Uncompahgre River Multi-benefit Project

Final Report

Uncompahgre River at 850 cubic feet per second on June 7, 2023.

Prepared for:
Colorado Water Plan Grant Program
Attn: Steven Reeves

January 3, 2024

American Rivers
Grant Amount: $71,446
Prepared by: American Rivers
Consulting work completed by Fred Phillips Consulting and Natural Channel Design

Table of Contents

- Introduction – page 2
- Background – page 3
- Methods – page 4
- Results – page 6
- Conclusion/Discussion – page 10
- Actual Expense Budget – page 10
- Appendix – page 11
- References – page 11

Introduction

In the summer of 2022, American Rivers began a partnership with the Ward Water Group in Portland, Colorado to help upgrade agricultural infrastructure, improve water quality and water management, and restore in-stream and riparian areas along a one-mile reach of the Uncompahgre River. The one-mile segment of the Uncompahgre River between the Ward Ditch Diversion and County Road 23 bridge has been heavily impacted by development, dredging and riprap/levees, causing the river to be incised, unnaturally straight, disconnected from the floodplain, and lacking in diverse habitat. Native riparian trees are dying, and invasive trees are establishing. The lack of organic matter, riparian habitat, pools, fish refugia and high levels of iron oxide/aluminum have contributed to this reach being almost devoid of fish and aquatic invertebrates. In addition, nearby wells have run dry, and the Ward Ditch, which serves 4 parties irrigating 30 acres of hay meadow, is unable to divert water when river flows are below 250 cubic feet/ second. Members of the Ward Water Group and American Rivers believe this project will improve access to their water, improve wildfire and drought resilience along their stretch of river and restore both instream and riparian habitat.

While this specific project is not directly identified in a local plan, it will help to address several issues around watershed health and irrigation improvements called out in the 2018 Uncompahgre Watershed Plan as well as the Gunnison Basin Implementation Plan. (Note, The Uncompahgre Watershed Group provided a letter of support for this application in addition to the WaterSMART application, and the Gunnison Basin Roundtable recommended funding from their Water Supply Reserve Fund to provide match for the WaterSMART application.) The Watershed Plan identified altered sediment dynamics that lead to river instability and limited in-stream and riparian habitat in the Uncompahgre River from Ouray to Ridgway, which includes the project area. This project will directly address these problems in this area by implementing irrigation infrastructure and river channel improvements and improving the connection to the floodplain, which will also benefit riparian habitat. In the BIP, it addresses two goals. First “maintain or, where necessary, improve water quality throughout the Gunnison Basin.” By improving the connection of the channel with the floodplain, this project will address this goal by reducing sediment loading downstream during high water flows, particularly in the event of a wildfire and subsequent rain event upstream. And second, this project will meet the goal of, “restore, maintain, and modernize critical water infrastructure” from the BIP. The headgate improvement will help maintain senior agricultural water rights.

Background

This project has multiple goals and benefits associated with it. Goals for this project include improving water access for members of the Ward Water Group, bolstering wildfire and drought resilience for those in this reach and communities downstream (including Ridgway Reservoir), and restoring both instream and riparian habitat. By improving floodplain connectivity, there will be greater groundwater recharge (improving drought resilience) and reduced water quality impacts from any future wildfires and resulting sediment loads. The improved health of riparian vegetation has also been shown to reduce wildfire spread. Stabilization of the river channel and revegetation of native species will reduce bank erosion and channel incision, as well as improve the safety for recreational boaters on the Uncompahgre River.

During this project, we utilized a number of existing plans and resources to support us, as well as meeting with essential members of the community to understand other important information. In developing the designs for this project, a number of plans and resources were referenced including the Uncompahgre Watershed Plan as well as existing LIDAR data. The Project Team completed 2 days of survey work and met with landowners multiple times during the project to discuss the project plans and designs.

Above: the Project location of the Uncompahgre River Multi-benefit Project

Above, the restoration design plan for the Uncompahgre River Multi-benefit Project

Methods

With the support of the CWCB funds, American Rivers and the Ward Water Group were able to contract with Fred Phillips Consulting and Natural Channel Design to complete the following tasks:

- Headgate Improvement design and engineering
- Ditch Improvement Design and Engineering
- Assessment and Site Selection for Instream Restoration Projects
- Conceptual Design for instream restoration projects
- HEC-RAS Analysis to optimize the design of channel improvements and avoid flooding impacts
- Well Sampling

Prior to launching any of the tasks, Fred Phillips Consulting and Natural Channel Design completed two days of surveying and conducted multiple meetings with local landowners to develop and finalize their restoration and engineering plans. Additionally, they met with Ouray County, the Bureau of Land Management and Bureau of Reclamation as a part of their design process to ensure the project does not impact the 100-year floodplain and identifiesappropriate right-of-ways. Ouray County provided feedback that our designs will not impact the 100-year floodplain (letter attached in the appendix).

The contractors completed the following workflows in order to finalize the tasks in this grant and develop near final design plans that were used in our WaterSMART application to the Bureau of Reclamation. More specific

information on the methods for how these tasks resulted in the final design plans are included in both the Engineering and Restoration design plans and final report (available in the appendix).

Task 1 – Headgate Improvement design and engineering: contractors completed on the ground survey work and gathered existing information on the headgate area of the Uncompahgre River, this included understanding the issues facing the headgate. From here the team developed a hydraulic model of existing conditions at the headgate to help address the issues the headgate has with ditch flow and stream stability. The watershed was modeled a Log-Pearson Type III gage analysis in RiverMorph based on nearby gages (there is no gage on this reach of the river). This model was used to determine the hydrology at the project site and determined the bankfull flow event for structure geomorphic design. The proposed design for the new inlet structure is based on emulating the stable stream cross section dimensions. NCD personnel collected 14 cross section data near the project site, of these cross sections four were determined to be reference riffles. The reference channel dimensions determine stream type as well as the dimensions of the rock structures. The team developed an engineering design to improve ditch flow and maintenance, river stability and create ecological uplift for aquatic and riparian habitats surrounding the headgate area.

Task 2: Ditch Improvement Design and Engineering: Contractors, along with the users of the Ward Water Group and Rewalt Plumber Ditches, worked together to evaluate diversion control and identify a design that could increase efficiency, control salinity, and improve water management/quality and restore riparian habitat along this section of Uncompahgre floodplain/upper terrace. They determined the goal of the design is to provide the Ward ditch the allotted 3 cfs while providing efficient flood irrigation on the properties to support native species and pasture. The design also includes return diversions to ensure that excess ditch water not being used for irrigation at a given time can be returned to the river, which will prevent pooling/flooding that has been occurring at the end of the Ward Ditch.

Task 3: Assessment and Site Selection for Instream Restoration Projects: Consultants, along with local landowners, worked together to assess and inventory the river channel and floodplain along the project reach. As a part of this work, maps and existing reports (including the Uncompahgre River Watershed Plan and TK) were analyzed to help construct what the restoration work would look like. During this process the consultants walked each of the properties to understand the current state of the floodplain and completed soil samples. Based on the soil samples and the goals of the project, the consultants developed the list of vegetation (both native and non-native) that would be used as a part of this restoration project.

Task 4: Design for instream restoration projects: Consultants designed individual restoration plans for each of the landowners along the river based on the goals of the project and what the landowners wanted to see on their property. These designs are available in the appendix, and included revegetation plans, gabions and other small rock features as well as plans for non-native eradication and long-term management. These plans were vetted with the property owners to ensure it met their goals. The structures must also be able resist the large storm events on the Uncompahgre River with minimal maintenance. Additionally, structures need to be able to match the current system so that the regulatory flood is not changed. The following design components were recommended to achieve these goals for the headgate and ditch:

- Cross vane weir to provide bank protection and grade control, which will concentrate depth of flow and shear stress towards the center of the channel, improving recreation and fish passage.

- Rock sills, which are designed have enough embedment depth to arrest upstream advancing headcuts if they were to occur on areas adjacent to the primary channel protection
- Toe rocks which protect the high shear stress areas of the bank while encouraging the creation of bankfull benches.
- Bank sloping, due to the steep and sheer banks that are not protected by vegetation. The sloping will reduce erosion and allow vegetation to be planted.
- Seeding, through native vegetation, will prevent soil erosion and provide habitat for wildlife.
- Erosion control fabric will help reduce erosion in the short term while vegetation is established.

Task 5: HEC-RAS Analysis: As described in the final report and above, the contractors completed a HEC-RAS analysis to optimize the design of channel improvements and avoid flooding impacts. They ran the model under several different flow conditions (low intensity/high frequency flooding as well as high intensity/low frequency flooding) and assessed the streams ability to overbank and sustain wetland and riparian habitats. As a part of this analysis they also identified high stress areas (to understand where erosion or channel incision could occur) and identified the locations to improve habitat based on future restoration and engineering designs.

Task 6: Permitting for instream restoration projects: The contractors worked with the USACE, Ouray County, USFWS and BOR to obtain the permits necessary to implement the project. This application does not include ESA surveys or an EIS. The Flood Plain Permit was approved by Ouray County in June 2023. The Nationwide 27 Permit for Clean Water Act Section 404 was submitted to USACE in Fall 2023 and was approved in January 2024. The approval letter is included as an attachment.

Task 7: Well Sampling: Contractors conducted well sampling as a part of this grant. Awater sample from a well within the project area was taken and submitted for testing to understand water quality. Sample results were shared with the property owner, and future samples can be taken to ensure no impacts to water quality.

Once these tasks were complete, the consultants developed near final reports that included near final restoration design and engineering plans for the headgate and ditch improvements, instream restoration and floodplain reconnection. These plans are included in the appendix and provide the methodology and key findings from their work.

Results

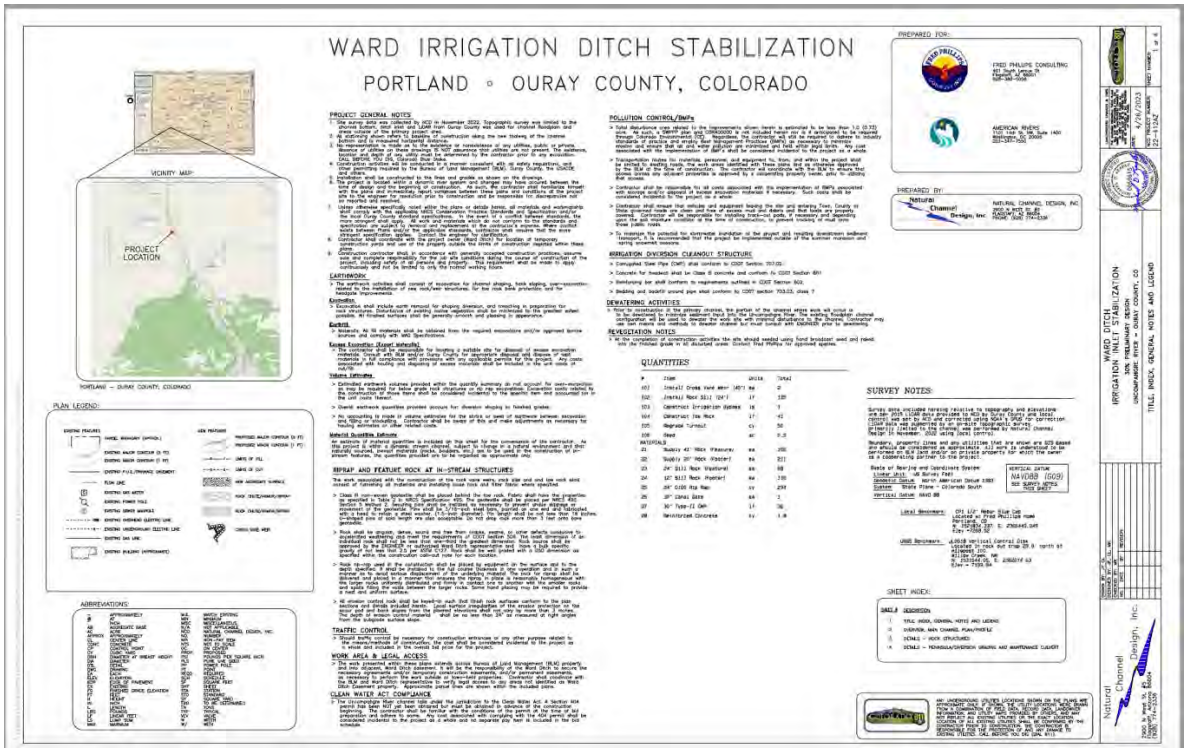
Please describe any findings through the duration of your plan or project including, but not limited to, any measurements taken, materials generated, communities affected, etc. Utilizing figures, pictures, and tables to represent findings is highly recommended. All figures, pictures and tables should have captions.

Through the planning and design phase, a number of measurements were taken to help develop and design the plans for the headgate, ditch work, in channel restoration and floodplain reconnection. Analysis of the channel found areas that were laterally unstable and some that were incising, as well as a section used as a reference reach. The measurements taken at the reference reach were important for designing channel improvements. The HEC-RAS analysis was important in supporting a design that both

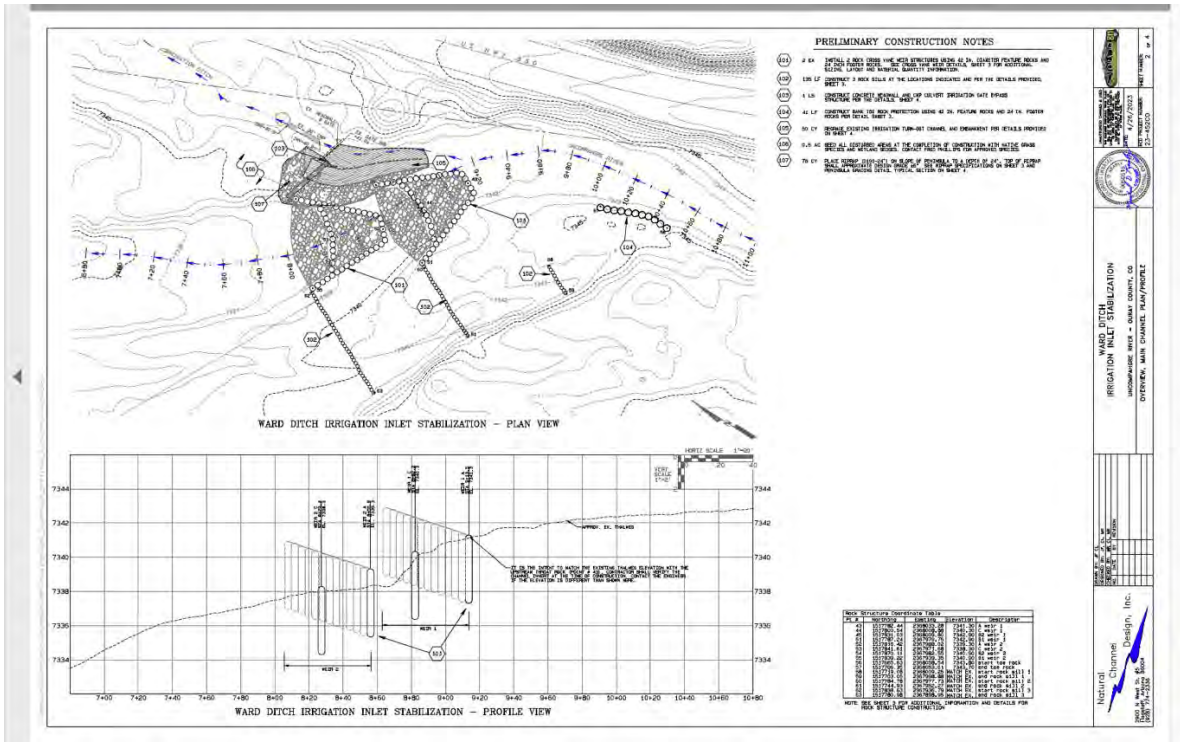
allowed for floodplain reconnection and improved riparian habitat, while ensuring no increased flood risks to properties at the 100-year floodline. All of these findings, as well as the resulting design, illustrate the ways in which river and riparian health can be supported while simultaneously improving irrigation infrastructure and use.

Detailed information regarding the findings and what was undertaken to create designs are included in both the Engineering and Restoration Design Package (included as attachments). Screenshots from both the Engineering and Restoration Design Packages are included below. These images show final designs for the headgate and near final designs for the other improvements, and specifics about how these designs were completed is included in the Design Package.

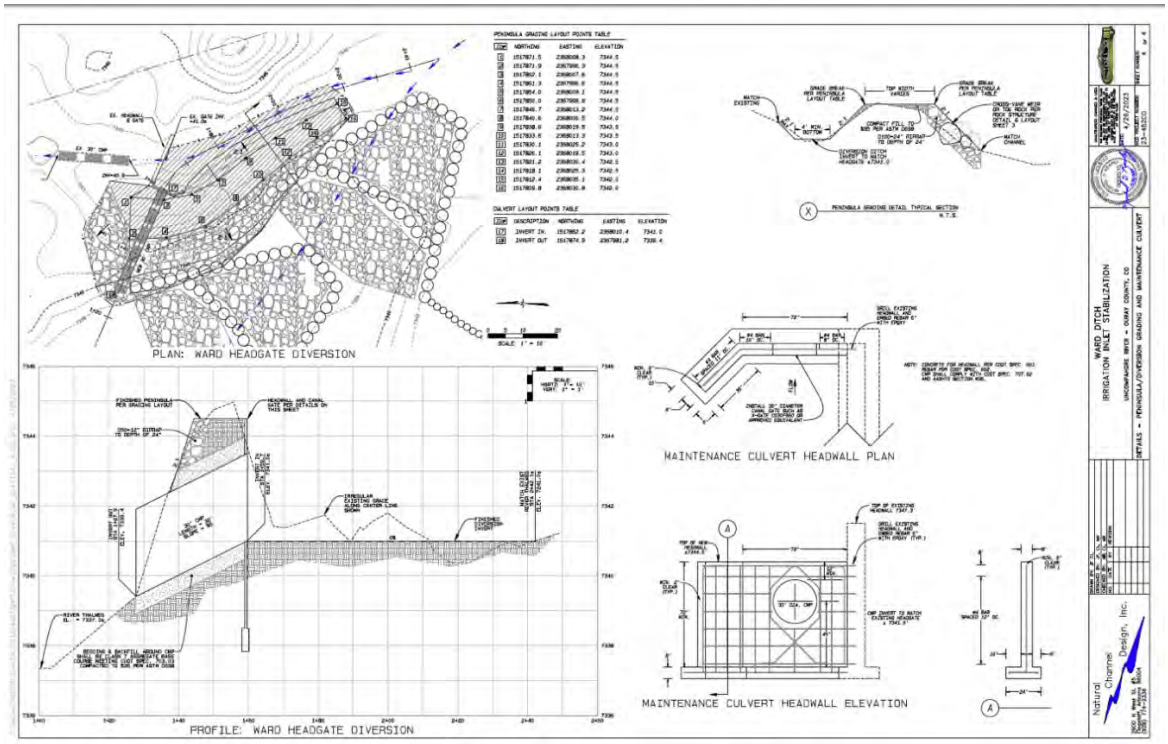
Using the information compiled during the analysis and development of the restoration and engineering plans, American Rivers completed a Bureau of Reclamation Environmental Water Resources Project WaterSMART grant for this project to assist with the implementation of three tasks: improving the headgate and ditch, completing instream restoration and restoring and reconnecting riparian lands. The final grant narrative is included in the appendix. In November 2023, we were awarded our WaterSMART grant to support the implementation of this project, beginning in fall 2024. Matching funds for the WaterSMART application have been secured through the Colorado River District Community Funding Partnership as well as the Colorado Water Conservation Board's Water Supply Reserve Fund. We are awaiting information on the Watershed Restoration Grant from the Colorado Water Conservation Board.



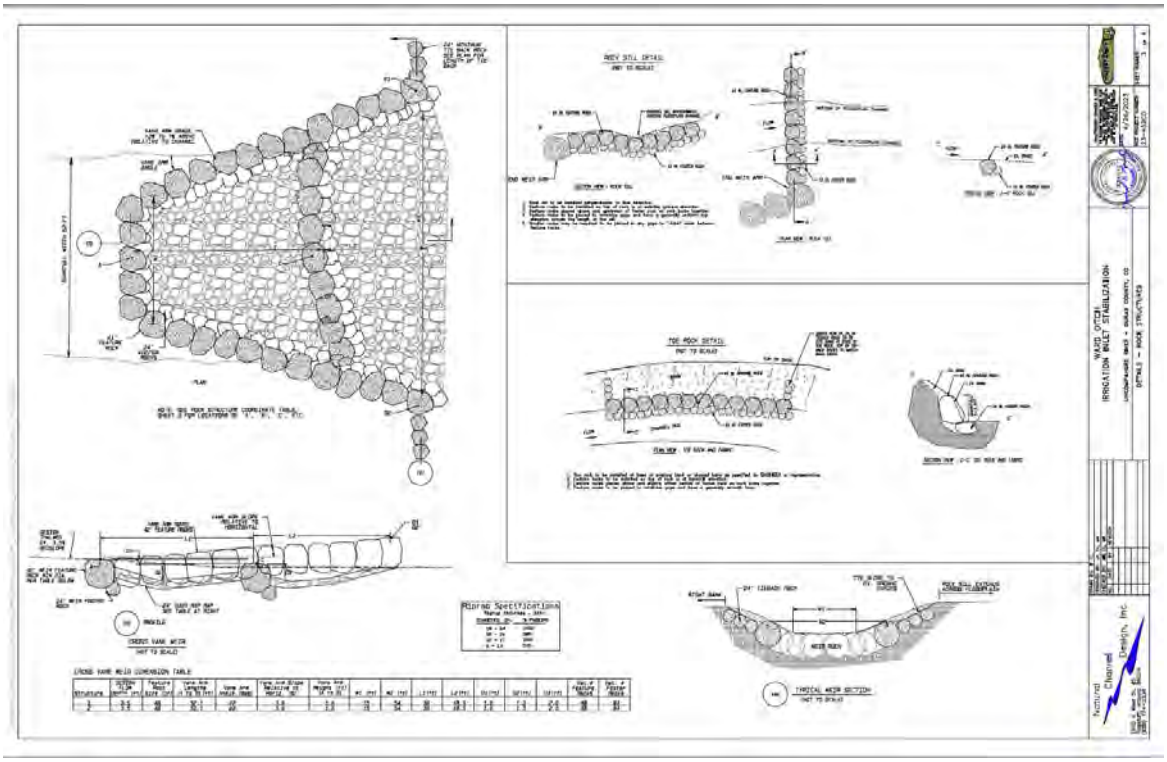
Above, Overview of the Irrigation Ditch Stabilization (Note, also available in the appendix, Design Package_Engineering)



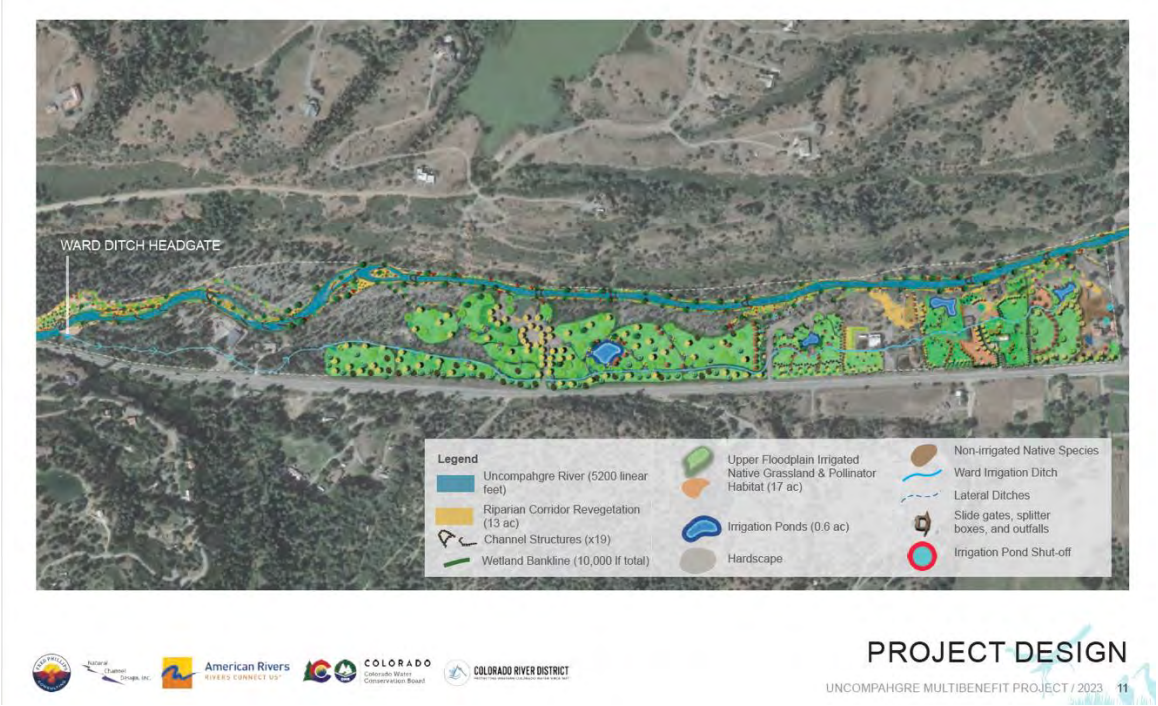
Above, Overview design for the main channel plan/profile (Note, also available in the appendix, Design Package_Engineering)



Above, Details on the Peninsula/Diversion Grading and Maintenance Culvert (Note, also available in the appendix, Design Package_Engineering)



Above, Details on the Rock Structures (Note, also available in the appendix, Design Package_Engineering)



Above, Overview Restoration Plan for Uncompahgre River Multi-benefit Project (Note, more specific information on the plans for the headgate and upper riparian corridor as well as individual private property plans are available in the appendix, Design Package_Restoration)

Conclusions and Discussion

Yes, objectives for this project were met. American Rivers and the Ward Water Group were able to work with Natural Channel Design and Fred Phillips Consulting to complete design and engineering plans for the headwater and ditch improvement, instream restoration and channel reconnection. The designs are attached as an appendix. Additionally, American Rivers completed an application to the Bureau of Reclamation's WaterSMART Environmental Water Resources Program as well as submitting match applications. A copy of the application is attached as an appendix.

There is no official monitoring taking place now as the project has not been implemented. However, members of the Ward Water Group have and continue to document the current state of the river, headgate, ditch and floodplains. An official monitoring plan will be developed by early 2024 (pending funding secured) and completed before the project implementation begins in 2024. Photo-monitoring and qualitative observations will be performed by the Ward Water Group for at least five years, including initial photo-monitoring of the pre-restoration landscape.

The "multi-benefit" aspect of the project provided both an opportunity and challenge in gaining support for the project. Because the project provided for multiple types of improvements (water rights access, irrigation infrastructure, water quality, river health), it was important to ensure that the local agencies, organizations, and community were aware of those benefits which were most relevant to them. Framing the project in a way that enabled others to see the value in it was important for gaining local support and developing cooperative relationships with agencies. To help gain community support, project partners held many meetings (including one-on-one conversations, group meetings and Zoom meetings) with the stakeholders to share information about the project, answer questions they had and help them fully understand the project and its benefits.

Developing a project design budget proved challenging because of variable market conditions, as well as the rural nature of the project which further impacts construction cost estimates. To help address this, we included contingency funds as a part of the project budget we submitted to the Bureau of Reclamation.

The local knowledge from long-time residents was an important aspect in developing the design for headgate improvements. Community members who have maintained the headgate for decades and observed changes and major events in river flow were able to provide information that helped the contractors create a headgate design that should improve water access and reduce long-term maintenance needs.

As a part of the grant deliverables, American Rivers completed a Bureau of Reclamation WaterSMART application and other match funding applications to support the implementation of this project. We were awarded funding from the WaterSMART program in November 2023. Once we are under contract, the designs will be finalized, and work will begin in fall 2024. We anticipate project implementation will take 2 construction seasons and will be completed in December 2025.

Actual Expense Budget

The expense budget is in the final invoice attachments and includes all cash and in-kind funding match, as well as the total amount spent.

Attachments

The following reports and applications are attachments to this report and help understand the restoration and engineering designs, including the methodology used, key findings and near final plans. Additionally, we are included the WaterSMART narrative application to illustrate how this project will be implemented and the benefits it will have for the nearby landowners, downstream communities, and the natural environment.

- Engineering Design Package
- Restoration Design Package
- WaterSMART application
- 404 Permit information submitted to USACE
- Nationwide 27 approval letter

References

A number of references were used to complete the restoration and engineering design plans and associated report. These are included in the final reports, which are included as attachments.