Paonia-Feldman Diversion Reconstruction Project
Final Report

The Paonia and Feldman ditch diversions are located on the North Fork of the Gunnison River, adjacent to the Town of Paonia. The Feldman Ditch is situated on the western side of the river; the Paonia Ditch is situated on the eastern side. See attached maps. Prior to the project, the diversions used a rock, gravel and debris structure created by bulldozing the river bed to divert water into the ditches. Neither of the two ditches had a control structure at the diversion point; the Paonia ditch 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 Feldman Ditch allowed an unmeasured amount of water to be diverted into the ditch and that in excess of their decree was dumped back to the river downstream of the diversion point. At the end of the irrigation season, the ditch was closed off by dumping soil into the mouth of the ditch

The total decree for the Paonia Ditch is 34.54 cfs. The Paonia Ditch also carries water for the Wade and Hightower Ditches. The Paonia Ditch water serves 700 acres of agricultural lands. The bulk of this water irrigates fruit orchards, hay meadows and vineyards. The Town of Paonia holds 3.9 percent of the Paonia Ditch shares. This water is used to irrigate lawns and gardens within the town. Delta County owns several shares; this water is used to irrigate the ball fields at Volunteer Park, a County-owned recreation area near Paonia. The Feldman ditch decree is for 3.8 cfs and provides water for 76 acres of orchards and hay fields. Some gardens and yards are also irrigated from the Feldman ditch.

The Paonia Ditch is the senior ditch on the North Fork of the Gunnison. Decree dates, amounts, and pertinent information for the two diversions are as follows:

Feldman Ditch – 1.90 cfs, 1914 decree when stream is low; 1.90 cfs, 1976 decree, high water only.
Paonia Ditch – 9.05 cfs, 1901 decree; the ditch also carries water for Wade and Hightower ditches for 4.05 cfs, 1901 decree, so the total 1901 decree in the Paonia ditch is 13.10 cfs (which can take all water in the river at certain low flow periods). The Paonia Ditch also has 21.44 cfs, 1937 decree, high water only.

In 2004, an unusually large volume of water entered the Feldman Ditch and washed it out, causing several thousand dollars in damage to the ditch and adding a huge volume of silt and debris to the river. Sediment and gravel losses from eroding bulldozed gravel dams are extremely high. This translated into higher sediment loads in the river and loss of adequate elevation required to meet the existing elevation of the ditch. The result was a vertical loss of riverbed and aquatic habitat upstream as the down-cutting process migrates.

The two diversions are situated immediately upstream from a previous in-stream gravel mine. As a result of gravel mining, extensive downcutting and headcutting has occurred immediately below the current diversion points. This erosion of the river bed resulted in the need to move the diversion point of the Paonia Ditch upstream in past years. As result of these moves, the two diversions are nearly opposite one another on different sides of the river.

The magnitude of the downcutting is evidenced by the fact that between 1992 and 1997 the river downcut 5 feet at the highway bridge located less than one-mile downstream of these diversions. Since mining in the river ceased in 1998 the downcutting has stopped.

Headcutting upstream from the gravel pit has also been measured. At the point of diversion for the Paonia Ditch, approximately 3,000 feet upstream from the bridge, 30 inches of bank erosion and 24 inches of channel degradation was recorded in one year in 1997. The rock diversion structure for the Paonia Ditch may have slowd the advancement of further headcutting upstream but does exhibit signs of damage from the river headcutting below.

In 1997, the North Fork River Improvement Association negotiated with the gravel company to quit mining in the channel and work only in the floodplain. The work in the floodplain has since been completed; it was reclaimed in March of 2004 and is now inactive. The gravel company has generously donated 19 acres in and along both sides of the river for a community river park.

Further degradation of the riparian corridor, including the stream channel appears to be slowing since the cessation of in-stream mining. However, failure of the old diversion, which was acting as a grade control, would have allowed the headcut could progress further upstream. Without rehabilitation, the river would have remained braided with a very high width-to-depth ratio and. annual repairs to the diversion and the associated disturbance to the channel bed would continue in the future.

The uncontrolled and inefficient diversion of water at this site resulted in over-diverting flows which often left the downstream reach in a dewatered condition and downstream users without water. This was particularly common in later summer and early fall and during drought conditions. This dewatering of the river left fish trapped in pools, usually leading to mortality as result of low oxygen levels and lethal water temperatures. The push-up dam also prevented fish migration and created a safety hazard for boaters during high and medium flow periods when water does overflow the dam.

Purpose. The project was designed to create an efficient, low-maintenance permanent concrete head gate for two ditches and low-head rock weir at the diversion point of the ditches. This delivers a full decree into the existing ditch supply systems while conserving water, improving use efficiencies, reducing the need for bulldozers in the channel, and decreasing suspended sediment. In addition, it provides for fish migration and allows boaters to travel across the diversion; both of which were previously prevented by the old diversion structure. These objectives are 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 Paonia and Feldman Ditch Diversion Project's three main goals include:

1. ***Enhance watershed health through restoration of an efficient water-conserving diversion structure***. The new structure will deliver exactly the decreed amount of water into the existing supply systems using a technologically up-to-date system to make efficient use of the water allotted to the ditches. This reduces the need for those with senior water rights to restrict flow to

junior users, as well as increasing flows for aquatic life, the surrounding communities, and the Gunnison River Basin. The elimination of annual bulldozing will reduce upstream and downstream migration of the down cutting process that was previously taking place.

2.***Improve fish and wildlife habitat by reducing the need for bulldozers.*** Channel disturbance by large equipment will cease. This will decrease suspended sediment, improving and diversifying aquatic macroinvertebrate and fish species that require clear clean water.

3.***Create safer recreation through construction of a low-head rock diversion wall.*** The community will benefit from the absence of a river-wide gravel dam that unnecessarily diverts the entire river. This will make recreational boating through this reach safer. Boaters will be able to float over a new rock wall without being sucked toward the ditch. Fish populations and the aquatic food web they rely on will be bolstered, increasing the carrying capacity of the riparian ecosystem and creating a more sustainable fishery for angling opportunities.

Long-term benefits to the community include a more reliable water source for sustainable agriculture and reduced costs of water delivery to agricultural producers. The community will also benefit from improved environment and aesthetics, as well as an economy boosted by an increased number of boaters and anglers using the river in the spring, drawn by improved recreation opportunities.

The project will be of major benefit to the water commissioner; having a controllable structure at the point of diversion provides a much better idea about who is getting the water and will help the commissioner and the ditch rider to control flows and make determinations about calls. This will further the goal in SWSI Recommendation #1 of reducing conflict among interest groups.

The project also addresses the issue of funding environmental and recreational enhancements, as addressed in SWSI Finding #8 and Recommendation #4. The project will also help small agricultural users, an issued identified in SWSI Finding #9.

The project meets the objectives or furthers the goals identified in the SWSI Report. Finding #1 and Recommendation #3 speak to the issue of agricultural needs and increased environmental and recreational needs. This project is located at the upper portion of the Paonia River Park. The project provides better control of river flows and keeps more water in the river for recreational use in the River Park and sections below the park. Simultaneously, it enables the irrigation water users a means of obtaining their decreed water.

Compliance with 37-75-102 C.R.S. The proposed project fully meets the requirements of the statute. The project does not impair or affect, in any way, the current system of allocating or adjudicating water rights as permitted under Colorado Law.

Funding:
Funding was obtained through the Gunnison Basin Water Roundtable, the Paonia Ditch Company, the Feldman Ditch Company, and the North Fork Water Conservancy District. In-kind contributions and support were provided by the Delta Conservation District and Delta County.

The Association's streambank monitoring program established permanent cross sections within the project limits in 1997.

Deliverables:

1. On site structures include 2 ditch headgates and headwalls, a low-head, in-stream rock weir, bank stabilization.

2. A project report with executive summary, detailed description of the project, cost data, map locating streambank monitoring cross sections, and photographs.

Cost Data: See Final Worksheet (attached).

Project Map: The project map, with location of monitoring cross sections, is attached.

Adaptive Management: As with every structure that is constructed in an active river channel, there will be some amount of repair and revisions required to meet the design objectives. We anticipate the need to raise additional funds for rock replacement or diversion sealing or a trash rack to improve long-term sustainability of the structure.

Photographs:

Diversion footing under construction.

Construction of diversion footing.

Sealing diversion footing.

Placing boulders in diversion structure.

Paonia headgate during construction.

Paonia headgate.

Paonia headgate at project completion.

Rock vein protecting bank above Paonia headgate.

Feldman flume.

Feldman intake.

Feldman headgate.

Completed plunge pools below diversion.