

FINAL REPORT

Paonia Ditch Diversion Adaptive Management Project

Submitted by: North Fork River Improvement Association

Date: September 8, 2009

Introduction

This report describes steps taken by the North Fork River Improvement Association (NFRIA) to complete adaptive management actions on the Paonia Ditch Diversion on the North Fork of the Gunnison River near Paonia, CO (Figure 1). The project was funded, in part, with a special \$5,000 Colorado severance tax grant received in June, 2008, and a \$15,000 Healthy Rivers Grant from the Colorado Water Conservation Board (CWCB) approved in March, 2009. The balance of the project was funded with in-kind donations organized by and contributed through NFRIA, and by cash from the Paonia Ditch Company (Company). This project report supplements the report submitted in April 2008 for the original Paonia-Feldman Project.

Background

Prior to the initial project in 2008, the Paonia Ditch Diversion used a rock, gravel and debris structure created by bulldozing the river bed to divert water into the ditch. The ditch had no control structure at the diversion point and used a metal culvert as the intake structure. When the irrigation season ended, poles were placed across the mouth of the culvert to stop flow into the ditch. The total decree for the Paonia Ditch is 34.54 cfs, which serves 700 acres of irrigated agricultural land. The Paonia Ditch is the senior ditch on the North Fork of the Gunnison River.

The Paonia Ditch Diversion is situated immediately upstream from a former in-stream gravel mine. As a result of the in-stream mining, extensive channel head-cutting has occurred immediately below the current diversion point. This erosion of the river bed resulted in the need to move the diversion point of the Paonia Ditch upstream in past years. The magnitude of the down-cutting is evidenced by the fact that between 1992 and 1997 the river bed was lowered five feet at the highway bridge located less than one mile downstream of the diversion. Gravel mining in this reach of the river ended in March of 2004, and further degradation of the riparian corridor, including the stream channel, appears to be slowing. However, failure of the old Paonia Ditch Diversion, which was acting as a grade control, would have allowed the head-cut to progress farther upstream. This eventual failure, without the diversion rehabilitation completed by NFRIA in 2008, made an updated and permanent diversion both useful and necessary for the Company's operation, as well as the health of the river.

In March, 2008, NFRIA completed the initial Paonia-Feldman Project. This initial project was funded through CWCB and the Gunnison Basin Roundtable, and a final report was submitted in April. However, 2008 spring runoff in the North Fork Gunnison River peaked at 5750 cfs near the project site, nearly double the normal runoff peak, and damaged the diversion structure completed just months before. New headgates for the Paonia and Feldman Ditches, installed as

part of the project, were undamaged. NFRIA immediately applied to CWCB's Watershed Protection Fund for funding to repair the structure. While awaiting CWCB's response, CWCB awarded NFRIA a special severance tax grant with which to initiate repairs.

Project Goal

The goal of the current project was to take needed actions to support the design goals of the irrigation diversion structure completed in the spring of 2008 and subsequently damaged by spring runoff.

Original (2007-2008) Project Goals

The original Paonia Ditch Diversion project, which was part of the Paonia-Feldman Project, included three main goals:

1. **Enhance watershed health through restoration of an efficient water-conserving diversion structure.** The structure is to deliver exactly the decreed amount of water into the existing ditch system. This reduces the need for those with senior water rights to restrict flow to junior users, as well as increase flows for aquatic life, surrounding communities, and the Gunnison River Basin. The elimination of annual bulldozing also reduces upstream and downstream migration of the down-cutting process triggered by the preceding gravel mine.
2. **Improve fish and wildlife habitat by reducing the need for bulldozers.** Channel disturbance caused by large equipment would essentially cease. This would decrease suspended sediment and improve and diversify aquatic macroinvertebrate and fish species requiring clear, clean water.
3. **Create safer recreation through construction of a low-head rock diversion wall.** The community would benefit from the absence of a river-wide gravel dam that unnecessarily diverts the entire river. This makes safer recreational boating through this reach of the river. Boaters would be able to float over a new rock diversion without being sucked toward the ditch. Fish populations and the aquatic food web they rely on would be bolstered, increasing the carrying capacity of the riparian ecosystem and creating a more sustainable fishery for angling opportunities.

The project is also to benefit the local water commissioner. Having a controllable structure at the point of diversion provides a much better way to measure and control water decrees. This helps the commissioner to control flows and make determinations about calls. This also furthers the goal in SWSI Recommendation #1 of reducing conflict among interest groups. The project similarly addressed the issue of funding environmental and recreational enhancements, addressed in SWSI Finding #8 and Recommendation #4. As well, the project helps small agricultural users, an issue identified in SWSI Finding #9.

Current Project Activities and Achievements

Following spring 2008 runoff, when the extent of the damage to the newly-constructed diversion structure became known, NFRIA contacted the Company on how best to repair the damages. For its part, the Company notified NFRIA that it was extremely disappointed that the diversion failed. According to Steve Tuck, local water commissioner, the partial diversion failure caused the Company to lose its ability to divert its full decree of water during two periods totaling 12 days during the months of July and September of 2008. The Company responded to this shortfall with renewed in-channel activities to improve the capability of the damaged diversion structure to divert the Company's full decree.

NFRIA and the Company agreed that NFRIA would stage large boulders (i.e., construction materials), near the diversion reconstruction site using funds from the severance tax grant. During the fall of 2008, NFRIA offered to rebuild the structure. The Company responded with a request that NFRIA assist in the reconstruction, that reconstruction essentially entail a "design/build" based on the original drawings, and that the Company be allowed to review and endorse any changes to the design. No additional substantive communication was received by NFRIA from the Company until mid-January, 2009, when the Company requested that NFRIA supply large boulders so the Company could rebuild the diversion without additional direct NFRIA involvement. Because of its grant with CWCB and the responsibility NFRIA believed the grant entailed, NFRIA agreed to consider this course of action if the Company would first provide its plans for NFRIA approval. Without advising NFRIA, however, the Company subsequently began reconstruction efforts in February. When NFRIA learned of this, and because 2009 spring runoff was only weeks away, NFRIA acquiesced and participated by locating, transporting and staging boulders for the Company to use during reconstruction. Notably, the required reconstruction efforts were significantly greater than those anticipated by NFRIA in its Healthy Rivers grant application. Approximately 790 cubic yards of rock ultimately were located, transported, and staged, whereas NFRIA initially proposed to use 600 cubic yards of rock. The rock was in-kind match to the project by private landowners in the North Fork Valley, located and contributed through NFRIA.

The Company's reconstruction of the diversion was completed during February and March of 2009. The initial project completed by NFRIA in 2008 was designed to create an efficient, low-maintenance permanent concrete head gate and a low-head rock weir at the diversion point for the ditch (Photo 1). The diversion also created a low-flow channel through the diversion structure (Photo 2) and energy-dissipating plunge pools below the diversion (Photo 3) to provide for fish migration and boater passage during low-flow conditions. These 2008 low-flow objectives were consistent with watershed management goals and needs assessments of the North Fork Water Conservancy District, the North Fork Gunnison Action Strategy (2000), and the Statewide Water Supply Initiative Findings and Key Recommendations. The Company's pre-2008 diversion structure prevented fish migration and ready boater passage.

Observations during the subsequent 2009 irrigation season, as well as comments by Steve Tuck, local water commissioner, indicate that the rebuilt diversion structure allowed the Company a full decree of water from the North Fork of the Gunnison River. The Company appears satisfied with the rebuilt diversion.

During the Company's construction activities in 2009, NFRIA asked the Company to again incorporate a low-flow channel into the diversion structure, and a Company representative stated a willingness to do so. More recently, a Company representative wrote that the rebuilt "... structure will continue to offer fish passage and safe boat passage...." NFRIA observations since the reconstruction was completed, and following 2009 runoff, reach different conclusions, however. The most significant departure from NFRIA's 2008 original design and construction is that the Company did not reconstruct a low-flow channel through the diversion. Photos 5 and 6 differ markedly from Photo 2. Field measurements likewise provide little or no evidence that a low-flow channel was incorporated into the Company's final reconstructed diversion.

At this time, beyond the normal role and actions of the water commissioner, the Company asserts full and complete control over the rebuilt diversion structure. NFRIA had no direct role in its reconstruction beyond providing construction materials. NFRIA is disappointed that the Company chose to ignore a reasonable request for a low-flow channel.

Lessons Learned and Recommendations

NFRIA and the Company are not on good terms. Although the Company insisted on rebuilding the diversion and did so using its own financial resources, it requested and apparently expected NFRIA to use its CWCB funding to provide construction materials, which NFRIA agreed to do. Given this history, however, the following lessons seem obvious, along with recommendations on how to avoid problems like those experienced with this project.

1. All agreements between NFRIA and the Company, including change orders, deviations from project plans, and "as-built" plans should have been in writing. Not only is this sound business practice, but it probably would have minimized subsequent disagreements over which party said or agreed to what.

Recommendation: All agreements between any watershed group and parties to a group's activities should be in writing. This is especially important if there is any indication that the parties distrust each other, as is now the case with NFRIA and the Company.

2. A written agreement should have existed between NFRIA and the Company. The current project had a contract only between NFRIA and CWCB concerning project funding.

Recommendation: Future projects should entail written agreements between project managers (e.g., NFRIA) and project owners or beneficiaries (e.g., the Company). However, such a requirement or practice should be balanced against whether similar projects would ever be completed. Some rural irrigation company owners are suspicious of written agreements, and negotiating such an agreement, including ownership, responsibilities, construction easements, etc., may prolong a project's lead time and possibly prevent needed or beneficial projects from ever being started.

3. The current project provides an excellent example of how and when construction inspectors can be used to advantage. Construction inspectors are trained observers, frequently hired by the owner (in this case, the Company), and paid by the contractor (in

this case, NFRIA). The inspector is on-site during all construction activities, noting quantities, deliveries, actions, etc. In this case, an inspector might have documented differences between the original project plans and completed as-built plans, as well as summarized meetings and agreements between the parties.

Recommendation: Future projects of any significant complexity, or in any situation where the parties might find it useful, a construction inspector's services should be added to the project budget. Costs for such services typically are not high, because inspectors are not highly qualified engineers. Their use in the present project might have paid substantial benefits. Of course, added costs frequently present their own problems.

Photographs:

Photo 1. Diversion footing under original diversion construction, 2008. Upstream to right.



Photo 2. Paonia Ditch headgate, foreground center, with completed original low-flow channel mid-ground left, 2008



Photo 3. Completed low-flow channel and energy-dissipating plunge pools below diversion, view upstream. 2008.



Photo 4. Realigned diversion structure under construction by the Company, February 2009.



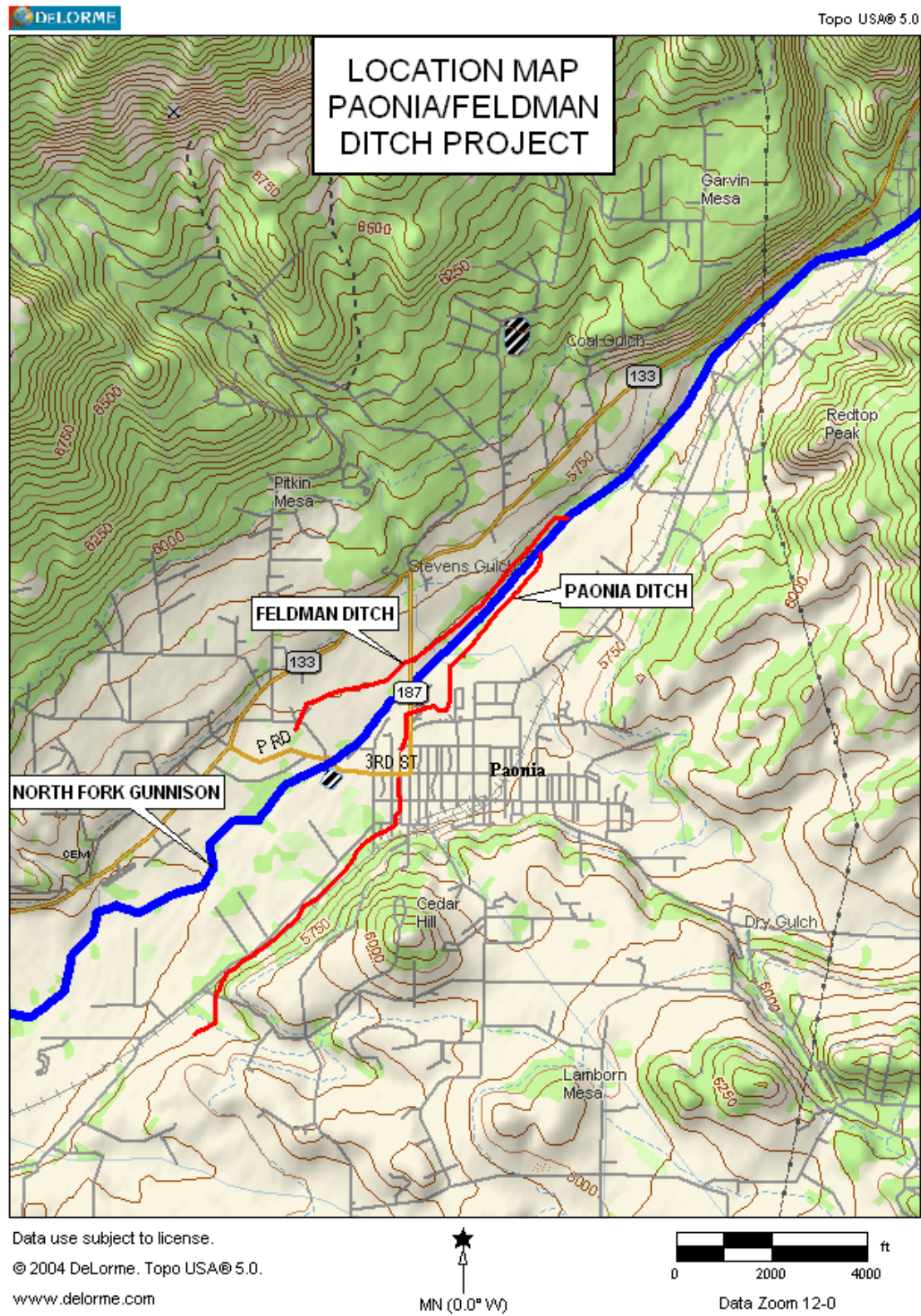
Photo 5. Completed diversion at low flow, March 2009. Upstream to right.



Photo 6. Diversion structure completed by Company, summer 2009. All flow is directed toward the headgate (right foreground); water not entering the Paonia Ditch is diverted back to the main river channel through a concrete “drop-chute” (not visible) adjacent to the headgate. Upstream to right.



Figure 1



Paonia Ditch Diversion Adaptive Management - Budgeted and Final Project Costs, 2008-09									
September 8, 2009									
Part 1: Final Funding Sources									
Severance Tax Grant (July 2008)	\$5,000								
CWCB Healthy Rivers Fund	\$15,000								
Local Cash Match	\$18,000								
In-kind Donation (Rock)	\$59,250								
TOTAL BUDGET	\$97,250								
Part 2: Funding by Task (1)									
	TOTAL EXPENDED	Budgeted Cash Match	Actual Cash Match (2)	Budgeted In- Kind Match	Actual In-Kind Match	Budgeted CHRF Funds	Actual CHRF Funds	Budgeted Severance Tax Funds	Actual Severance Tax Funds
Task 1: Engineering									
Project engineering, surveying & site management	\$0	\$0	\$0	\$0	\$0	\$1,500	\$0	\$0	\$0
Task Total	\$0								
Task 2: Load, transport & stage 1185 tons rock									
Donation of rock (Private landowners arranged by NFRIA)	\$59,250	\$0	\$0	\$6,000	\$59,250	\$0	\$0	\$0	\$0
Load & haul approximately 790 cu yd rock (3)	\$16,700	\$0	\$0	\$0	\$0	\$12,500	\$12,500	\$4,500	\$4,200
Task Total	\$75,950		\$0		\$59,250		\$12,500		\$4,200
Task 3: Place rock									
(Trackhoe with Operator)	\$18,000	\$4,000	\$18,000	\$0	\$0	\$0	\$0	\$0	\$0
Task Total	\$18,000		\$18,000		\$0		\$0		\$0
Task 4: Project management & final report.									
(NFRIA)	\$3,300	\$0	\$0	\$0	\$0	\$1,000	\$2,500	\$500	\$800
Task Total	\$3,300		\$0		\$0		\$2,500		\$800
TOTAL BUDGET	\$97,250	\$4,000	\$18,000	\$6,000	\$59,250	\$15,000	\$15,000	\$5,000	\$5,000

(1) Variances between budgeted and expended discussed and approved by CWCB Feb 19-20, 2009

(2) Reported orally from two Company sources as Task 3 only

(3) Actual rock required for project significantly greater than budget estimate