Relief Ditch Diversion Modification

Final Report, November 24, 2014

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Section I – Introduction and Project Description

This final report provides the summary and description of the construction and management tasks related to the Relief Ditch Diversion Modification Project. This report also provides breakdown of expenditures related to the project separated by task and funding agency.

Prior to the modification the Relief Ditch Irrigation Company diverted water from the river using a river wide cobble push-up dam that was founded with large sandstone boulders at its base and marked with steel railroad rail driven vertically into the river bed along its upstream face. This structure created a barrier to fish moving upstream especially when the cobble dam was in place, created excessive erosion and over widening of the river, did not provide adequate control of diversions, and was a threat to boaters and other users of the river.

The objectives of this modification project were to:

1. Replace the existing dam with a rock weir structure that would remove the need for in river disturbances
2. Provide uninterrupted fish passage
3. Improve control over diversions
4. Reduce impacts to the riparian area
5. Stabilize eroding river banks
6. Improve safe access for recreational users

This project was initiated by local TU chapter, Gunnison Gorge Anglers, who began discussions with the Bureau of Land Management, and the Relief Ditch Irrigation Company (RDIC). Through a lengthy discussion and planning process the RDIC selected a design from three alternatives provided by TU which were provided by Crane and Associates with assistance from FlyWater Engineering. The preferred alternative was selected in 2011 by the irrigation company. This design alternative to move the point of diversion upstream 250 feet and used a parallel river wide rock weir structure to divert water and included a new concrete diversion structure and stainless steel headgate.

TU began the funding search in 2011 by writing and submitting grant applications to numerous potential funding agencies. Project funding ultimately was received through a variety of funding sources including the Colorado Water Conservation Board's Species Conservation Trust Fund, Colorado Parks and Wildlife Fishing is Fun Program, Colorado River District, Colorado Water Conservation Board's Watershed Restoration Grant, TU along with their local Chapters including Gunnison Gorge Anglers and Grand Valley Anglers, The Western Slope Conservation Center and Federation of FlyFishers. The Relief Ditch Irrigation Company also provided funding to the project and Trout Unlimited provided considerabe in-kind donations. The project received significant donation of materials from Whiting Farms of Delta, Colorado. The Bureau of Land Management provided significant in-kind donations in the form of the Environmental Assessment.

Section II – Project Management and Contractors

Project management was provided by Cary Denison, Trout Unlimited Project Coordinator, and George Osborn, TU volunteer. Other TU volunteers including Marshall Pendergrass and Ed Kehoe provided project management and oversight support.

The project management team of Cary Denison, Marshall Pendergrass, and George Osborn jointly selected Stonefly Earthworks from more than 5 qualified applicants to complete the construction tasks. Trout Unlimited signed a construction contract with Stonefly in November, 2012 after the grant contracting was completed.

Terri Smith was hired to manage accounting, invoicing and payroll tasks.

Jeff Crane of Crane Associates was hired to provide construction oversight services including design, survey, and material inspections.

Section III – Site Preparation and Permitting

Site preparation began in the last week of June, 2012 immediately after the Environmental Assessment was completed by the Bureau of Land Management. The initial site preparation consisted of clearing a half acre of brush and trash from the staging area to make room for rock deliveries.
In excess of 1300 tons of donated boulders from Whiting Farms of Delta were delivered to the site by local contractors. Additionally 1000 tons of top soil was also delivered by Wells Excavating and Farming from Delta.

In November Stonefly Earthworks began working on the site preparation by improving the staging area and access road to the river. This work included installation of a 96 inch galvanized steel culvert in the Relief Ditch which replaced a narrow and unsafe access that had been used historically. Other work included grading of the access road and construction of a working pad in the river at the site of the new headgate. During this timeframe Stonefly Earthworks also installed strategically placed spill mitigation kits at the construction site.

All equipment was pressure washed and inspected prior to being used at the construction site.

The permitting for the project was managed by TU with assistance from Stonefly Earthworks and Crane Associates.

A floodplain construction permit was obtained through Delta County. Delta County reviewed the HEC-RAS modeling that was completed in the design phase to determine that the high water elevation would not be increased as a result of the project.

A construction discharge permit was secured for the project by Trout Unlimited through the Colorado Department of Health and Environment. The discharge permitting reporting was managed my Stonefly Earthworks with supervision from TU.

This project is located on lands managed by the Bureau of Land Management (BLM) therefore the project required an Environmental Assessment which was completed by the BLM in June of 2012.

Section IV – Initial Construction Phase & Schedule of Tasks

Construction of the initial phase of in-river improvements began on November 20th 2012 and continued until the second week of April 2013. The initial phase of construction built the diversion and restoration components as specified by the design supplied by Crane and Associates. During the irrigation year of

2013 it became clear to TU and Relief Ditch Irrigation Company that modifications to the structures would be necessary to allow the irrigators to access their decreed right during periods of low flow. The modifications that followed are listed and described in the following section.
The following is a listing of significant phases of the construction process separated by time periods:

- November 15 to December 1, 2012: Initial phases of road construction, staking, removal of portion of old dam, construction of site for new headgate and diversion

- December 1 to December 15: Coffering of North Side construction area, dewatering, construction of upper rock weir, removal of old dam, concrete footing

- December 15 to December 30: Construction of upper rock weir, armoring along north bank, removal of old dam, forming and pouring of concrete headwall.

- January 1 to January 30: Construction of lower rock weir, and fill and shaping along north bank restoration area.

- February 1 to February 15: Forming and pouring of flume walls for diversion, armoring between weirs on north side of river, bank filling on north bank

- February 15 to February 27: Road construction, bank fill and compaction, fill and armoring in river, removal of coffer dam around north side construction area.

- March 1 to March 15: built coffer on south side, constructed upper and lower weir, road construction or headgate, canal and bank grading, armoring in river and along south bank

- March 15 to April 1: Finished armoring and in-river rock placement, restoration of river banks, set headgate and trash rack, and turned ditch on.

- April 1 to April 15: Final seeding, grading and restoration work.

Section V – Tuning and Modifications

Mentioned above, modifications to the structure were necessary for the diversion to operate as properly. The tuning and modification phase included multiple flow measurements, including measurements by the Division of Water Resources that were used to determine the extent the diversion structure needed to be elevated to insure irrigators adequate access to water at periods of low flow. This led to enlarging the orifice on the headgate wall, construction of a small cobble dam on the upstream edge of the new diversion structure to elevate water to supply adequate water to the headgate and a permanent improvement to the upstream weir that elevated the structure about 8 inches while still allowing for fish passage.

High flows of 11,300 cubic feet per second during the 2014 irrigation season nearly caused considerable damage to the diversion structure and ditch access road and ditch by overtopping the diversion headwall. The original design constructed these features to withstand a 100 year flood event of approximately 20,000 cfs. Flows of 11,300 cfs proved to be hazardous to the structure. Further surveying of natural high water line in the area and consulting with engineers resulted in an elevation increase to the road and headwall of 24 inches. The rock weir diversion structure did not show any signs of structural damage from the high water event.

TU anticipates there may be small minor tuning and restoration follow up that may be necessary in the future. The following is a list of the some of the key tasks that were completed by TU and its contractor, Stonefly Earthworks, during this modification and tuning stage.

- April 13: Enlargement of diversion orifice. (no photo)
- June 2013: Construction of temporary cobble dam on top of existing dam to increase water level at diversion.

- November 2013: Elevated upstream rock diversion weir by elevating rock structure 8 inches by adding an adjoining upstream boulder face to existing rock weir and modifying fish passage. (upstream row of rocks was added)

- Increased height of diversion wall and access road by 24 inches.

- Replaced top soil, reseeded and roughened south bank and access road.

Section VI – Budget/Expenditures Summary

Task Description/Funding Contributions	CWCB SCTF	COLORADO RIVER DISTRICT	CPW FIF	CWCB WSRA	Federation of FlyFishers	TU, GGA & GAS	Conservation Center	RDIC	TOTALS
Design		937.00		20,650.00		5,000.00			**26,587.00**
Mobilization	$8,712.50								**$8,712.50**
Site Prep	$12,770.00	$1,412.50							**$14,182.50**
Materials		$99,022.50			$1,500.00	$640.00			**$101,162.50**
Impact Mitigation	$16,732.80								**$16,732.80**
Removal Existing Diversion			$15,000.00						**$15,000.00**
Coffering & Water	$44,000.00								**$44,000.00**
North Side Stabilization	$33,136.00					$2,500.00			**$35,636.00**
Construction of Access	$44,267.55		$4,400.00						**$48,667.55**
Diversion Structure	$91,755.00	$11,481.50				$1,000.00			**$104,236.50**
Diversion Weir Construction	$45,530.65	$2,323.25							**$47,853.90**
Grade Control Weir	$45,420.50	$2,323.25	$29,000.00						**$76,743.75**
Replacement of Native River Bed and Installation	$50,000.00								**$50,000.00**
South Side Stabilization	$10,634.00		$3,000.00			$3,500.00			**$17,134.00**
Site Reclamation	$15,710.00		$29,000.00				$700.00		**$45,410.00**
De-mobilization	$6,000.00							$3,800.00	**$9,800.00**
Administration	$2,550.00								**$2,550.00**
Project Management	$26,681.50								**$26,681.50**
Grand	$5,000.00								**$5,000.00**
Construction Inspection	$41,099.50								**$41,099.50**
Totals/Item	**$500,000.00**	**$117,500.00**	**$80,400.00**	**$20,650.00**	**$1,500.00**	**$12,640.00**	**$700.00**	**$3,800.00**	**$737,190.00**

Section VII – Project Information

- Diversion located within Bureau of Land Management Gunnison Gorge National Conservation Area
- Relief Ditch diversion right total: 51cfs
- Installed approximately 3000 tons of imported boulders 2000 tons of imported dirt and pit run material installed
- Formed and poured over 90 cubic yards of reinforced concrete for diversion structure
- Installed new stainless steel headgate and trash rack

Section VIII- Lessons Learned

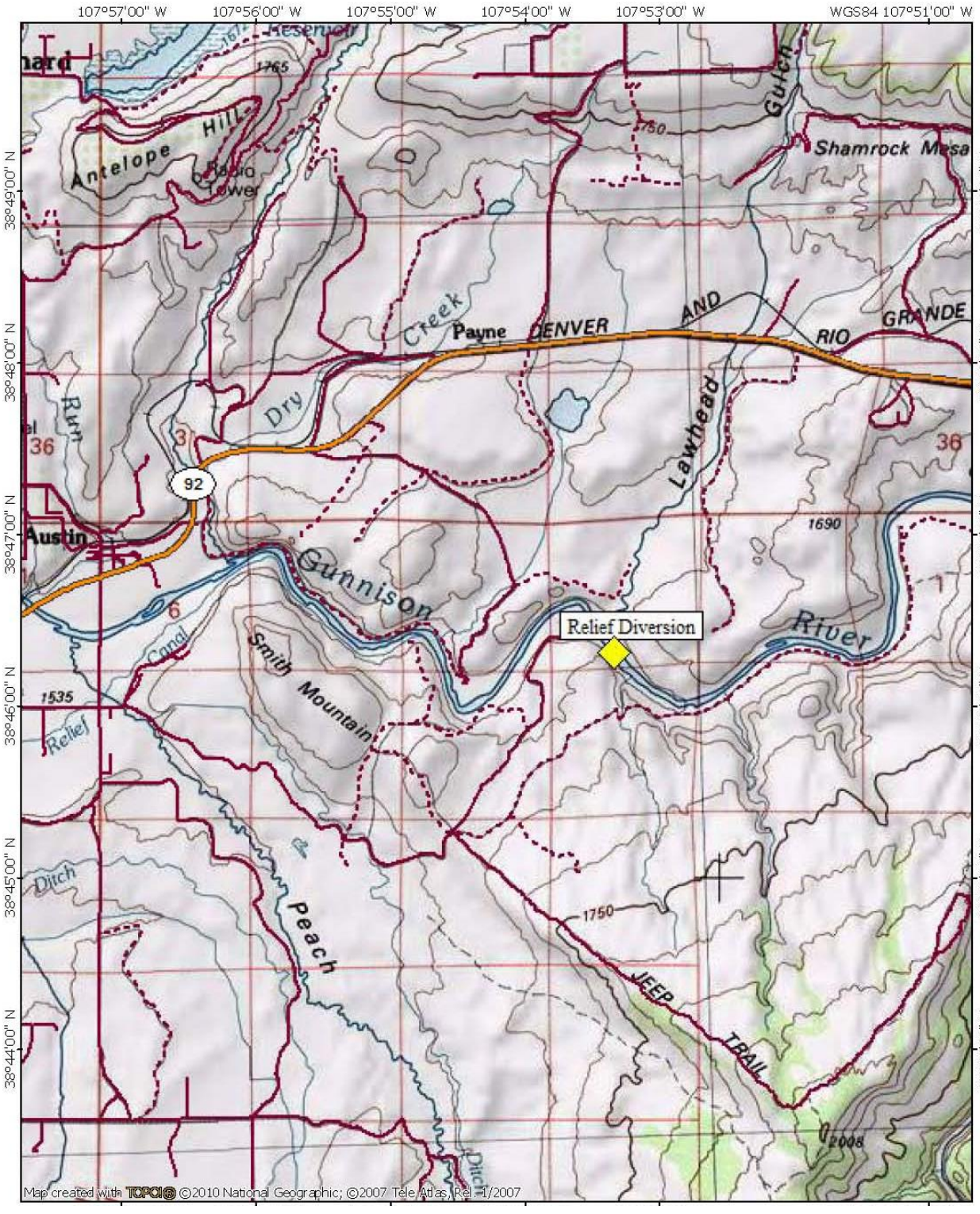
This project provided many valuable lessons for project proponents and stakeholders. Most notably is the importance of adequate project planning and engineering. The task of designing and constructing a rock weir structure that will meet the lofty goals of meeting the environmental needs along with those of the irrigation company without yearly modification proved to be quite difficult, especially with a somewhat limited budget. While pre-project reconnaissance should always include an adequate amount of time, establishing actual diversion demands and other expectations of the water users is valuable to creating a true win-win project. Unfortunately there was not an accurate record of diversion for the Relief Ditch nor was there a great understanding of irrigation demands under the ditch

which resulted in building the diversion to a bit of a moving target. Surveying the ditch and connecting that information to the in-river construction plan would have also been very valuable.

Selection of contractors and other support staff is critical to the success of the project. We were very fortunate to have the opportunity to work with Stonefly Earthworks on this project.

The most valuable lesson learned is that with projects of this nature where antiquated infrastructure is being replaced there is an opportunity to address other water concerns. While we had not planned on directly addressing in-stream flow or on farm efficiency needs this project through the relationship with the ditch company and its shareholders provided us with an opportunity to help them address some of the other infrastructure issues along the ditch which can result in additional benefits to the Gunnison River as well as the water users.

Appendix A- Location Map



Appendix C- Photos

Preconstruction

From downstream

From upstream

At diversion

Staging and Ditch Improvements

Replacing old culvert/crossing

Staging area before and after

New headgate

Excavation for weir foundation