystem in Colorado.

Application Questions

*The grant fund request is referred to as "project" in this application.

Overview (answer for both tracks)
In a few sentences, what is the overall goal of this project? How does it achieve the stated purpose of this grant fund (above)?
While this project's primary objective falls into the Environmental and Recreation project type, Task 3 focuses entirely on outreach, education, and public engagement. Our project presents an opportunity to educate and engage the public on topics listed in chapter 9.5 of the Colorado Water Plan. The geography and history of Taylor Park allow outreach, education, public engagement, and innovation to occur before, during, and after project implementation.
Who is/are the target audience(s)? How will you reach them? How will you involve the community?
Our engaged audiences during Phase 1 of the project were students from Western Colorado University, members of the Gunnison Valley Beaver Believers, local land managers, and community members. During Phase 1 of the project, three community volunteer days were held during which volunteers were educated on low-tech process-based restoration (LTPBR) treatments, and wetland habitats, and were supervised during the implementation of LTPBR treatments. Phase 2 of the project will target the same audiences as well as students from two local high schools. HCCA manages a robust volunteer stewardship program, holds the ability to recruit residents from Gunnison County, and is currently developing a partnership with the two local high schools to engage students in environmental restoration projects. Community members will be invited to participate during multiple stages of the project through HCCA's volunteer program, the Gunnison Valley Beaver Believers' network, and advertisements in the two local newspapers.

Describe how the project is collaborative or engages a diverse group of stakeholders. Who are the partners in the project? Do you have other funding partners or sources?

We are continuing to leverage the collaborative support of partners and community members that made Phase 1 of the project a success. Our partners include: Coal Creek Watershed Coalition, Community Volunteers, Gunnison County, High Country Conservation Advocates, Private Landowners, local restoration practitioners, Sustainable Tourism & Outdoor Recreation Committee, Taylor Park Cattle Pool, Trout Unlimited, Upper Gunnison River Water Conservation District, Western Colorado University, Colorado Parks and Wildlife, Defenders of Wildlife, Bureau of Land Management, National Park Service, and the US Forest Service.

Describe how you plan to measure and evaluate the success and impact of the project?

Engagement will by recorded and tracked by:

Community Volunteer Workdays:

- Volunteer attendee list and log of hours
- Volunteer coordinator reports

Education and outreach materials:

- Educational Brochure on living with beaver
- Website communicating information about projects, successes, LTPBR techniques, the importance of beaver and wetlands, and non-lethal beaver management strategies for local stakeholders

Academic and community workshop days:

- Workshop attendee lists
- Workshop coordinator timesheet and reports

What research, evidence, and data support your project?

This project relies on community members engaging with a diverse group of multiple government agencies and nonprofit organizations. According to Bassler et al, 2008, outcomes of community engagement in projects often improve citizens' knowledge and skills in problem solving. Participants learn about the issues in-depth. Greater knowledge allows them to see multiple sides of the problem. Citizens can practice communication and decision-making skills. Another outcome may likely result in an increased trust in community organizations and governance. Working together improves communication and understanding. Knowing what government, community citizens and leaders, and organizations can and cannot do may reduce future conflict. With this project we aim to continue to gain more local volunteers and expertise to expand our locally led climate adaptation strategies.

Describe potential short- and long-term challenges with this project.

The engagement aspect of this project does not face any major challenges. Initial short-term hurdles may include establishing the proper protocols to make the most efficient use of the volunteers' time. Project leaders must clearly be able to communicate the goals and objectives of the project to community members.

Please fill out the applicable questions for either the Engagement Track or Innovation Track, unless your project contains elements in both tracks. If a question does not relate to your project, just leave it blank. Please answer each question that relates to your project. Please reference the relevant documents and use chapters and page numbers (Colorado's Water Plan, Basin Implementation Plan, PEPO Education Action Plan, etc.).

Engagement Track
Describe how the project achieves the education, outreach, and public engagement measurable objective set forth in Colorado's Water Plan to "significantly improve the level of public awareness and engagement regarding water issues statewide by 2020, as determined by water awareness surveys."
Through community volunteer workdays, educational outreach materials, academic and community workshop days, this project will improve the level of public awareness and engagement regarding water issues. The relevant issues include: Water-related recreation opportunity enhancement, riparian, instream, and wetland habitat improvement, promotion of riparian-dependent species and plant communities, wildfire mitigation, flood mitigation, and drought and climate change mitigation.
Describe how the project achieves the other measurable objectives and critical goals and actions laid out in Colorado's Water Plan around the supply and demand gap; conservation; land use; agriculture; storage; watershed health, environment, and recreation; funding; and additional.
The project supports the measurable objectives and critical goals and actions defined in the Colorado Water Plan by working to enhance communication, outreach, education, and public engagement efforts. Education and outreach materials, community volunteer days, and workshops will educate a diverse group of stakeholders on the importance of beaver as a keystone species, how to co-exist with beaver, principles of LTPBR restoration, and the benefits of restoring historic wetlands. Our education and outreach efforts, as well as our overall ecological restoration targets, align directly with the following goals (for more detail see Water Project Justification section): **Goals** • **Section 6.6, pg 6-157**: Promote restoration, recovery, sustainability, and resiliency of endangered, threatened, and imperiled aquatic- and riparian dependent species and plant communities. • **Section 6.6, pg 6-157:** Protect and enhance economic values to local and statewide economies that rely on environmental and recreational water uses, such as fishing, boating, waterfowl hunting, wildlife watching, camping, and hiking. • **Section 6.6, pg 6-157:** Understand, protect, maintain, and improve conditions of streams, lakes, wetlands, and riparian areas to promote self-sustaining fisheries and functional riparian and wetland habitat to promote long-term resiliency • **Section 7.2, pg 7-11**: Promote water resource resilience from natural disasters through strategic preparedness and response. • **Section 10.3, pg 10-9:** Use a grassroots approach to formulate projects and methods that avoid some of the undesirable outcomes of the supply-demand gaps. The plan addresses the gap from multiple perspectives (e.g., water storage, reuse, recycling, integrated water management, restoration, and conservation). • **Section 10.3, pg 10-10:** Maintain Colorado's agricultural productivity, support of rural economies, and food security (through meaningful incentives and grassroots efforts). • **Section 10.3, pg 10-12**: The protection and restoration of water quality should be a key objective when planning for Colorado's current and future consumptive, recreational, and environmental water needs. • **Section 10.3, pg 10-12**: Protect and restore watersheds critical to water infrastructure, environmental or recreational areas. • **Section 10.3, pg 10-13**: Inform Coloradans about water issues to encourage engagement and innovation in determining Colorado's water future. • **Section 10.3, pg 10-14**: Respond to, monitor, and prepare for climate change **Critical Actions:** • Provide grants, loans, and technical support to update and improve Colorado's aging agricultural infrastructure, especially where improvements provide multiple benefits.

- Develop common metrics for assessing the health and resiliency of watersheds, rivers, and streams.
- Promote the sustainability of endangered, threatened, and imperiled aquatic- and riparian-dependent species and communities.
- Evaluate and incorporate appropriate adaptation for the potential effects of climate change on municipal, industrial, environmental, and agricultural projects and methods that address the water supply gaps.
- Work on creating resilient watersheds to protect, restore, and enhance water quality in the face of climate change.

Education and outreach materials on the importance of beaver as a keystone species, how to co-exist with beaver, principles of LTPBR restoration, and the benefits of restoring historic wetlands will be produced for both land managers and the public. These will include a website, and printed brochures. The website will communicate information about projects, successes, LTPBR techniques, the importance of beaver and wetlands, and non-lethal beaver management strategies for local stakeholders. The publication and dissemination of education materials will address objectives laid out in the Colorado Water Plan and how this project applies to water supply and demand, water conservation, land-use planning on both public and private lands, agricultural benefits, water attenuation, watershed health, environmental services, and recreation opportunities.

Describe how the project achieves the education, outreach, and public engagement goals set forth in the applicable Basin Implementation Plan(s).

The Gunnison Basin Roundtable Implementation Plan has listed the primary basin goal: Protect existing uses in the Gunnison Basin. The relevant complimentary goal the roundtable listed projects create and maintain active, relevant and comprehensive public education, outreach and stewardship processes involving water resources in the six sectors of the Gunnison Basin (Gunnison Basin Implementation Plan, page 10). Our project will provide educational materials on beavers and the restoration of wetlands, opportunities for community members and students to engage in the stewardship of riparian areas, and on-site educational opportunities through workshops.

Describe how the project achieves the basin roundtable's PEPO Education Action Plans.

This project aligns with these sections of the Gunnison Basin Roundtable Education Action Plan for 2021-2022:

-a.h.) Collaborating with K-12 educators, especially those involved with water related activities (e.g., seminars, field trips, and public forums) (EAP a.h, page 2)

-a.i.) Partnering with related higher education facilities such as Western Colorado University's Environmental and Sustainability Program (Water emphasis section) to share pertinent water resource information (EAP a.i, page 2)

-b) This above-mentioned water resource information is to be customized and marketed to several distinct audiences, including:

i. basin residents, state citizens, community leaders and decision makers
ii. the "next generation" of Gunnison Basin water users such as K-12, high school and secondary education students as well as young farmers / ranchers of the Gunnison River Basin;
iii. experienced and new water users in all sectors, including municipal and industrial water providers;
iv. current and potential GBRT participants and WSRF applicants, especially those that are focused CWP and GBIP activities;
v. new target audiences, as appropriate, that may be identified

c) The abovementioned water resource information will support education related to current and emerging water resource issues, for example –

a. understanding and protecting historical water uses
b. water quality (e.g., selenium, nutrients, salinity, bacteria, etc.)
c. hydro-climatic influences and related impacts (e.g., climate variability, warming and dust-on-snow) that directly affect water resources in the Gunnison Basin
d. concepts and topics that relate to new and evolving regulations, permitting, river restoration, groundwater hydrology, drought planning,
e. consumptive and non- consumptive needs assessments
f. management of public lands and watershed areas that impact Gunnison Basin water resources
(EAP page 3)

The following table describes the Colorado Water Plan Grant Goals that will be met through the Trail Creek Wetland Restoration Project.

CWP Goal	Page Reference	How Project meets Goal
Promote restoration, recovery, sustainability, and resiliency of endangered, threatened, and imperiled aquatic- and riparian-dependent species and plant communities.	Section 6.6, pg 6-157	Wetland Program Priority Tier 1 species of concern such as the Greater Sandhill Cranes, Western Yellow-billed Cuckoos, Boreal Toads, and Leopard Frogs.
Protect and enhance economic values to local and statewide economies that rely on environmental and recreational water uses, such as fishing, boating, waterfowl hunting, wildlife watching, camping, and hiking.	Section 6.6, pg 6-157	Hunting and fishing are common recreational activities in Taylor Park. The Trail Creek drainage offers opportunities for fishing, waterfowl hunting, wildlife watching and camping.
Understand, protect, maintain, and improve conditions of streams, lakes, wetlands, and riparian areas to promote self-sustaining fisheries and functional riparian and wetland habitat to promote long-term resiliency.	Section 6.6, pg 6-157	This project is designed to restore riparian and wetlands habitats to enhance watershed resiliency in an arid landscape.
Use a grassroots approach to formulate projects and methods that avoid some of the undesirable outcomes of the supply-demand gaps. The plan addresses the gap from multiple perspectives (e.g., water storage, reuse, recycling, integrated water management, restoration, and conservation).	Section 10.3, pg 10-9	A Watershed Restoration Action Plan (WRAP) for Trail Creek-Upper Taylor River watershed will be produced to identify essential projects for watershed health and address supply-demand gaps from multiple perspectives.
Maintain Colorado's agricultural productivity, support of rural economies, and food security.	Section 10.3, pg 10-10	This project works with agricultural producers and stakeholders to protect irrigation infrastructures from conflict with beaver, protecting wetlands above irrigation headgates and improving access to water during drought.
The protection and restoration of water quality should be a key objective when planning for Colorado's current and future consumptive, recreational, and environmental water needs.	Section 10.3, pg 10-12	Headwater streams are important influences on water quality and quantity. LTPBR treatments can increase sediment retention,which can increase water quality.
Protect and restore watersheds critical to water infrastructure, environmental or recreational areas.	Section 10.3, pg 10-12	The project uses LTPBR techniques to increase the health and quality of our water resources above Taylor Reservoir, working to achieve our watershed health goals.
Inform Coloradans about water issues to encourage engagement and innovation in determining Colorado's water future.	Section 10.3, pg 10-13	Education and outreach materials, community volunteer days, and workshops will educate a diverse group of stakeholders on the importance of restoring historic wetland, beaver as a

		keystone species, co-exist with beaver, and principles of LTPBR.
Respond to, monitor, and prepare for climate change	Section 10.3, pg 10-14	Restoring degraded headwater streams improves their resilience to extreme events like wildfire and flood and improves their ability to retain sediment, sequester carbon, and filter water while sustaining native riparian communities.

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Last Updated: May 2021

Colorado Water Conservation Board
Water Plan Grant – Statement of Work – Exhibit A

Statement Of Work	
Date:	**November 28, 2021**
Name of Grantee:	**National Forest Foundation**
Name of Water Project:	**Trail Creek Wetland Restoration Project – Phase 2**
Funding Source:	**Colorado Water Plan Grant**

Water Project Overview:

The project is an ongoing effort with broad community support. Our overall goal is to restore historic wetlands using low-tech process-based restoration (LTPBR) principles and techniques in degraded drainages in Taylor Park.

LTPBR restoration principles and techniques are becoming increasingly recognized as key tools to improve watershed health. The award-winning Gunnison Basin Wet Meadows Project has used LTPBR strategies, specifically Zeedyk Structures, to build resilient ecosystems better able to withstand drought and changes in precipitation patterns by attenuating water across the landscape and by restoring historically wet areas. The project aims to continue this community supported effort by working to restore wetland and riverscape habitats by implementing LTPBR treatments to reconnect riparian areas that have become hydrologically and ecologically disconnected from incised stream channels.

LTPBR structures are built by hand, with the help of small machines, out of natural materials. Combinations of structures, grouped into complexes, work together to mimic, promote, and sustain natural physical and biological processes. The sites selected for treatment were historically beaver complexes, and sustainable long-term recovery ultimately depends on beavers.

Recently the Draft Revised Land Management Plan for the Grand Mesa, Uncompahgre, and Gunnison National Forests (GMUG) integrated the use of beaver-based restoration approaches in draft planning documents about future desired conditions on the GMUG. In these comments the Forest Service recognized that the science has changed and proposed adopting nature-based solutions and LTPBR strategies as ways to provide better water security for people and wildlife. The project aims to improve beaver habitat with the idea that beavers will naturally move into the area and maintain existing dams or build new ones, continuing the process of building and maintaining wetlands.

Land managers and other stakeholders collaborated with restoration practitioners to identify Trail Creek as the first drainage for the project. Trail Creek was selected as an ideal site for treatment because it had the appropriate geologic context, hydrologic context, evidence of recent beaver activity, geomorphic complexity, native vegetation, beaver metapopulation connectivity, low conflict potential, and rapid recovery potential.

In its current state, Trail Creek has become a single sinuous stream thread, characterized by a shallow and contiguous riffle. This sort of homogenous stream makes for poor fish habitat as it does not provide the complexity of habitat that fish need for all stages of life. The channel has become incised and no longer has conductivity between the stream and the floodplain. One result of this is that there is a lack of water on the

flood plain and the riparian vegetation that exists now lacks biodiversity of plant species typically found in complex wetland areas. The current wetland is drying out and is transitioning into a non-wetland corridor, evidence of this is the encroachment of conifers and cinquefoil into the 100-year floodplain which historically (with beaver dams) would have been inundated with water and wetland plants.

In Phase 1, restoration practitioners, contractors, partner organizations, and volunteers worked together to build 32 beaver dam analogs, 12 sod speed-bump structures, and 18 woody material structures along 0.3 miles of stream corridor on Trail Creek. In addition to the structural treatments, volunteers harvested approximately 250 tall-stature willow stems from riparian areas on the Taylor River and planted them in the riparian area along Trail Creek.

In Phase 2 we aim to restore natural stream-wetland conditions to as much of the mainstem of Trail creek as possible by addressing the remaining 2.7 miles of stream corridor on Trail Creek. This restoration approach can feasibly improve conditions over about 3.0 miles of riverscape corridor, about 127 acres. With a commitment to ongoing care and stewardship in the form of annual maintenance and construction of new structures as needed, the positive effects of this work can be extended for years or decades. Long-term improvements and decreasing need for ongoing maintenance will depend on how well the treatments promote and sustain beaver activity and processes over time.

Project Objectives:

- **Water-related recreation opportunity enhancement –** We aim to protect all road crossings from being blocked by beaver and keep them open to the public for recreational access. Restoration work will enhance opportunities for fishing, waterfowl hunting, and wildlife watching by increasing habitat heterogeneity including providing pools of deep water, essential habitat for wildlife during migration, winters, wildfire, and drought.
- **Riparian, instream, and wetland habitat improvement –** Currently, many headwater streams in the project area are characterized by incised channels, a lack of structural diversity, and degrading instream habitat heterogeneity. We aim to reconnect streams to their native floodplains and thereby restore their historic hydrologic functions, promote instream habitat diversity, and increase access to water resources for riparian and wetland vegetation.
- **Promotion of riparian-depended species and plant communities –** The species we would most like to promote on the landscape is the beaver. Beaver-influenced wetlands provide crucial habitat for aquatic, wetland obligate, and terrestrial wildlife species. The restored wetland conditions will attract and better support beaver than the incised channels. By creating suitable corridors and habitat for beavers, we hope to attract them to our restoration areas and allow them to maintain wetland habitat and function. The habitat conditions created through restoration work and maintained by beavers are favorable for Colorado Tier 1 species of concern such as the Greater Sandhill Cranes, Western, Yellow-billed Cuckoos, Boreal Toads, and Leopard Frogs.
- **Wildfire mitigation –** Riparian and wetland restoration is an important component of wildfire management and mitigation, as wetlands provide critical ecosystem services both during and after a burn. During an active wildfire, large, well-functioning beaver complexes are some of the only features on the landscape that do not burn. The saturated wetland habitat creates a natural fire break, preventing small fires from spreading and serving as critical wildlife refugia in mega-fires. After an area has experienced a burn, these systems retain the fine ash and sediment that enters waterways as runoff from burn scar, reducing downstream turbidity.
- **Flood mitigation –** Restoration efforts and beaver activity force hydraulic complexity which, in turn, build more complex channel and floodplain habitats. The greater the complexity of a floodplain habitat, the more resilient it is to flood disturbance. The streams in the project area are headwater streams and are not located near major infrastructure. However, restoring wetland and riparian function in the headwater streams could mitigate downstream flood damage to a small degree.

Last Updated: May 2021

Drought and climate change mitigation – Restored riverscapes provide greater access to water resources for riparian and wetland vegetation, making the vegetation more productive and less dependent on precipitation over time. By augmenting production of riparian vegetation and encouraging beavers to build complexes, we increase the resilience of the riverscape. Such riverscapes can maintain water even through drought, providing essential habitat refugia for wildlife, and buffering the impacts of drought and climate change.

Tasks

Task 1 – Restoration Treatment Implementation

Description of Task:

Riparian wetlands have been severely impacted by human activities over the last 150 years, with more than 70% of riparian forests lost in the U.S. during the Euro American period. In Colorado, 50% of the estimated 2,000,000 acres of wetlands have been lost or degraded because of anthropogenic activities. Intense land use in Taylor Park dating back to the late 1800s has severely impaired many headwater systems. This historical use has resulted in a persisting heritage of dried wetlands and incised stream channels.

LTPBR practices using simple, low unit-cost, structural additions to riverscapes to mimic natural functions and promote geomorphic and fluvial processes can work to reverse legacy stressors and recover the ecological functions of riparian and wetland ecosystems. This strategy is an adaptive approach to the protection, enhancement, and restoration of riverscape ecosystems to their historical conditions by addressing the underlying causes of degradation to its current state. LTPBR treatments are temporary, non-engineered, hand-built structures made of natural materials including slash, gravel, mud, and sod (sourced on-site).

Two of the common LTPBR structures we will construct are Beaver Dam Analogues (BDAs) and Post-Assisted Log Structures (PALS). BDAs mimic and promote beaver activity by influencing the hydrology and geomorphic processes, elevating water tables, maintaining channel-floodplain connectivity, increasing riparian areas, reducing peak flows, and increasing sediment retention. PALS mimic and promote the process of wood accumulation in a system to influence hydrology and geomorphic processes and help promote sediment and nutrient retention. Both restoration structures promote channel incision recovery by forcing channel widening and aggradation, altering erosion and deposition patterns, and increasing channel-floodplain connectivity, therefore increasing the complexity of the system, and creating high flow refugia for aquatic species.

In areas with degraded riparian vegetation quality, we will plant native trees and shrubs to encourage the establishment of riparian vegetation that are used by beavers for food and dam building, reducing erosion, and increasing vegetative structural diversity.

The US Forest Service, Gunnison County, and local agricultural producers will collaborate to improve road crossings and irrigation infrastructure so that they are more compatible with riverscapes and beaver activity. Many conflict locations can be managed through the installation of flow devices (keystone fences, distraction dams, pond levelers, etc.). Some road areas need additional design work, including the raising of roads and installation of Aquatic Organism Passages (AOPs) to protect watersheds and infrastructure, improve transportation systems, benefit adjacent resources, and improve safety. Partners will collaborate to select six sites where road crossings or irrigation infrastructure can be improved with flow devices to reduce beaver conflict and protect wetland habitat and beaver populations near human infrastructure. We are pursuing other funding sources to support road work where necessary.

Method/Procedure:

- **LTPBR Treatments** – Postless and post-assisted BDAs will be constructed using locally-harvested willow, rocks, sod, and gravel. Post-assisted BDAs will be supported by untreated wooden posts driven into the stream bed. Sod speedbump structures are included in the postless BDA category. Estimated height ranges from 0.5 to 2.5 feet.

  Bank-attached and channel-spanning woody material structures will be constructed using locally harvested willow and conifer logs, branches, and slash. PALs (post-assisted log structures) are secured with posts, but not all the structures will use posts.

  For this project we anticipate building LTPBR 300 structures over a two-year period.

- **Riparian Revegetation** – For this project we will harvest native species, like willows, soak them in water to help speed up root formation, and then plant the cuttings in the desired locations.
- **Flow Devices** – Partners will collaborate to select six sites where road crossings or irrigation infrastructure can be improved with flow devices in order to reduce beaver conflict and protect wetland habitat and beaver populations near roads and irrigation infrastructure. Contractors will collaborate to determine the best protection method and conduct installations in 2022 and 2023.

Deliverable:

- Implementation of restoration treatments and riparian revegetation in the Trail Creek drainage, targeting the installation of 300 structures along 2.7 stream miles over 2 years.
- Installation of six flow devices at priority sites within Taylor Park.

Tasks

Task 2 – Monitoring & Evaluation

Description of Task:

EcoMetrics will lead monitoring and studies to document ecological response to restoration treatments and evaluate project effectiveness. Data collection and analysis will focus on riverscape health factors including flow regime, riverscape hydrology, floodplain connectivity, riverscape dynamics, riparian vegetation dynamics, and physical habitat heterogeneity.

Data collection will occur both prior to project implementation and post-completion to document initial system responses. Collected data will be analyzed and used to produce scientific reports monitoring project effectiveness for funders, project partners other stakeholders, and the public.

Method/Procedure:

- **Photo points** - repeat on-the-ground photography at a fixed point over a period to document visual changes.
- **Aerial imagery** - repeat aerial imagery collection using an unmanned aerial vehicle (UAV) over a period. High quality aerial imagery can be used to document visual changes and to conduct quantitative analyses.
- **Topographic surveys** - repeat aerial photogrammetric surveys using a UAV over a period to document changes in topography.
- **Field surveys** - field data collection to methods to quantify key riverscape health factors such as riverscape hydrology, riverscape dynamics, riparian vegetation, physical heterogeneity, and aquatic biota.
- **Wetland delineation** - field assessment of hydrology, soil, and vegetation indicators to identify wetland boundaries and document expansion over time according to US Army Corps of Engineer protocols.

Deliverable:

- The collection and analysis of relevant data via photo points, aerial imagery, field surveys, and wetland delineation.
- A succinct written report containing data analysis, metrics, and evaluation will be produced and delivered to funders, project partners and the public via our education and outreach activities (see Task 3).

Tasks

Task 3 – Volunteer & Community Engagement

Description of Task:

Community volunteer workdays- LTPBR projects are an excellent opportunity for volunteer effort. The volunteer coordination and community engagement component will drive buy-in, pride, and a sense of ownership to the project. Mobilizing diverse volunteers from a broad public spectrum to engage in wetland restoration and habitat improvement leads to an educated and aware community base. The accessible location and process-based nature of this project provide an excellent avenue to engage diverse community members in contributing to the legacy of wetland restoration efforts in Taylor Park.

To facilitate community volunteer days volunteers must be recruited, support supplies (food, water, safety equipment, tools, etc.) must be provided, and a fun but professional atmosphere must be maintained. The goal is to provide volunteers with rewarding, hands-on work that accomplishes wetland restoration. To accomplish this, Task 3 involves the coordination, training, and oversight of volunteer teams.

Educational workshops – In addition to community volunteer workdays we will hold two LTPBR workshops. One workshop will be held as a field trip for Ecological Restoration students at Western and the second will be held for local land managers. In addition to the workshops, partners will attend the local Rural Landowner Day in Gunnison to lead field tours of beaver conflict mitigation structures and wetland restoration project sites.

Education and outreach materials – There is an educational gap in the public about the importance of beaver as a keystone species and how to coexist with beaver successfully. It is not uncommon for members of the public to view beaver as nothing more than varmint or a nuisance. Many land owners see the destruction of dams and the killing of beaver as their first line of defense when conflicts arise around infrastructure. Education and outreach materials on the importance of beaver as a keystone species, how to co-exist with

beaver, and LTPBR restoration will be produced for both land managers and the public. These will include a website and printed brochures.

Method/Procedure:

Community volunteer workdays

HCCA will coordinate 12 -16 volunteer workdays for this project:

- 2-4 workdays in 2022 that will focus on staging and preparing materials for implementation
- 4 workdays in 2022 that will focus on structure implementation
- 2-4 workdays in 2023 that will focus on staging and preparing materials for implementation
- 4 workdays in 2023 that will focus on structure implementation

Before volunteers begin project work, HCCA and project partner leaders will provide education about project objectives and structure design. This will include educating and training volunteers on safety goals, proper tool use and technique, project site selection, and reducing the risk of introducing invasive species into the project site.

Educational workshops

Partners will coordinate two educational workshops for this project:

- One workshop day will be held as a field trip for Ecological Restoration students at Western.
- One workshop day will be held for local land managers from local, state, and federal agencies.

Educational workshops will introduce participants to LTPBR approaches to restoring riverscapes (streams and their associated riparian and wetland areas) and how these approaches benefit wildlife, fish, and working lands. Participants will learn the theory guiding LTPBR techniques and gain practical experience building simple, hand-built structures including beaver dam analogs (BDAs), woody material structures (including PALS – post-assisted log structures), and sod speed bump structures.

Education and outreach materials

Partners will collaborate to produce a website which can disseminate information about LTPBR projects, successes, riverscape principles, the importance of beaver and wetlands, and non-lethal beaver management strategies for local stakeholders.

Partners will collaborate to create an educational brochure which can be used by local, state, and federal agencies to educate internally and distribute to the public about co-existing with beaver, including non-lethal management methods around human infrastructure.

Deliverable:

Last Updated: May 2021

Community Volunteer Workdays:

- Volunteer hour log
- Volunteer waivers
- Volunteer coordinator timesheet and reports
- Photo documentation of project staging and implementation

Academic and community workshop days:

- Workshop attendee lists
- Workshop coordinator timesheet and reports
- Photo documentation of workshop activities

Education and outreach materials:

- Educational Brochure on living with beaver
- Website communicating information about projects, successes, LTPBR techniques, the importance of beaver and wetlands, and non-lethal beaver management strategies for local stakeholders

Tasks

Task 4 – Future Restoration Project Scoping

Description of Task:

This task encompasses initial planning efforts to develop the next phases of the project. We have identified 11 drainages on the Grand Mesa Uncompahgre and Gunnison National Forest in Taylor Park that could be improved through restoration work. These streams need to be further assessed for geomorphic and hydrologic context, vegetation community context, recovery potential, beaver metapopulation connectivity, potential conflicts, technical feasibility, and stakeholder interest.

To support restoration activities, beaver metapopulation dynamics will be studied by Dr. Madelon van de Kerk's lab at Western. Many LTPBR projects are implemented with the hope that they eventually become stable, self-regulating systems. By restoring wetland habitat, we aim for beavers to take advantage of the improved habitat conditions to recolonize the site and regain their natural function as ecosystem engineers. An improved understanding of beaver space use and population dynamics, as well as their underlying drivers, is vital to improve stream and wetland restoration strategies.

Academic partners at Western will collaborate with US Forest Service staff to develop a Watershed Restoration Action Plan (WRAP) for the Trail Creek-Upper Taylor River 14-digit HUC watershed to identify essential projects for watershed health and address supply-demand gaps from multiple perspectives.

Based on the findings of the watershed and landscape assessments, the USFS will complete NEPA and acquire Army Corp permits to assure projects remain in compliance with the law. Ideally permits and clearances would cover 6 years of shelf ready subprojects, allowing us to work at pace and scale to make a basin-wide difference above Taylor Reservoir.

Method/Procedure:

Last Updated: May 2021

EcoMetrics will lead the following activities:

- Complete a watershed/landscape assessment by conducting field surveys to identify and evaluate sites based on restoration potential (functional lift), feasibility, and partner preferences.
- Based on the watershed/landscape assessment, identify priority drainages for restoration treatments and create an implementation plan covering a 6-year period (2022-2028).
- Create prescriptive treatment plans for the priority projects planned for implementation in 2022-2028.

The U.S. Forest Service will lead the following activity:

- Complete NEPA and acquire Army Corp permits to assure shovel-ready projects from 2022-2028

Academic partners at Western will lead the following activities:

- Conduct a study targeted at documenting beaver population density, range, and activity in Taylor Park. Field sites (control, reference, and treatment) will be established in and around project drainages and monitored for beaver movement and space use, survival and mortality causes, and if restoration treatments affect colonization and range expansion.
- Develop a Watershed Restoration Action Plan (WRAP) for the Trail Creek-Upper Taylor River 14-digit HUC watershed that identifies the suite of essential projects needed to change or maintain condition class and estimate their costs.

Deliverable:

- A six-year restoration plan for phased implementation of restoration treatments in priority drainages.
- Completion of NEPA and Army Corp permits to assure shovel-ready projects from 2022-2028.
- Support academic research of beaver metapopulations to inform future restoration work.
- A Watershed Restoration Action Plan (WRAP) for the Trail Creek-Upper Taylor River 14-digit HUC watershed.

Tasks

Task 5 – Project Administration, Contracting, and Permit Compliance

Description of Task:

Task 5 involves the administrative and management requirements for project implementation, including project oversight, management, contracting and partner coordination. It includes addressing any other federal regulatory requirements and determining legal compliance requirements for volunteer participation.

Approximately .75 miles of Trail Creek has been NEPA cleared and permitted by the Corp of Engineers (NWP27) for restoration treatment. NEPA clearance and permitting will be conducted by the USFS for the remaining portion of the geographic area targeted for Phase 2.

Method/Procedure:

- Completing all applicable paperwork in coordination with NFF, HCCA, USFS, restoration practitioners, and other stakeholders
- Tracking costs and budget
- Managing invoicing and reimbursement requests

- Completing periodic reports

Deliverable:

- Necessary permits/procedural documents (i.e., NEPA docs), reports, and project components will be completed within the allocated time frame at the allocated cost.

Budget and Schedule

This Statement of Work shall be accompanied by a combined Budget and Schedule that reflects the Tasks identified in the Statement of Work and shall be submitted to CWCB in excel format.

Reporting Requirements

Progress Reports: The applicant shall provide the CWCB a progress report every 6 months, beginning from the date of issuance of a purchase order, or the execution of a contract. The progress report shall describe the status of the tasks identified in the statement of work, including a description of any major issues that have occurred and any corrective action taken to address these issues.

Final Report: At completion of the project, the applicant shall provide the CWCB a Final Report on the applicant's letterhead that:

- Summarizes the project and how the project was completed.
- Describes any obstacles encountered, and how these obstacles were overcome.
- Confirms that all matching commitments have been fulfilled.
- Includes photographs, summaries of meetings and engineering reports/designs.

The CWCB will pay out the last 10% of the budget when the Final Report is completed to the satisfaction of CWCB staff. Once the Final Report has been accepted, and final payment has been issued, the purchase order or grant will be closed without any further payment.

Payment

Last Updated: May 2021

Payment will be made based on actual expenditures and must include invoices for all work completed. The request for payment must include a description of the work accomplished by task, an estimate of the percent completion for individual tasks and the entire Project in relation to the percentage of budget spent, identification of any major issues, and proposed or implemented corrective actions.

Costs incurred prior to the effective date of this contract are not reimbursable. The last 10% of the entire grant will be paid out when the final deliverable has been received. All products, data and information developed as a result of this contract must be provided to as part of the project documentation.

Performance Measures

Performance measures for this contract shall include the following:
(a) Performance standards and evaluation: Grantee will produce detailed deliverables for each task as specified. Grantee shall maintain receipts for all project expenses and documentation of the minimum in-kind contributions (if applicable) per the budget in Exhibit C. Per Grant Guidelines, the CWCB will pay out the last 10% of the budget when the Final Report is completed to the satisfaction of CWCB staff. Once the Final Report has been accepted, and final payment has been issued, the purchase order or grant will be closed without any further payment.
(b) Accountability: Per Grant Guidelines full documentation of project progress must be submitted with each invoice for reimbursement. Grantee must confirm that all grant conditions have been complied with on each invoice. In addition, per Grant Guidelines, Progress Reports must be submitted at least once every 6 months. A Final Report must be submitted and approved before final project payment.
(c) Monitoring Requirements: Grantee is responsible for ongoing monitoring of project progress per Exhibit A. Progress shall be detailed in each invoice and in each Progress Report, as detailed above. Additional inspections or field consultations will be arranged as may be necessary.
(d) Noncompliance Resolution: Payment will be withheld if grantee is not current on all grant conditions. Flagrant disregard for grant conditions will result in a stop work order and cancellation of the Grant Agreement.

COLORADO
Colorado Water Conservation Board
Department of Natural Resources

Colorado Water Conservation Board

Water Plan Grant - Exhibit C
Budget and Schedule

Prepared Date: November 19th, 2021
Name of Applicant: National Forest Foundation
Name of Water Project: Trail Creek Wetland Restoration Project - Phase 2
Project Start Date: March 2022
Project End Date: December 2023

Task No.	Task Description	Task Start Date	Task End Date	Grant Funding Request	Match Funding	Total
1	Restoration Treatment Implementation	Jun-22	Sep-23	$65,000	$198,000	$263,000
2	Monitoring & Evaluation	August 2022	Nov 2023	$12,000	$15,000	$27,000
3	Volunteer Coordination & Community Engagemen	June 2022	September 2023	$21,000	$26,000	$47,000
4	Project Development	June 2022	Nov 2023	$18,000	$48,500	$66,500
5	Project Administration	May 2021	Nov 2023	$17,400	$41,625	$59,025
			Total	$133,400	$329,125	$462,525

COLORADO
Parks and Wildlife
Department of Natural Resources

Gunnison Office
300 W. New York
Gunnison, CO 81230
P 970.641.7060 | F 970.641.7883

November 18, 2021

Chris Sturm
Colorado Water Conservation Board
Water Plan Grant Application
Chris.Sturm@state.co.us

Dear Mr. Sturm:

Colorado Parks and Wildlife's Gunnison Field Office would like to support the Gunnison National Forest - Gunnison Ranger District's (GRD) application, Taylor Park Wetland Restoration Project (TPWRP) to the National Forest Foundation (NFF). This project aims to enhance and restore historic wetlands in the Taylor Park Basin through mimicking and restoring the natural processes that beaver (*Castor canadensis*) provide in the ecosystem. These types of restoration projects are essential to increasing drought resiliency, which ultimately benefits all down-stream water users and dependent wildlife by increasing natural water storage and promoting late season water flows.

The TPWRP is an ongoing and growing collaborative effort with broad support to restore stream, riparian, and wetland habitat in the headwaters of the Gunnison River. Last year, the GRD successfully completed a wide-scale volunteer project in the Trail Creek area, constructing 32 beaver dam analog structures, 12 sod speedbump structures, and 18 other wood material structures within a 0.3-mile stream corridor. The GRD is planning to build off of this success, implementing additional restorative structures in several of the various Taylor Park drainages where beaver historically were present or could potentially be reintroduced. Colorado Parks and Wildlife is an active partner and shares the GRD's vision of enhancing these riverscapes through low-tech natural processes.

The TPWRP is a prime example of a successful partnership working to provide stewardship and restoration activities on the GRD. Colorado Parks and Wildlife hopes the NFF will continue to support the GRD's efforts to improve forest health, wetland productivity, and wildlife habitat on the GRD. If you have any questions or would like to discuss further, please contact me at Nathan.Seward@state.co.us or (970) 641-7882.

Sincerely,

Nathan W. Seward, Wildlife Conservation Biologist

cc: Brandon Diamond, Area Wildlife Manager CPW)
Jamin Grigg, SW Senior Terrestrial Biologist (CPW)

USDA United States Department of Agriculture
Forest Service
Grand Mesa, Uncompahgre and Gunnison National Forests
2250 South Main Street
Delta, CO 81416
970-874-6600
TDD: 970-874-6660
Fax: 970-874-6698

Date: November 18, 2021

Chris St
Colorado Water Conservation Board
Water Plan Grant Application
(303)866-3441
Chris.Sturm@state.co.us

Dear Mr. Sturm:

The USDA Forest Service Grand Mesa, Uncompahgre and Gunnison National Forests (GMUG), Gunnison Ranger District (GRD), are honored to express support for the National Forest Foundations (NFF) grant application, Taylor Park Wetland Restoration Project (TPWRP). This project aims to improve and restore historic wetlands in the Taylor Park basin. Projects like these are essential to protecting natural resources identified as critical in decreasing drought impacts on agriculture, streams, animals and people. Further these projects fight climate change by: attenuating surface and ground water, creating natural wildfire break, reducing storm flooding damage, increase biodiversity, restore fisheries, storing carbon it the soil and decrease the effects of draught.

After the successful NFF, USFS and partnership implementation of Trail Creek phase 1 (2021), the GRD has full confidence in the implementation of future projects outlined in the TPWRP. The Trail Creek project is part of a greater vision to work with beavers to restore degraded stream/wetland riverscapes throughout Taylor Park and the greater Upper Gunnison Basin Headwaters. By restoring these natural ecosystems, we aim to improve watershed-and landscape-scale resilience to drought, flood, and wildfire in the face of climate change. The Trail Creek project will serve as a demonstration of some of the strategies that can be employed to achieve this vision.

The Taylor Park Wetland Restoration Project is also a prime example of a successful partnership working to provide stewardship and restoration activities on the GRD. NFF and USFS have achieved broad community involvement for the development and implementation of the TPWRP, by establishing diverse and meaningful partnerships with a myriad of organizations. Given the NFF's unwavering commitment to the sound management of our National Forests, community-based stewardship, and habitat protection/restoration, we hope you will continue to support the efforts. If you have any questions or would like to discuss further, please contact Ashley Hom or ashley.hom@usda.gov

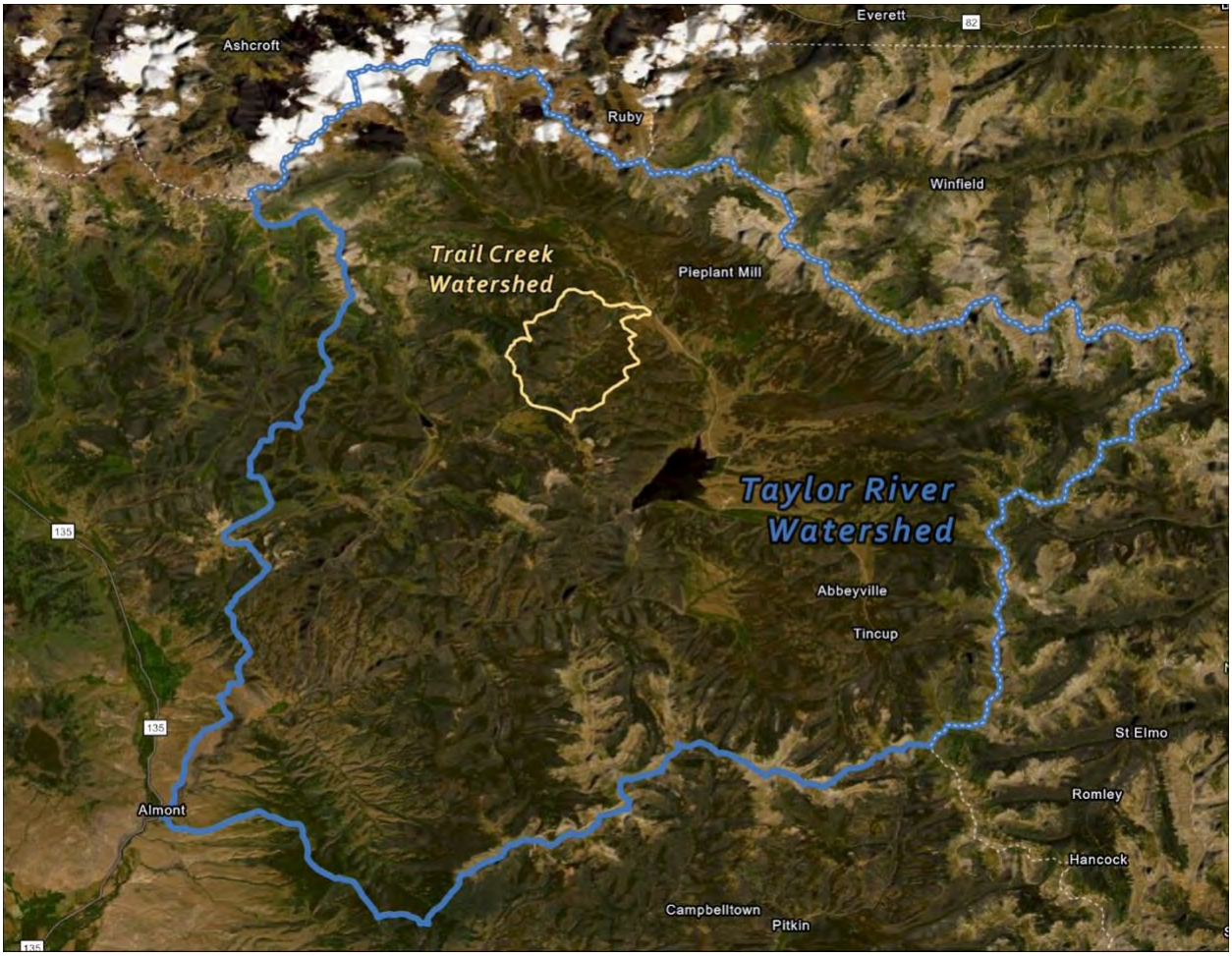
Sincerely,

MATTHEW MCCOMBS
Gunnison District Ranger

Taylor Park Wetland Restoration Project - Long Term Planning				
Phase	**Status**	**Drainage**	**Implementation Years***	**Notes**
1	Complete	Trail Creek	2021	Applied LTPBR treatments (32 beaver dam analogs (BDAs), 12 sod speedbump structures, and 18 woody material structures) on 0.3 miles Trail Creek, improved conditions over an estimated 10-12 riverscape acres.
2	Seeking Funding	Trail Creek	2022-2023	Actively seeking funding. Partial clearence for NEPA, Army Corps permits, applying for full clearence in 2022. Targeting restoration efforts over about 2.7 miles of riverscape corridor (about 115 acres).
3	Pending	Upper Taylor Creek	2024-2026	Project scoping targeted for 2022. Start seeking funding in 2023. NEPA, Army Corps permits, WRAP.
4	Pending	Italian Creek	2024-2026	Project scoping targeted for 2022. Start seeking funding in 2023. NEPA, Army Corps permits, WRAP.
5	Pending	Tellurium Creek	2024-2026	Project scoping targeted for 2022. Start seeking funding in 2023. NEPA, Army Corps permits, WRAP.
6	Pending	Potholes	2027-2029	NEPA, Army Corps permits, WRAP.
7	Pending	Red Mountain	2027-2029	NEPA, Army Corps permits, WRAP.
8	Pending	Pie Plant	2027-2029	NEPA, Army Corps permits, WRAP.
9	Pending	Illinois Creek	2030-2032	NEPA, Army Corps permits, WRAP.
10	Pending	Texas Creek	2030-2032	NEPA, Army Corps permits, WRAP.
11	Pending	Cottonwood Creek	2030-2032	NEPA, Army Corps permits, WRAP.
12	Pending	Willow Creek	2033-2035	NEPA, Army Corps permits, WRAP.

* Implementation years are estimated based on conducting work in a multi-phase appraoch for each drainage and are not exact

Map 1. Taylor River Watershed
Description: The Taylor River Watershed (ten-digit HUC 1402000101) totals about 477 square miles and contains 13 twelve-digit HUCs. This is the geographic area of the project. The Trail Creek Watershed is the geographic area for the work to be conducted as a part of Trail Creek Phase 2 and is approximately 10.7 square miles.



Map 2. Trail Creek Project Area
Description: Trail Creek riverscape valley-bottom areas (shaded in green) total about 127 acres of stream/wetland corridor that could benefit from restoration over the full 3.0 miles. The treatments applied on 0.3 miles of the Middle segment improved conditions over an estimated 10-12 riverscape acres.

Trail Creek 2021: Partnering with beaver to restore stage-0 stream-wetland corridor

Phase-1 treatments and initial response

Background

Trail Creek is one of many streams in the headwaters of the Gunnison Basin that, prior to anthropogenic disturbance, was a broad valley-wide Stage-0 wetland complex, naturally maintained by beavers. The North American Beaver is an aquatic ecosystem engineer and keystone species that was once ubiquitous in the riverscapes of Taylor Park and other headwaters riverscapes. But after the near-extirpation of the species during the 19th century fur trade—and then following almost two centuries of subsequent riparian land use and suppression of beaver populations—most of the natural stream-wetland corridors in these areas have become incised, simplified, and dried up. While sporadic beaver colonies do occasionally reside along Trail Creek and other tributaries, approximately 90% have become degraded in their absence. Degradation of this sort is responsible for a severe loss of wetland, poor riverscape health, diminished watershed resilience, and a concomitant loss of the important habitat, hydrological benefits, and ecosystem services that these systems would normally provide when healthy.

← Beavers work indefatigably to create and maintain aquatic habitat and wetlands on small maintain creeks. By mimicking, promoting, and sustaining beavers in areas where they historically thrived, we take advantage of their natural "ecosystem engineering" efforts to do most of the restoration work.

↑ This juvenile beaver is maintaining a dam in Taylor Park.

The Greater Vision

The Trail Creek project is part of a greater vision to work with beavers to restore degraded stream/wetland riverscapes throughout Taylor Park and the greater Upper Gunnison Basin Headwaters. By restoring these natural ecosystems, we aim to improve watershed- and landscape-scale resilience to drought, flood, and wildfire in the face of climate change, development pressure, and increasing demands on natural resources in the basin. The Trail Creek project will serve as a demonstration of some of the strategies that can be employed to achieve this vision.

↑ Trail Creek in June 2021. What used to be a valley-wide wetland beaver complex has degraded to a simple incised channel surrounded by dried riparian area. This project aims to restore the dynamic stage-0 stream-wetland corridor using beaver dam analogs and other low-tech woody material structures and by partnering with beaver, the native keystone species and aquatic ecosystem engineers.

Contents

Prepared by EcoMetrics
November 16, 2021

EcoMetrics

Why Trail Creek?

Trail Creek is an ideal site to demonstrate the strategy of using low-tech treatments and partnering with beaver to restore a stage-0 stream-wetland corridor:

- **Appropriate geologic context:** Long reaches of the stream corridor are in geologically unconfined low-gradient alluvial valley that have the capacity to sustain broad wetland complexes.
- **Appropriate hydrological context:** Streamflow is perennial with peak flows in the range within which beaver complexes normally persist.
- **Evidence of recent beaver activity:** Sporadic beaver occupation is evident throughout the historical aerial photo record, and evidence of recent beaver activity is widespread on the site. This confirms that habitat is suitable.
- **Geomorphic complexity:** The valley-bottom retains much of the geomorphic complexity typical of beaver complexes (abandoned beaver dams and ponds, anastomosing channels, swales, beaver canals, etc.). The complex aquatic habitat created by beavers past can easily be reactivated by raising the water level out of the incised channel.
- **Rapid recovery potential:** The channel is not too deeply incised (stage 1-3), with depths (less than 3 feet) that are within the range attainable by normal beaver dams or beaver dam analogs. While low-tech treatments and beavers can accelerate recovery of more deeply incised streams, it is a much longer and more involved process.
- **Vegetation:** Native riparian and wetland vegetation is present, with ample shrub cover (although most shrubs are currently short-stature willows) to support beavers' food, building material, and structural complexity.
- **Metapopulation connectivity:** Beaver are present in the watershed both upstream on tributaries and downstream on the Taylor River (albeit in small numbers). Connectivity to surrounding beaver populations increases the odds of natural recolonization and resilience of populations at the watershed scale.
- **No conflicts:** There is little potential for conflicts between beaver and people, infrastructure, or land uses. Proactive measures an be taken to reduce potential for conflict at the two road crossings.
- **Multiple benefits:** Restoration aligns with programmatic fish and wildlife management, recreation, and land use objectives while providing a full suite of ecosystem service benefits such as resilience to wildfire, drought, and flood.
- **Logistics:** The site has good road access, making it a good candidate for demonstration, monitoring, studies, and volunteer support.
- **Education:** The site is ideally suited for outdoor experiential education about nature, ecology, and restoration. The project provides a convenient research opportunity for Western Colorado University and other academic institutions.

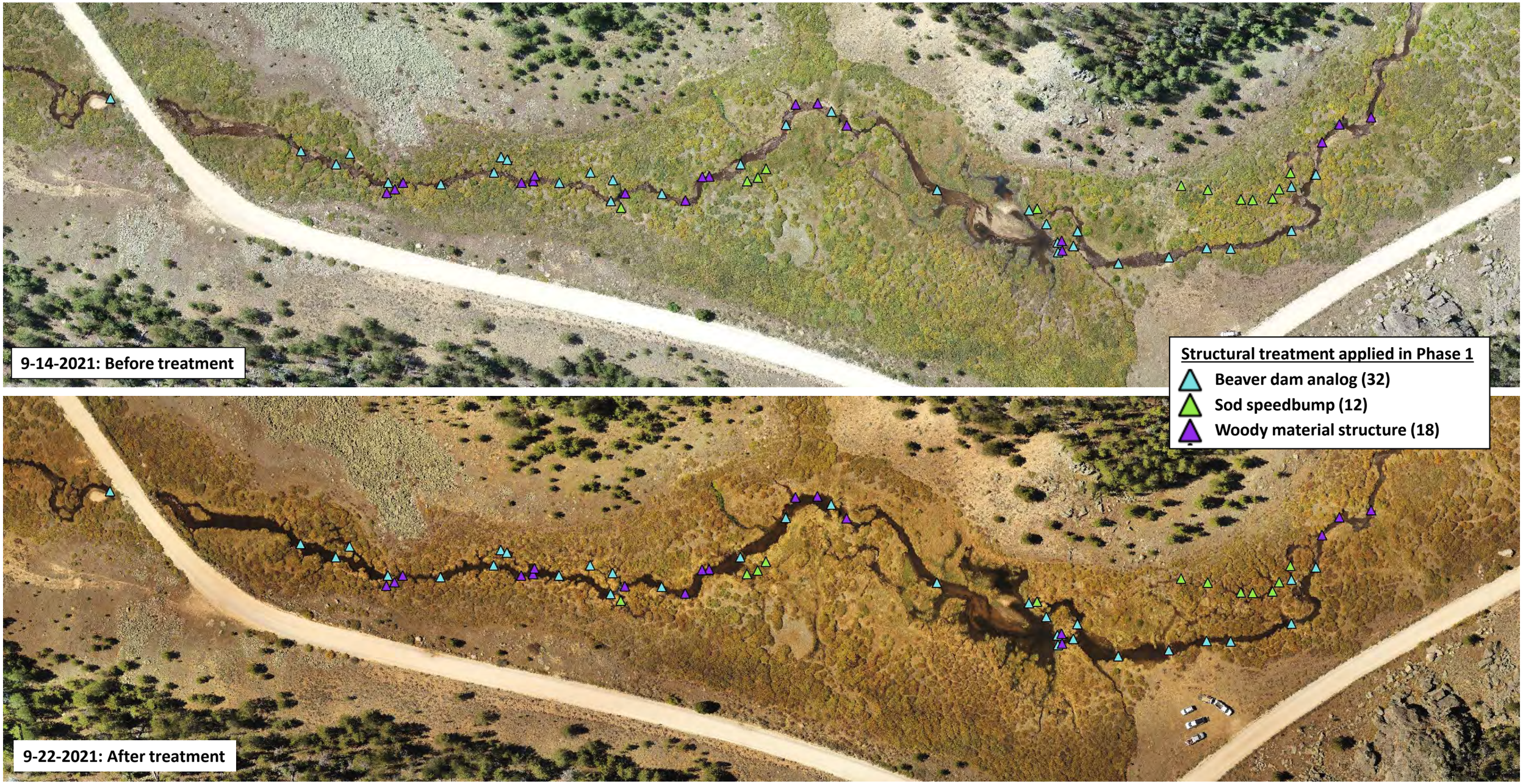
↑ Trail Creek riverscape valley-bottom areas (shaded in green) total about 127 acres of stream/wetland corridor that could benefit from restoration over the full 3.0 miles. The treatments applied on 0.3 miles of the Middle segment improved conditions over an estimated 10-12 riverscape acres.

A phased riverscape-scale project

This project aims to restore natural stream-wetland conditions to as much of the mainstem of Trail creek as possible over multiple phases. This restoration approach can feasibly improve conditions over about 3.0 miles of riverscape corridor (about 127 acres), identified by 4 segments. The amount of effort (density of treatments) needed varies, with the greatest effort proposed on the Middle segment. In phase 1, approximately 0.3-miles of the Middle segment was treated, starting where County Road 748 crosses and going downstream, to improve an estimated 10-12 acres of riverscape. Future phases will extend treatments up- and downstream with the aim of restoring the full 3.0 miles (127 acres) over time.

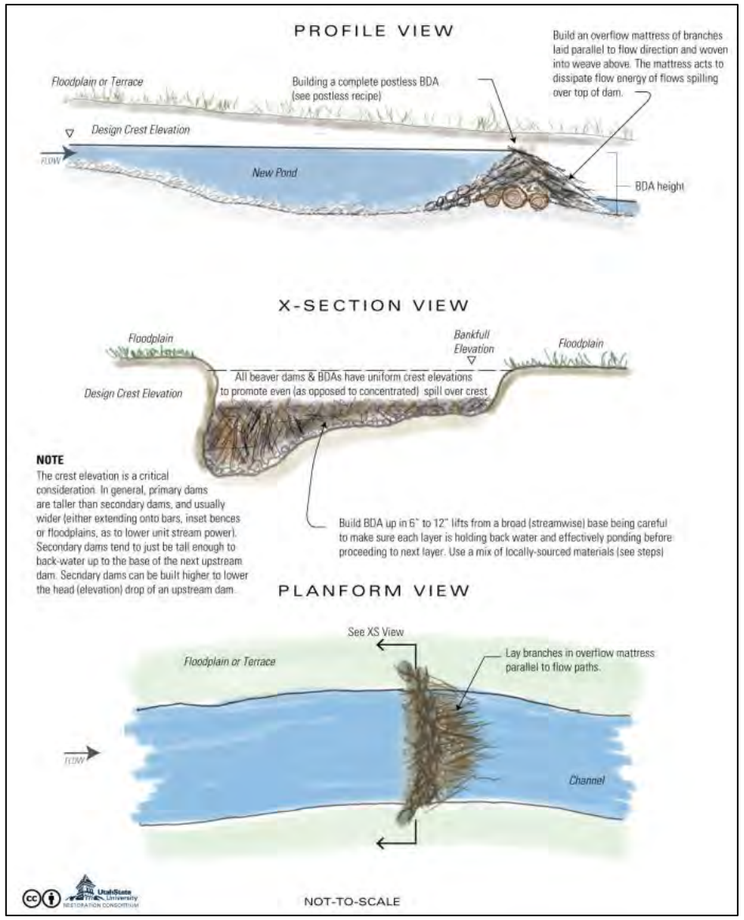
Treatments

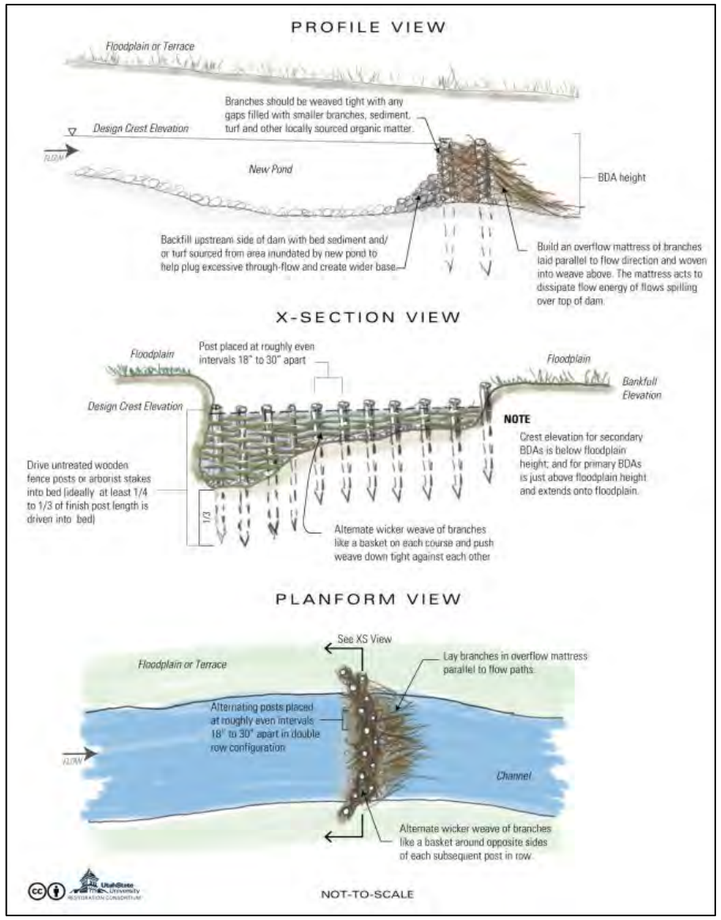
Streams like Trail Creek are structurally starved. Without beavers' constant activity importing woody material for dams, lodges, and caches; and without dynamic fluvial processes such as lateral migration and inundation which normally entrain wood; the volume of wood and other structure accumulating in the stream has diminished rapidly. As a result, the stream becomes locked into a simplified, relatively static channelized form with limited complexity or diversity. Low-tech process-based restoration treatments (Wheaton et. al 2019) treat this condition by mimicking the natural processes of beaver dams (beaver dam analogs), sod root mass (sod speed bumps), and wood accumulation (woody material structures). In Phase 1 of the Trail Creek project, restoration practitioners, contractors, and volunteers worked together to build 32 beaver dam analogs (BDAs), 12 sod speedbump structures, and 18 woody material structures (mostly PALS – post-assisted log structures). In addition to the structural treatments, volunteers harvested approximately 250 tall-stature willow stems from riparian areas on the Taylor River and planted them in the riparian area along Trail Creek.



To better understand low-tech process-based restoration and typical treatments, see: Wheaton, et. al. (2019). Low-Tech Process-based Restoration of Riverscapes: Design Manual DOI: 10.13140/RG.2.219590.63049/1

BDA and sod speedbump treatments





↑ Schematics for a typical postless BDAs (left) and post-assisted BDAs (right). The postless BDAs on Trail Creek range from 0.5 to 1.5 feet tall and were constructed using locally-harvested willow, rocks, sod, and gravel. Post-assisted BDAs on Trail Creek range from 1.0 to 2.5 feet tall with locally-harvested trees, willow, sod, rocks, and gravel supported by untreated wooden posts driven into the stream bed. Sod speedbump structures are essentially postless BDAs built mostly or entirely of native sod. *These schematics are from Wheaton, et. al. (2019). Low-Tech Process-based Restoration of Riverscapes: Design Manual DOI: 10.13140/RG.2.219590.63049/1*

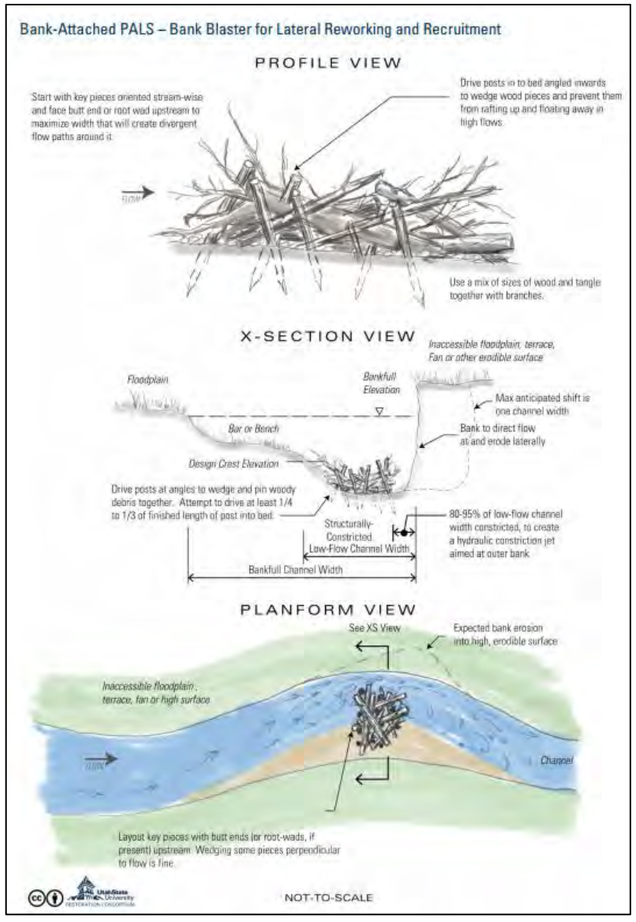
Beaver Dam Analogs (BDAs)

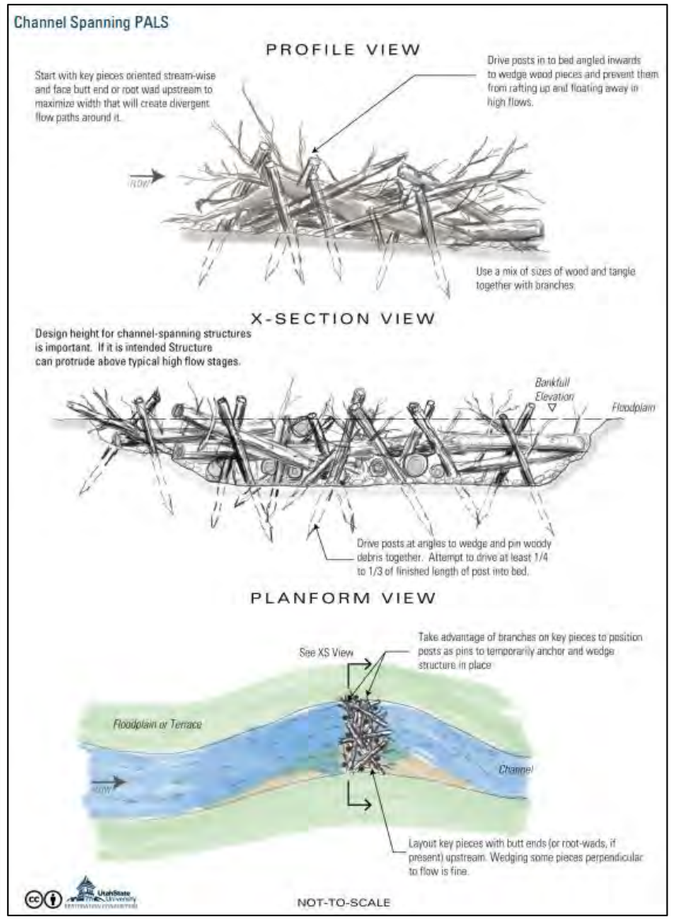
BDAs are structures built of native materials to mimic the function of beaver dams. Functions they perform include:

- Raising water level (stage) and elevating groundwater table
- Promoting ponds and areas with deep water
- Creating backwater areas and flooding swales and depressions
- Activated branching distributary channels, beaver canals, and swales
- Spreading flow and increasing the lateral extent of fluvial processes
- Expanding wetland and supporting hydric vegetation
- Promoting habitat quality, diversity, and complexity
- Inducing geomorphic and ecological dynamics (natural disturbance)
- Improving beaver habitat suitability and potential for beaver colonization

While BDAs perform these functions, they are no match for the actual beaver dams they are built to mimic. Without the constant maintenance that beavers perform on their own dams, BDAs deteriorate over time and come to function more like abandoned beaver dams than active ones. BDAs are ultimately most effective when beavers move in. When even beavers don't move in, a modest commitment to ongoing maintenance can greatly extend the lifespan and level to which BDA treatments function over time.

Woody material structure treatments





↑ Schematics for a typical bank-attached (left) and channel-spanning (right) woody material structures. The woody material structures on Trail Creek were constructed using locally-harvested willow and conifer logs, branches, and slash. PALs (post-assisted log structures) are secured with posts, but not all the structures on Trail Creek used posts. *These schematics are from Wheaton, et. al. (2019). Low-Tech Process-based Restoration of Riverscapes: Design Manual DOI: 10.13140/RG.2.219590.63049/1*

↑Typical bank-attached PALS on Trail Creek →

Typical cross-channel PALS on Trail Creek ↓

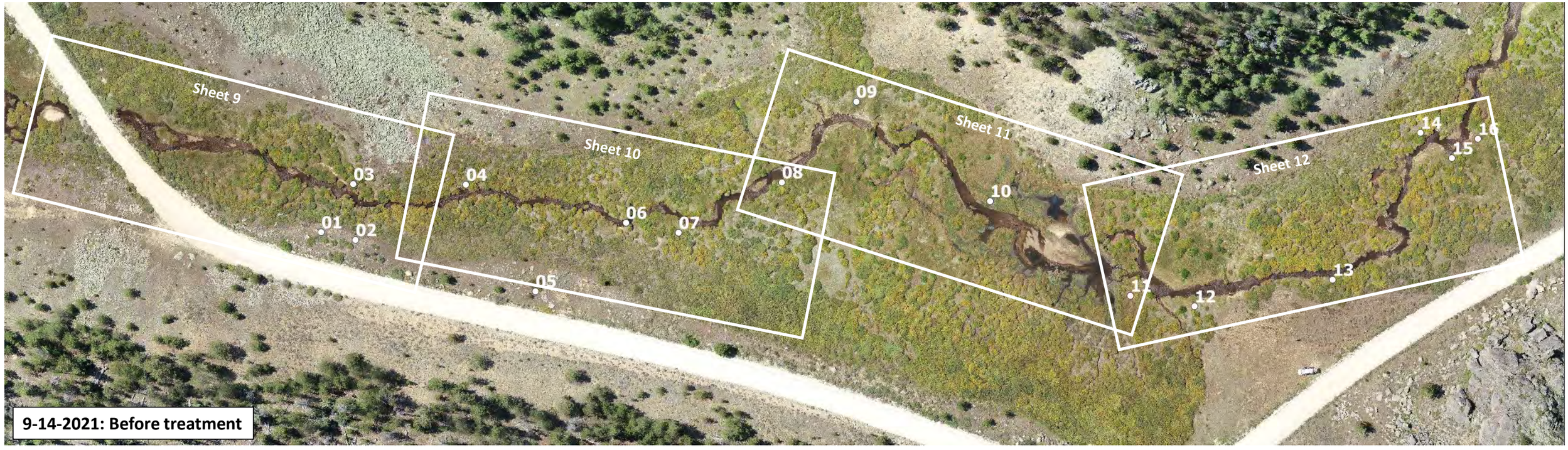
Woody material structures

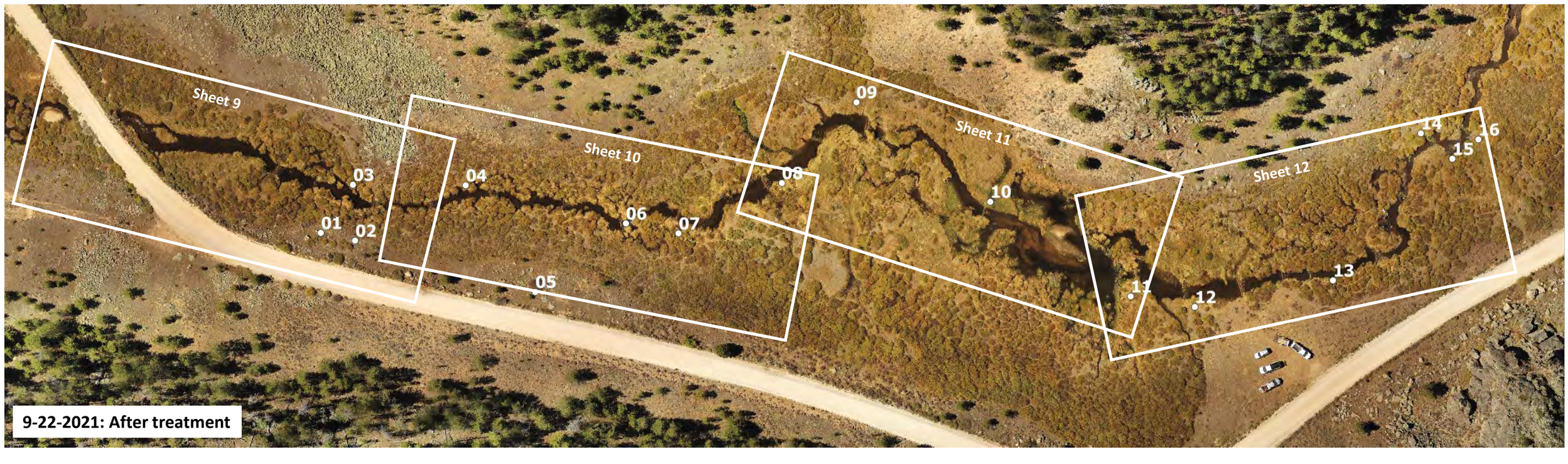
Woody material structures like PALS (post-assisted log structures) are expedient treatments that mimic the accumulation of woody material in jams and dams. These treatments promote functions such as scour, deposition, and lateral erosion while providing structural complexity, roughness, and a supply of organic material. Like BDAs, and like natural wood jams, these structures are not meant to be permanent. They are no replacement for the natural processes of wood entrainment that we hope to ultimately see restored.

Initial response

To document the initial response to treatments on the Phase 1 project area, we used a drone and survey-grade GPS equipment with control points to capture georeferenced aerial orthomosaics before treatment (9-14-2021) and immediately after treatment (9-22-21) as well as repeated ground photos from monumented photopoints. These efforts maty be repeated to monitor ongoing trends.

↓ Aerial images of the Phase 1 project area before and immediately after treatment. Numbers indicate photopoints which correspond to photos on sheets 7 and 8. Rectangles show location of close-up aerials on sheets 9-12.





Initial response

9-14-2021: Before treatment

9-22-2021: After treatment

06a

07a

07b

9-14-2021: Before treatment

9-22-2021: After treatment

08a

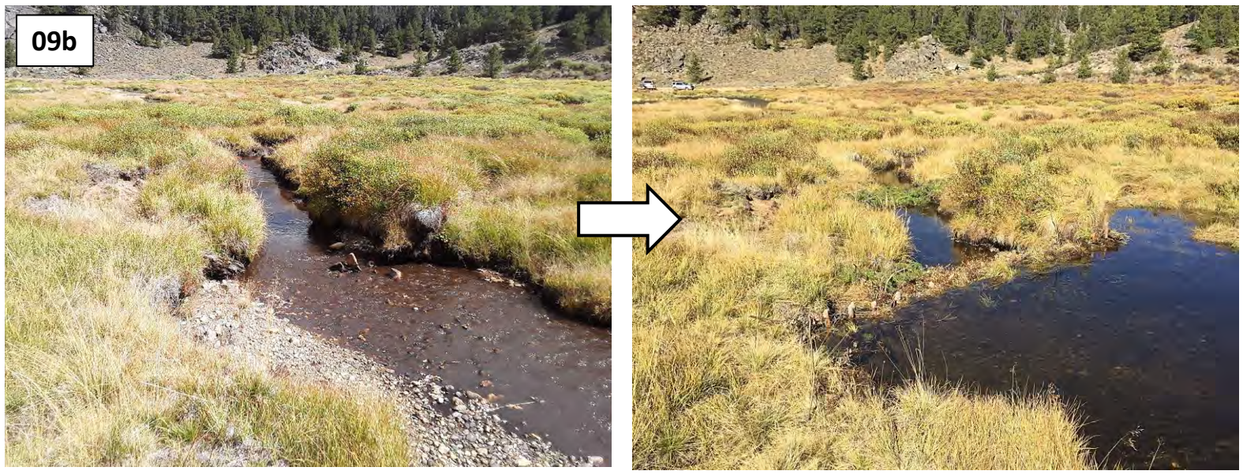
08b

09a

Initial response

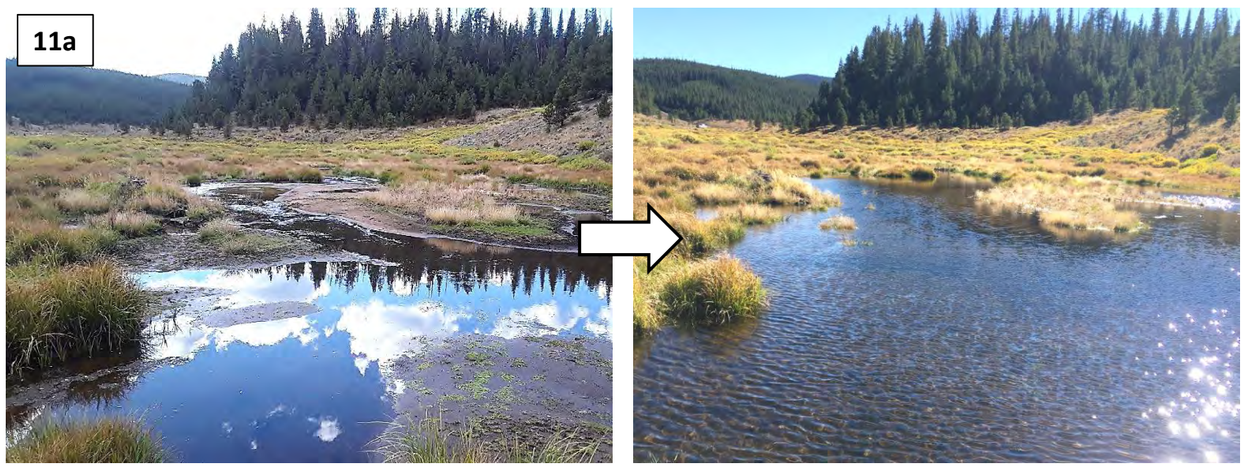
9-14-2021: Before treatment | **9-22-2021: Before treatment**

09b



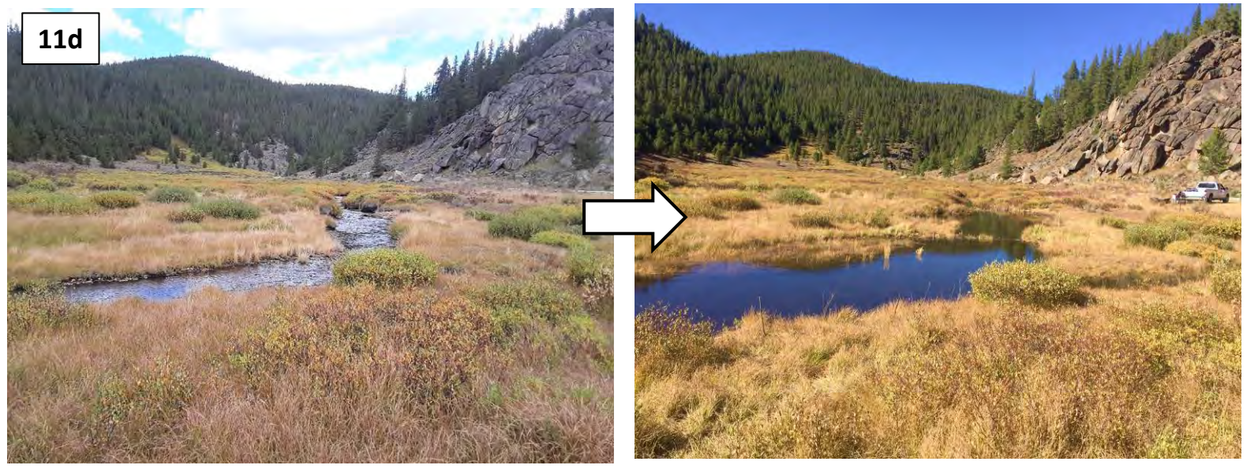
10c

11a

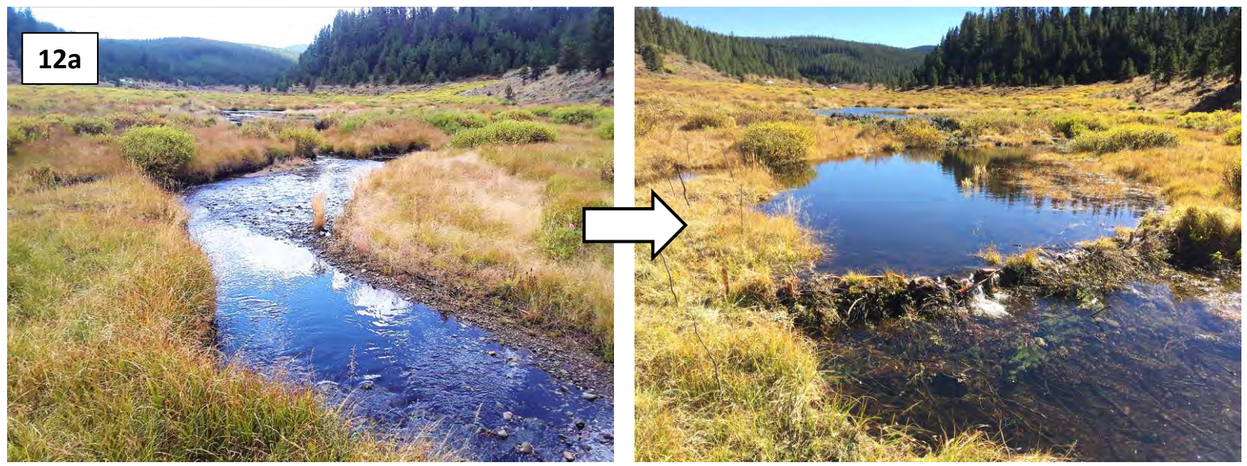


9-14-2021: Before treatment | **9-22-2021: Before treatment**

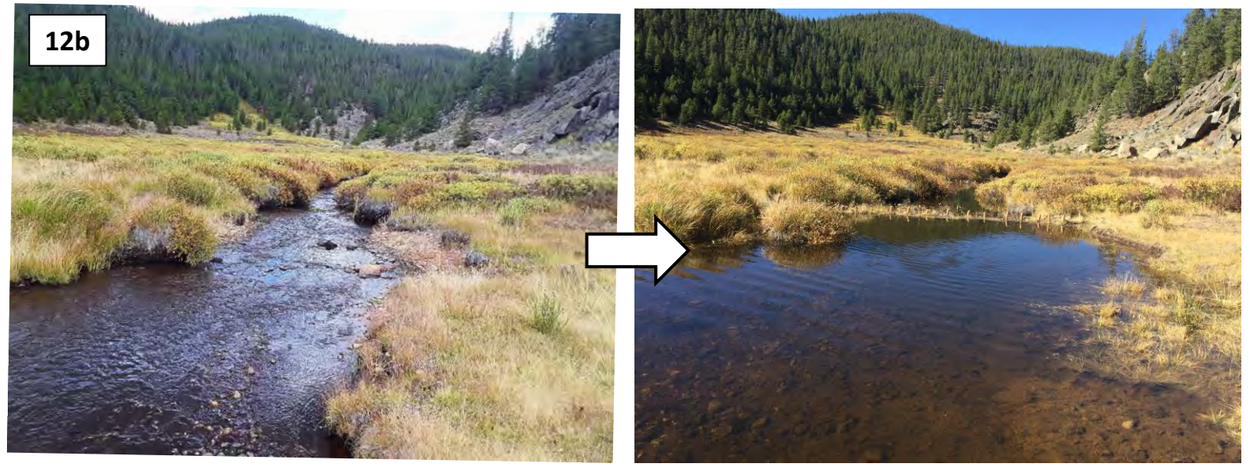
11d



12a



12b



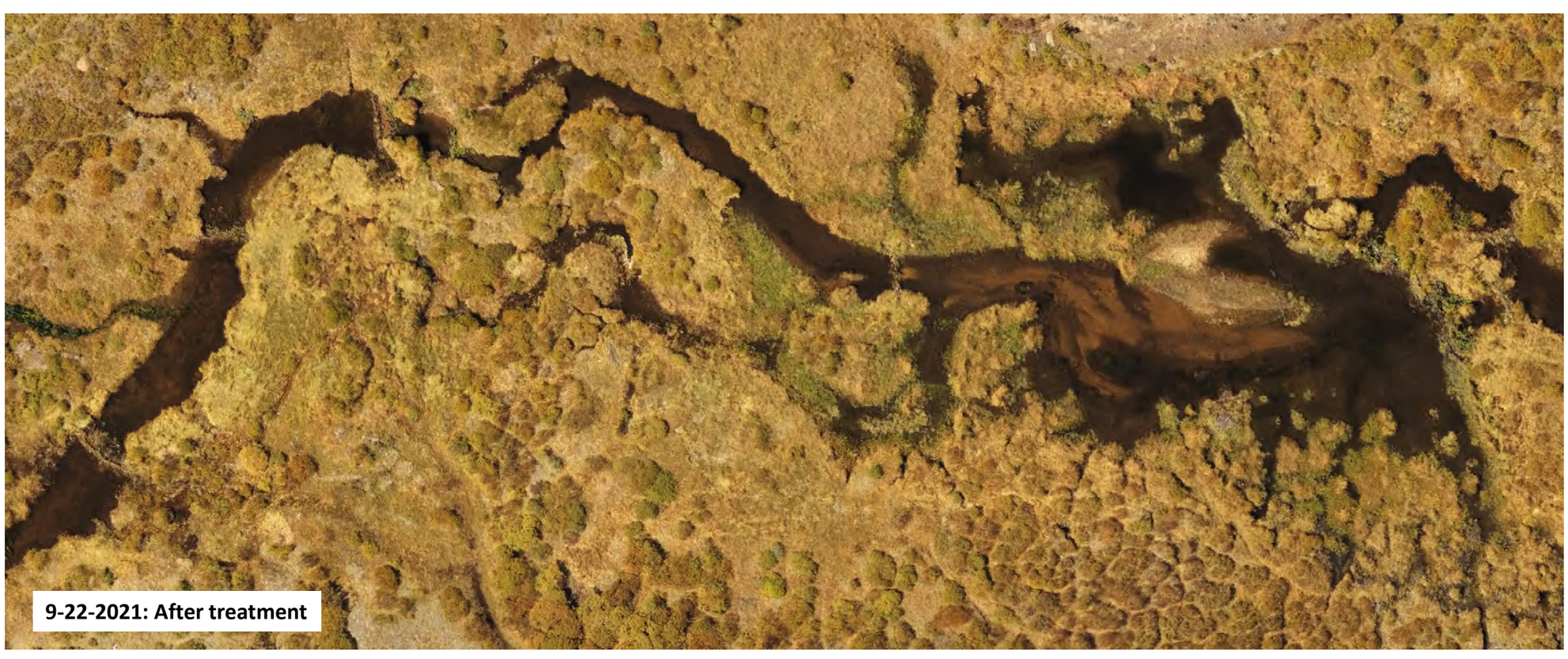
Initial response

Initial response

9-14-2021: Before treatment

9-22-2021: After treatment

Initial response



Initial response

Are we improving riverscape health?

What is riverscape health?

Riverscapes are complex ecosystems made up of the surface water flowing in and outside of channels, hyporheic water flowing through the ground, and all the organic and inorganic materials, chemical components, and the plant, animal, and microbial communities interacting together. When we talk about riverscape health, what we mean is the integrity of the ecosystem, resilience to disturbance, capacity for self-repair, ability to perform vital functions, and potential for supplying ecosystem services. The goal of restoration is to improve riverscape health.

Riverscape health factor	Baseline assessment	Initial response	Explanation
Flow regime	A	→	Natural flow regime present, with no significant stressors in the contributing watershed.
Materials supply	B-	↗	Presumably normal supply of sediment and organic material from watershed but import to riverscape was limited due to lack of beaver (vectors) and static channelized form. Improved with import of woody material in treatments and suspected increase in fluvial dynamics.
Water quality	A	→	No known water quality issues or observable stressors in watershed.
Landscape support	A	→	Good connectivity with surrounding landscape and riverscape network. Few stressors (roads, culverts, land use, etc.)
Riverscape hydrology	D	↑	Riverscape hydrology was severely impaired due to incised channel. Improved greatly by raising water stage and lateral extent of saturated area during low, moderate, and peak flows.
Riverscape dynamics	D	↑	Riverscape dynamics were severely impaired due to incised channel and structural starvation. Improved greatly by expanding the lateral extent of fluvial activity during moderate to high flow.
Riparian vegetation	B-	↗	Riparian vegetation was in moderate condition but with hydric species underrepresented and lack of dynamics. Primary stressors were drying due to depressed water table (incised single channel) and lack of keystone herbivore. Improved via rehydration (improved riverscape hydrology)
Physical heterogeneity	C-	↑	Aquatic habitat heterogeneity was severely limited, dominated by homogenous shallow gravel riffle with occasional shallow pools. Greatly improved with the introduction of more deep pool area, backwaters, shallow emergent habitat, structure, variety of substrate, and thermal diversity.
Aquatic biota	C	↗	Biodiversity and biomass of aquatic biota presumed to be lacking due to greatly simplified habitat. Improvements expected with expanded aquatic habitat area, increased habitat complexity, and heterogeneity.

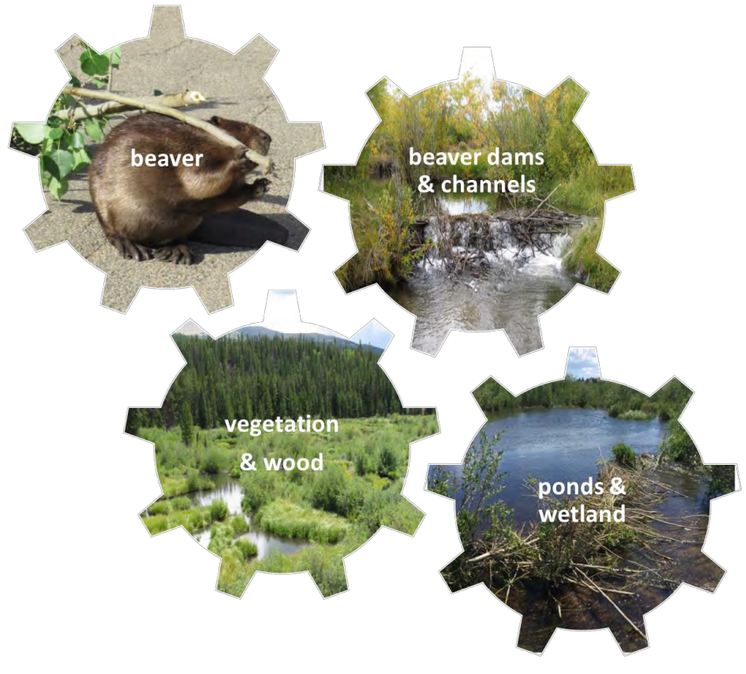
Response to treatment

We used COSHAF to assess baseline riverscape health of the Phase 1 project area prior to treatment, and then evaluated the initial response immediately after treatments were applied. The arrows indicate the observed response (upward indicates a positive response, and downward a negative response). We observed or predict positive responses in all the significantly impaired variables. The greatest improvements are in riverscape hydrology, riverscape dynamics, and physical heterogeneity.

Expectations

This initial positive response reflects our efforts at **mimicking** the natural processes of beaver activity and wood and sod accumulation. With a commitment to ongoing care and stewardship in the form of annual maintenance and construction of new structures as needed, the positive effects can be extended for years or decades. Long-term improvements and decreasing need for ongoing maintenance will depend on how well the treatments **promote** and **sustain** beaver activity and processes over time.

The ultimate goal of restoration is to promote and sustain the natural processes that maintain riverscape health. On Trail Creek this means restoring the keystone biological feedback loop made up of beavers, beaver dams and channels, ponds and wetland, vegetarian and wood. →



Evaluating riverscape health

Riverscape health is evaluated by assessing the degree to which key health factors are impaired relative to natural pre-disturbance reference conditions. We use the Colorado Stream Health Assessment Framework (COSHAF) in which the nine riverscape health factors are assessed and given a letter grade to reflect the degree of impairment (baseline assessment). The effectiveness of ecological, process-based restoration can then be evaluated by the degree to which critically impaired factors improve after treatment (response).

Project Partners

A collaborative effort between many partners made the Trail Creek project, Phase 1, possible. The National Forest Foundation (NFF) provided grant funds to implement the Trail Creek project (Phase 1 of the Taylor Park Wetland Restoration Project). The Coal Creek Watershed Coalition and US Forest Service (USFS) funded initial project scoping and grant writing efforts. The USFS obtained necessary environmental clearances and permits. High Country Conservation Advocates organized and supported two community volunteer days. Restoration practitioners including EcoMetrics, Arable Earth, and RangeWorks were also critical partners.

Thank you to all the partners who supported these efforts and participated in the process to restore riparian and wetland ecosystems in Taylor Park:

Local Partners

Coal Creek Watershed Coalition
Community Volunteers
Gunnison County
High Country Conservation Advocates
Private Landowners
Restoration Practitioners
Sustainable Tourism & Outdoor Recreation Committee
Taylor Park Cattle Pool
Trout Unlimited
Upper Gunnison River Water Conservation District
Western Colorado University

State Partners

Colorado Parks and Wildlife
Defenders of Wildlife

Federal Partners

Bureau of Land Management
National Forest Foundation
National Park Service
US Forest Service