Plaza Project Phase 3: Prairie Ditch Implementation Project

Final Report prepared for CWCB - May 2017

Colorado Rio Grande Restoration Foundation
Rio Grande Headwaters Restoration Project

The Mission of the Rio Grande Headwaters Restoration Project is to restore and conserve the historical functions and vitality of the Rio Grande in Colorado for improved water quality, agricultural water use, riparian health, wildlife and aquatic species habitat, recreation, and community safety while meeting the requirements of the Rio Grande Compact

Final Report Executive Summary
Project Title: Plaza Project Phase 3 - Prairie Ditch Implementation Project
CWCB WSRA Grant Contract Number: CTGG12015-295
CWCB Loan Contract Number: CT2015-134

Project Start Date: January 1, 2015
Project Completion Date: May 24, 2017

FUNDING

Total CWCB WSRA - Cash	$430,000.00
Total Landowner (CWCB Loan plus additional contribution) - Cash	$132,413.60
NRCS - Cash	$312,176.90
Subtotal Cash	$874,590.50
In-kind Contributions	$96,000.00
Subtotal In-kind	$96,000.00
TOTAL FUNDING	**$970,590.50**

EXPENDITURES

Expenditures of CWCB WSRA Funds	$430,000.00
Expenditures of CWCB Loan Funds	$130,000.00
Other Expenditures	$410,590.50
TOTAL EXPENDITURES	**$970,590.50**

Summary Accomplishments
The Plaza Project: Phase 3 - Prairie Ditch Implementation Project (Phase 3) was a diversion dam and headgate replacement project completed through a partnership with the Rio Grande Headwaters Restoration Project (RGHRP) and the Prairie Ditch Company. The goal of Phase 3 was to replace the aging and inefficient Prairie Ditch diversion headgate with a new grouted rock diversion structure and a concrete headgate with automated water gates, while improving streambanks stability and riparian condition throughout the project area. Phase 3 included the construction of a new grouted rock diversion dam, concrete headgate, trash rack, sluice gate, and sluice channel for the Prairie Ditch Company. In addition to replacing the diversion, Phase 3 included the stabilization of 500 feet of streambank in the Project area. Throughout project implementation the RGHRP gave tours, developed outreach materials, and provided updates to community groups as part of outreach and education. The RGHRP will continue to give tours and complete long-term monitoring to ensure that Phase 3 objectives stand the test of time. Benefits of Phase 3 include improved diversion efficiency and reduced maintenance, enhanced water quality, improved riparian condition, increased capacity for sediment transport, improved aquatic and wildlife habitat, improved public safety and recreation opportunity, and increased public involvement in water improvement activities.

INTRODUCTION and BACKGROUND

The Colorado Rio Grande Restoration Foundation (Foundation) is the fiscal agent for the Rio Grande Headwaters Restoration Project (RGHRP). The RGHRP was formed to implement the recommendations of the 2001 Study. The 2001 Study was prompted by a group of citizens who were concerned that the Rio Grande had been impaired. The 2001 Study, sponsored by the San Luis Valley Water Conservancy District and funded by the Colorado Water Conservation Board, analyzed 91 miles of the Rio Grande from South Fork to the Alamosa/Costilla County line. This reach was identified as the portion of the Rio Grande in Colorado that has been most impacted by human intervention over the past 100 years. The 2001 Study analyzed the vegetation, human impact, agricultural disturbance, geomorphology, hydrology, wildlife habitat, condition of structures, and aquatic habitat within the 91-mile study reach.

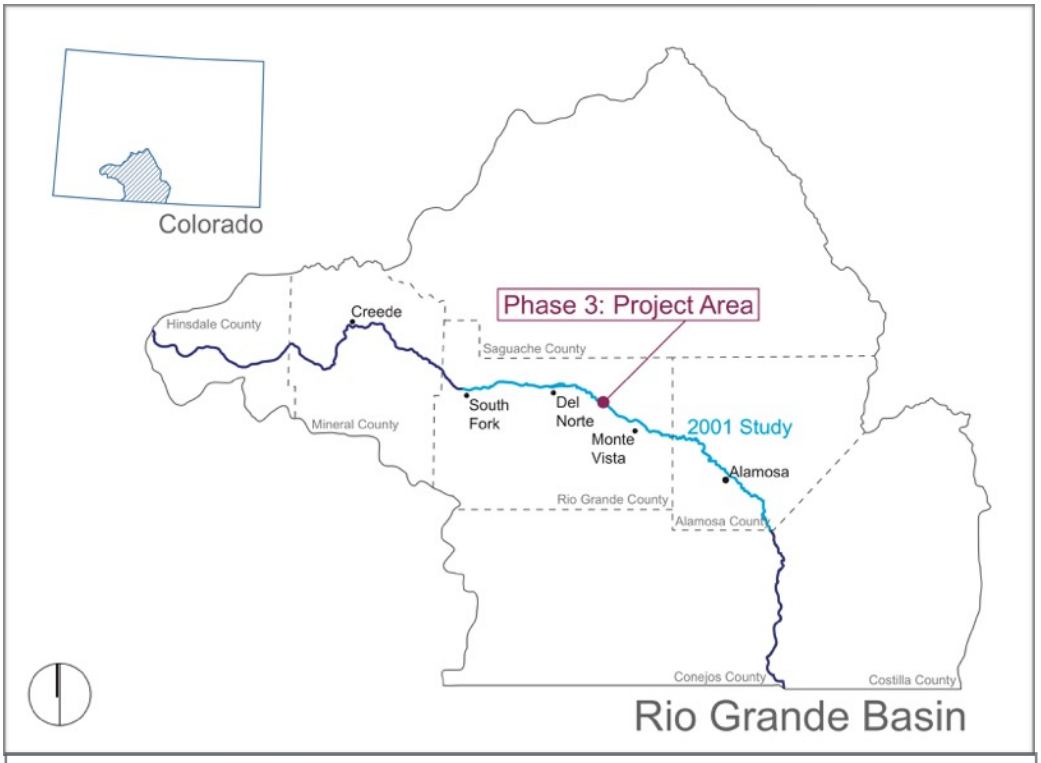

Figure 1: Location of Plaza Project - Phase 3: Prairie Ditch Implementation Project.

Since 2001, the RGHRP has accrued a successful record of working with landowners, and local, state, and federal entities to improve the condition and function of the Rio Grande. To date the RGHRP has completed 10 cost-share restoration projects on 62 sites to improve the condition of over 11 miles of streambanks on the Rio Grande. These projects reduce sediment loading by stabilizing the streambanks, improve the riparian and upland habitat by increasing willow and riparian vegetation cover, enhance the fishery, increase the capacity of the Rio Grande to transport sediment, and recover the condition of wetlands located throughout the riparian area. In 2010, the RGHRP began working with ditch companies to address concerns

surrounding aging and inefficient diversion and headgate structures. The first of these projects was the Plaza Planning Project – Phase 1 (Phase 1) in the Sevenmile Plaza area of Rio Grande County. Phase 1 was administered by a partnership between the McDonald Ditch Company and the RGHRP. The RGHRP worked with stakeholders to determine the primary issues in the area, identify remediation methods, and develop an implementation plan (The Plaza Plan) to improve the health and function of the Rio Grande in the Sevenmile Plaza area. The identified issues include streambank instability in the 2.8-mile project reach, a degraded wetland, and aging, hazardous, and inefficient diversion structures. The Plaza Project - Phase 2: McDonald Ditch Implementation Project was the first phase of implementation of the Plaza Plan and resulted in the replacement of the McDonald Ditch diversion dam and headgate with a new concrete diversion and headgate with automated gates, as well as the reclamation of a 2-acre wetland and the stabilization of 2,000 feet of streambank.

Phase 3 continues these efforts directly downstream at the Prairie Ditch Diversion. The project area is located within the Sevenmile Plaza in Rio Grande County. As designated by the 2001 Study, the project area is located within Subreach C1 of Reach C, which was ranked “poorest” in channel stability and condition of the floodplain and was identified as a high priority for restoration. Additionally, the channel in the project area is impacted by sedimentation, which built up on the old diversion dam. Finally, the old Prairie Ditch diversion dam and headgate were constructed in the early 1900s. While they have served the ditch company well, years of use left the headgate crumbling and the rock diversion dam blown out 150 feet. This aging infrastructure impacted the Prairie Ditch Companies ability to efficiently divert their water. Phase 3 addressed these issues by replacing the old diversion dam with a new grouted rock structure and replacing the old headgate with a new concrete headgate with automated gates, new concrete trash rack and sluice gate. In addition, streambanks were stabilized throughout the project area. The project was completed in April of 2017.

PROJECT OBJECTIVES, TASKS, and ACTIVITIES

The proposed objectives of the Project were to:

1. Improve diversion efficiency and reduce maintenance by replacing the aging Prairie Ditch headgate, installing automated water gate, and replacing the Prairie Ditch diversion dam with a grouted rock structure;
2. Enhance water quality by reducing erosion and sediment input;
3. Improve riparian condition by stabilizing up to 1,000 linear feet of streambanks in the project area;
4. Increase the capacity of the Rio Grande to transport sediment;
5. Improved aquatic and wildlife habitat;
6. Encourage local recreation by including fish and boat passage in the new diversion structure;
7. Promote public involvement in water improvement activities through public outreach and education.

The following passages detail how these objectives were met, modified, and in some cases exceeded, through the completion and planned completion of Project Tasks.

Figure 2: Map of Project elements

Task 1: Finalize Design for Project Elements
Description of Task: Finalize the design for the Prairie Ditch headgate, trash rack, sluice, and diversion replacement, and streambank stabilization.

Activities: District, area, state, and national NRCS engineers completed designs for the headgate, trash rack, sluice gate and sluice channel. Riverbend Engineering was hired to complete designs for the new grouted rock diversion dam that includes fish passage. In 2015, project engineers consulted with geology, hydraulic, and vegetation specialists, completed HEC-RAS hydraulic modeling, and performed a load analysis for the diversion and headgate structures.

The designs were completed by the NRCS and Riverbed Engineering engineers in Fall 2015.

Figure 3: Completing survey for Prairie Ditch diversion dam design.

Task 2: Prairie Ditch Diversion Replacement
Description of Task: Replace the Prairie Ditch Diversion with a rock diversion that allows for fish and boat passage.

Activities: The Prairie Ditch Company and the RGHRP hired Robins Construction to complete all project construction, including the replacement of the diversion dam. Robins mobilized in September 2015, but temporarily demobilized for two weeks due to an adjacent landowner that filed an injection against the Prairie Ditch Company. The injunction was denied in Rio Grande County Court. Robins remobilized in October 2015 and removed the existing diversion structure. The crew built a cofferdam, dewatered half of the river channel and completed the necessary earthwork for the diversion dam construction. They placed large boulders with an excavator, installed rock riprap and a membrane, and poured concrete, grouting the rock dam. Once

complete, the crew moved the cofferdam, dewatering the seconded half of the river channel, and constructed the second half of the diversion structure. The new diversion structure included a low flow channel allowing for fish and boat passage. The diversion dam and associate structures were completed in December 2015. Completing this task met the objectives of improving diversion efficiency, reducing maintenance, improving community safety, enhancing aquatic habitat and passage, and providing boat passage.

Figure 4: Construction of the new Prairie Ditch Diversion Dam.

TASK 3 : Prairie Ditch Headgate Replacement

Description of Task: Replace the Prairie Ditch headgate with a concrete headgate that includes automated gates. Additional structural work includes a sluice gate and trash rack.

Activities: Robins Construction began water removal and earthwork for the new headgate construction in late January 2016. They poured concrete for the new headgate and trash rack in February 2016. The concrete for the sluice gate was poured and the water control gates, catwalks, and guardrails were installed in March 2016. The old Prairie Ditch headgate was removed at the end of March 2016 and the new headgate and trash rack were functional in time for the Prairie Ditch Company to divert their allotted water at the start of the 2016 irrigation

season. Automated Control Experts, LLC was hired to install automation on the water control gate. Construction of the headgate and associated sluice gate and trash rack resulted in an overage of 53 yards of concrete, which put the headgate and associated structures over budget by $22,695. Project partners were able to make up for the extra expenses by reallocating funds from Project administration and the sluice channel construction materials in order to complete the project within budget. Robins Construction completed the excavation of the sluice channel, installed the radial gate, and lined the channel with rock rip rap between December 2016 through March 2017. All construction was complete by April 2017. The completion of this task met the objectives of improving diversion efficiency and reducing headgate maintenance.

Figure 5: Headgate Replacement 1) Prairie Ditch headgate before; 2) Headgate and sluice gate construction; 3) Adjusting automation on new headgate; 4) Completed trash rack; 5) Completed Prairie Ditch headgate and sluice gate.

TASK 4: Channel Shaping and Streambank Stabilization

Description of Task: Implement channel and streambank stabilization techniques upstream and downstream of the Prairie Ditch diversion and headgate structure.

Activities: Robins Construction implemented channel shaping and streambank stabilization during the construction of the new diversion dam. This included installing a rock barb deflector and additional rock structures to stabilize the streambanks up and downstream of the new

diversion on the north side of the river. The planned streambank stabilization and riparian restoration on the south side of the river did not take place at the request of landowner. This resulted in a reduction in the length of streambank stabilized from the original project plans. While not all of the planned stabilization occurred, a total of 500 feet of streambank was stabilized in the project area. The completed channel shaping and streambank stabilization efforts met the objectives of enhancing water quality by reducing erosion and sediment input, improving riparian condition, increasing the capacity of the Rio Grande to transport sediment, improving aquatic and wildlife habitat, and improving local recreation.

TASK 5 – Monitoring

Description of Task: Monitor the site for three years using the RGHRP Sampling and Analysis Plan (SAP).

Activities: Project engineers with NRCS and Riverbend Engineering in partnership with the RGHRP completed pre-construction surveys, cross section transects, photographic documentation, and visual stream assessments. Post-construction as-built surveys of the new diversion and headgate structures and surrounding area have been completed by project engineers. These surveys, along with long-term monitoring will map locations and features of the streambanks, diversion and headgate, and wetlands over time. Photo documentation will be used to track conditions of the riparian and shoreline plant communities, bank stabilization, and overall visual condition of the Project area. The United States Department of Agriculture's Stream Visual Assessment Protocol II (SVAP II) has been used to assess the sites pre-construction and will be used for long-term monitoring. Project engineers will complete a biannual inspection that classifies the condition and function of the headgate and diversion structure. The RGHRP will be responsible for the long-term monitoring of Phase 3.

Figure 6: Phase 3 construction monitoring and surveying.

TASK 6 – Outreach and Education

Description of Task: Conduct a public outreach and education program to raise awareness of Phase 2 activities and the RGHRP, and encourage other landowners to participate in future projects.

Activities: The RGHRP developed visual aids and written materials showing the specific sites and proposed work. These materials were used during tours of the site, which were given before, during and after project construction. Tour groups included the Rio Grande Basin Roundtable, NRCS, college classes, community groups and others. Presentations and project updates were made at meetings of the Rio Grande Water Conservation District, San Luis Valley Water Conservancy District, the Rio Grande Water Users, the Alamosa Rotary Club, and other public meetings. The RGHRP also shared construction updates in newsletters, social media, radio interviews, and local press. These outreach efforts met the objective of promoting public involvement in water improvement activities.

Figure 7: Pictures from project tours and events for Phase 3.

TASK 8 – Project Administration

Description of Task: Complete all necessary contracts, status reports, and internal and external documents. Ensure Tasks are completed within approved costs and timelines.

Activities: The RGHRP administered Phase 3. This included completing contracts with the CWCB, project partners, landowners, and contractors; obtaining the necessary permits; soliciting bids and working with the Prairie Ditch Company to hire contractors; managing budgets and reimbursement requests; and completing semi-annual and final reports. Additionally, the RGHRP performed Project oversight, making certain project design and implementation was timely and accurate. The RGHRP organized outreach and education efforts and will complete long-term site monitoring.

Figure 8: Prairie Ditch president LaVern Hart (center) and superintendent Mark Brown (right) discuss Phase 3 progress with contractor Adam Robins during construction of the diversion dam.

PROJECT BUDGET: Tasks 1-3

Plaza Project: Phase 3 - Prairie Ditch Implementation Project Actual Budget by Task and Source of Funds							
Project Tasks	Actual	Sources of Funds					Total
		Cash Contribution			In-Kind Contribution		
		NRCS	WSRA	Landowners	NRCS	RGHRP	
Task 1: Finalize Design							
NRCS District, Area, and State Engineers will complete the headgate design (in-kind contribution is a NRCS Estimate)	$ 90,000.00	$ -	$ -	$ -	$ 90,000.00	$ -	$ 90,000.00
Riverbend Engineering will complete the diversion dam design and construction management	$ 49,000.00	$ -	$ 49,000.00	$ -	$ -	$ -	$ 49,000.00
Total Task 1	$ 139,000.00	$ -	$ 49,000.00	$ -	$ 90,000.00	$ -	$ 139,000.00
Task 2: Diversion Replacement							
Site Preparation: Includes clearing and grubbing, removal of the old structure, pollution control, mobilization, and traffic control.	$ 40,000.00	$ -	$ 40,000.00	$ -	$ -	$ -	$ 40,000.00
Demobilization and Remobilization for court	$ 17,000.00	$ -	$ 17,000.00	$ -	$ -	$ -	$ 17,000.00
Dewatering Cost During Construction	$ 85,500.00	$ -	$ 85,500.00	$ -	$ -	$ -	$ 85,500.00
Materials and Instillation of Rock Diversion Dam	$ 234,300.00	$ -	$ 152,800.00	$ 81,500.00	$ -	$ -	$ 234,300.00
Extra heating for concrete	$ 11,000.00		$ 11,000.00	$ -	$ -	$ -	$ 11,000.00
Total Task 2	$ 387,800.00	$ -	$ 306,300.00	$ 81,500.00	$ -	$ -	$ 387,800.00
Task 3: Headgate Replacement							
Site Preparation: Includes clearing and grubbing, removal of the old structure, channel clearing and shaping, pollution control, mobilization, and traffic control.	$ 22,672.00	$ -	$ -	$ 22,672.00	$ -	$ -	$ 22,672.00
Dewatering costs during construction	$ 20,000.00	$ 20,000.00	$ -	$ -	$ -	$ -	$ 20,000.00
Earthwork: Includes earthfill.	$ 6,270.00	$ 6,270.00	$ -	$ -	$ -	$ -	$ 6,270.00
Construction of new headgate including concrete and steel reinformecment, rock rip rap, water control gates, catwalk and handrails	$ 107,120.00	$ 66,503.55	$ 26,788.45	$ 13,828.00	$ -	$ -	$ 107,120.00
Construction of trash rack including concrete and steel reinforcement, catwalk, and guard rails	$ 86,160.00	$ 86,160.00	$ -	$ -	$ -	$ -	$ 86,160.00
Construction of sluice channel including excavation for structural works and sluice channel, radial gate structure concrete, rock rip rap, and radial gate	$ 118,210.00	$ 102,804.45	$ 15,405.55	$ -	$ -	$ -	$ 118,210.00
Extra yards of cement for structures	$ 22,695.00	$ 22,695.00	$ -		$ -	$ -	$ 22,695.00
Construction access improvements: culvert installation	$ 3,720.00	$ 2,306.40		$ 1,413.60			$ 3,720.00
Headgate Automation	$ 17,437.50	$ 5,437.50	$ -	$ 12,000.00	$ -	$ -	$ 17,437.50
Total Task 3	$ 404,284.50	$ 312,176.90	$ 42,194.00	$ 49,913.60	$ -	$ -	$ 404,284.50

PROJECT BUDGET: Tasks 4-8

Plaza Project: Phase 3 - Prairie Ditch Implementation Project Actual Budget by Task and Source of Funds

Project Tasks	Actual	Sources of Funds					Total
		Cash Contribution			In-Kind Contribution		
		NRCS	WSRA	Landowners	NRCS	RGHRP	
Task 4: Channel Shaping and Streambank Stabilization							
Channel shaping up and downstream diversion	$ 2,500.00	$ -	$ 2,500.00	$ -	$ -	$ -	$ 2,500.00
Total Task 4	$ 2,500.00	$ -	$ 2,500.00	$ -	$ -	$ -	$ 2,500.00
Task 5: Monitoring							
Field Personnel - RGHRP Personnel will coordinate and complete post-construction monitoring of Project sites. These hours include monitoring preparation, data collection, and data analysis.	$ 1,000.00	$ -	$ -	$ 1,000.00	$ -	$ -	$ 1,000.00
Field Volunteer - One volunteer will assist in data collection. The volunteer will contribute approximately 12 hours per year for two years at an in-kind value of $20.85 per hour.	$ 500.00	$ -	$ -	$ -	$ -	$ 500.00	$ 500.00
Total Task 6	$ 1,500.00	$ -	$ -	$ 1,000.00	$ -	$ 500.00	$ 1,500.00
Task 6: Outreach and Education							
Project Outreach and Education; press, tours, production of materials, and volunteer coordination by the RGHRP.	$ 3,143.00	$ -	$ 3,143.00	$ -	$ -	$ -	$ 3,143.00
Total Task 7	$ 3,143.00	$ -	$ 3,143.00	$ -	$ -	$ -	$ 3,143.00
Task 7: Administration							
Cost for the RGHRP to administer the Project at the average rate of $35/hour	$ 26,863.00	$ -	$ 26,863.00	$ -	$ -	$ -	$ 26,863.00
Office Support In-Kind Match: office space and utilities are donated by the San Luis Valley Water Conservancy District. The value is $140.00 per month. Because the RGHRP has 3 active Projects, the in-kind match for the Project is 1/3 of total office support.	$ 2,000.00	$ -	$ -	$ -	$ -	$ 2,000.00	$ -
Project Administration In-kind Match: time contributed by the CRGRF Board President to assist in Project Administration ($20.85)	$ 3,500.00	$ -	$ -	$ -	$ -	$ 3,500.00	$ 3,500.00
Total Task 8	$ 32,363.00	$ -	$ 26,863.00	$ -	$ -	$ 5,500.00	$ 32,363.00
TOTAL	**$ 970,590.50**	**$ 312,176.90**	**$ 430,000.00**	**$ 132,413.60**	**$ 90,000.00**	**$ 6,000.00**	**$ 970,590.50**

LESSONS LEARNED & FUTURE PROJECT RECOMMENDATIONS

RGHRP is continuing to implement the recommendations of the 2001 Study, 2007 Watershed Strategic Plan, and the Plaza Plan by administering additional projects in the project area and in other reaches of the Rio Grande. Phase 3 was the second diversion dam and headgate replacement project that the RGHRP has implemented. Lessons learned from the planning and implementation of this project include:

- Communication between partners is critical to project success. Maintaining clear communication with project engineers, contractors, and partners throughout all stages of project implementation allows partners to address any unforeseen challenges or delays before they impact the project objectives, budget, and timelines.
- Secure the support of all surrounding landowners during the project planning phase and before construction begins. This was not possible for Phase 3, resulting in extra legal fees for the Prairie Ditch Company in order to keep the project moving forward.
- Allow flexibility in both time and funding for contingency plans in the case of unexpected river flows and weather conditions.
- Build robust partnerships and community support. The RGHRP worked hard to build community support and engagement from the very beginning of Plaza Plan and Phase 3 planning. This support helped move the project forward when there were road bumps.
- Continue to organize a variety of tours and volunteer events to provide opportunities for community involvement and ownership in Projects.
- Commemorate project successes with project partners and funders. The Prairie Ditch Company hosted a barbecue and ribbon cutting for stockholders, partners, and funders to acknowledge those that helped make the project possible. This fun event encouraged community engagement and allowed partners to celebrate project accomplishments.
- Track all project timelines and complete needed reports in advance of deadlines.

Phase 3 is the second of several planned projects that will improve the water diversion and management efficiency on the Rio Grande. The RGHRP is currently working with the Consolidated Ditch Company to plan for the Consolidated Ditch Implementation Project, which will replace the Consolidated Ditch diversion dam and headgate just over a mile downstream from the Phase 3 project site. Additional ditch companies have been working with the RGHRP to coordinate structural and riparian restoration plans. Lessons learned throughout Phase 3 will be applied to future projects implemented by the RGHRP.

ACKNOWLEDGMENTS

The successful completion of the Plaza Project: Phase 3 is a testament to hard work, collaboration, and coordination with landowners, project partners, stakeholders and funders. Project partners include the Prairie Ditch Company, National Resource Conservation Services, Riverbend Engineering, Robins Construction, the Plaza Stakeholders, the Rio Grande Inter-Basin Roundtable, Colorado Water Conservation Board, and others.

Special thanks to the Colorado Water Conservation Board for providing grant and loan funds for the continued efforts to improve the overall condition of the Rio Grande. This great project would not have been possible without your support!

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