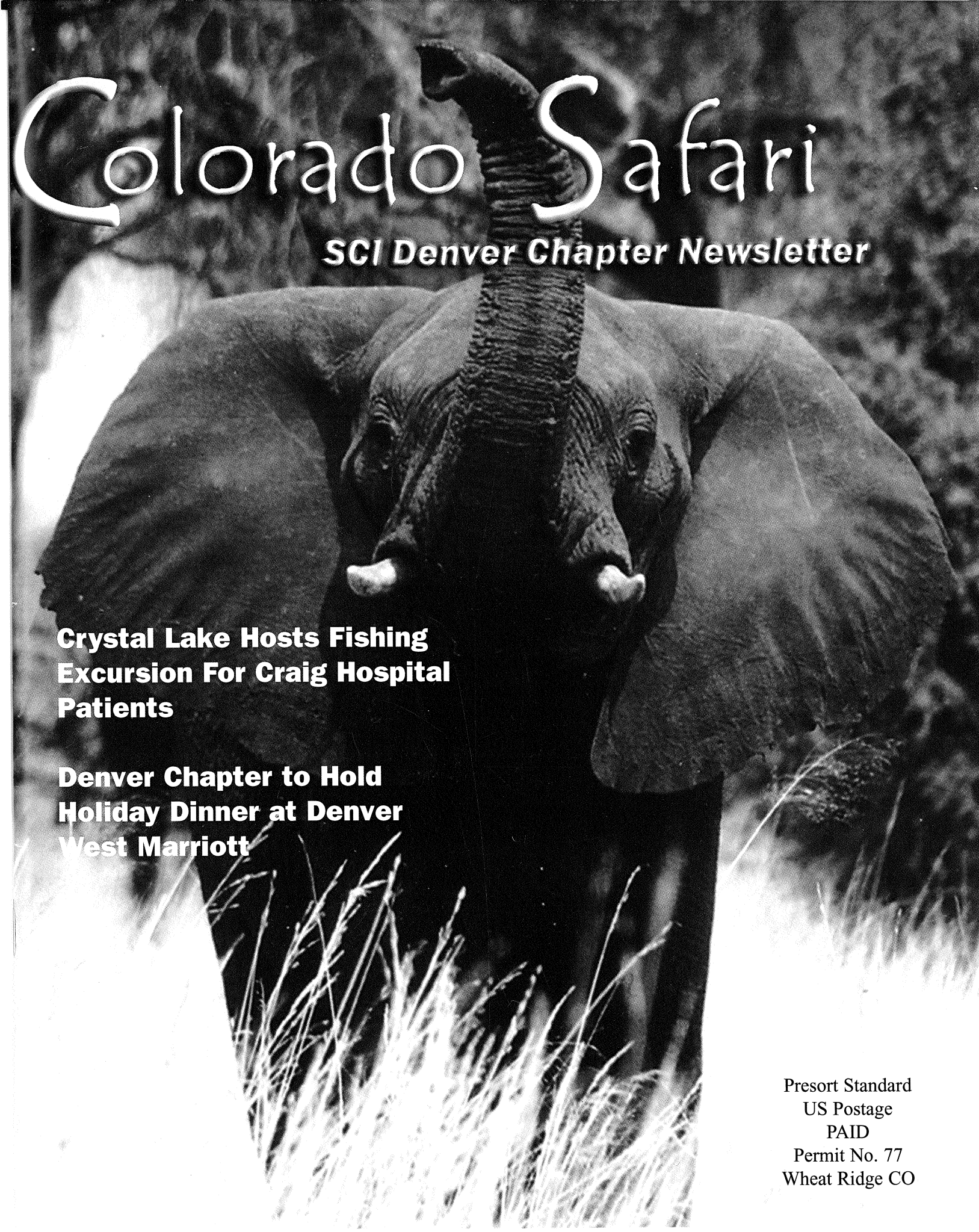
Colorado Safari

SCI Denver Chapter Newsletter



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Improving Trout Habitat and Fishing Opportunities below the Dillon Dam

By Troy Thompson, P.E. and Dave Blauch, Ecological Resource Consultants, Inc.

Usually the mention of tailwater fisheries brings a smile to the face of any Colorado angler. Opportunities for year-round open water, a reliable food supply and the chance to catch, or at least hook into very large trout are among the reasons tailwaters are so revered.

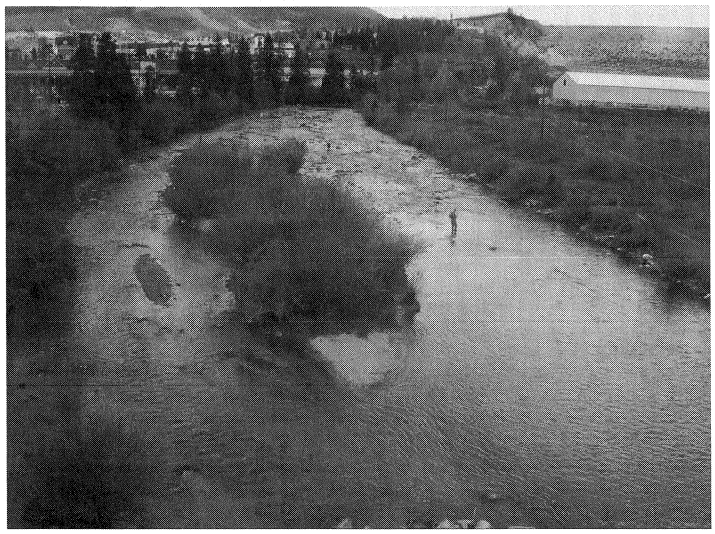
Often overlooked by the angler in pursuit of the 10 pounders that lay below the outlet works of many of the State's dams is the impact that these structures have on the overall quality of aquatic habitat downstream. By altering the amount and pattern of flows in the river and cutting off the natural sediment load that would otherwise be transported through the river, dams often lead to poor downstream habitat. Such was the case for the Blue River below the Dillon Reservoir in Summit County.

The Blue River below Dillon Dam has long been one of the most productive and heavily fished stretches of water in the State. Never does a day go by, regardless of weather, without at least one angler trying to outwit the river's wise fish. The problem with the heavily fished section directly below the dam was that quality habitat was limited and fishing pressures in the few good holes was fierce. "During the summer months people were faced with the choice of fishing shoulder to shoulder with other anglers or finding a different stream to fish", said Barry Kirkpatrick, co-owner of Cutthroat Anglers in Silverthorne.

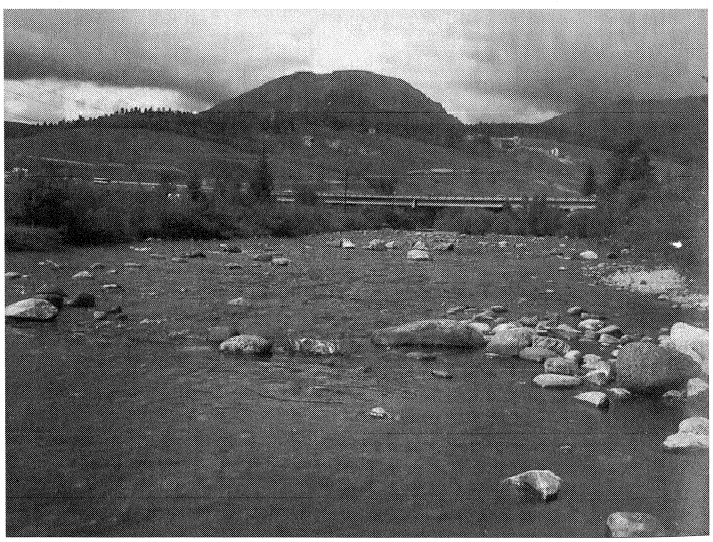
The Colorado Division of Wildlife (CDOW) was well aware of the fact that instream habitat in the reach below the Dam was limiting fish numbers and fishing opportunities. "Prior to the restoration project, this reach of the Blue River was characterized by many negative habitat attributes indicative of a stream system that was no longer functioning in a natural manner due to the formation of Dillon Reservoir," said CDOW Aquatic Biologist Bill Atkinson. "The existing wide, shallow stream section did not contain adequate pool habitat or cover, and was characterized by shallow, low gradient riffle habitat. Subsequently, there were food producing areas (riffles), but little available resting/security habitat (pools and runs), which resulted in a lower productivity stream with regards to sustainable trout biomass."

These problems can largely be attributed to construction of the dam and the decreased flow releases that result from ever growing water demands. The river, which was accustomed to annual peak spring flows in the range of 1000 cubic feet per second now, may go years between large flows and the increase in future water demands will only exacerbate this problem. From the later part of 2001 through June of 2003, releases from the dam were maintained at approximately 50 cubic feet per second for 20 straight months.

In addition to its impact on flows, the dam also traps the natural sediment load which otherwise would be flowing through the stream. This creates an additional stress on the system as water flowing through the area is not starved for sediment and highly erosive. The combined effects of the altered flow regime and loss of sediment have resulted in the stream being out of its natural balance. Consequently aquatic habitat has suffered.



The existing channel was too wide for the flows released from the dam resulting in shallow flow depths and minimal habitat.



Natural habitat features such as defined riffle, pool and glide sections were absent from the channel in large part because of the imbalance between stream width and flow releases.

A multi-jurisdictional group comprised of the town of Silverthorne, NWCCOG Foundation, Trout Unlimited, US Forest Service – White River National Forest, Colorado Division of Wildlife, Colorado Department of Transportation, Denver Water Board and Summit County Government came together to undertake a restoration project to improve the trout habitat and the fishing experience of those who fished this stretch of the river. The group received a $94,750 challenge grant from the Natural Forest Foundation and raised $99,898 from local donations to fund the project.

"The town sees the Blue River as a major attribute for the town; it is what makes Silverthorne special", said Bill Linfield, Director of Public Works for the Town of Silverthorne and the project manager for the river restoration project. "We care deeply for the river and the aquatic habitat and are always looking for opportunities to protect or improve the river."

The partners wanted to complete a project that was different from a majority of the other fish habitat restoration projects that had been undertaken. They wanted to restore the river in a way that provided an excellent trout habitat without the artificial appearance and frequent stability and maintenance problems often associated with boulder drops, wing deflectors, vortex weirs and other unnatural restoration techniques. Ecological Resource Consultants, Inc. out of Golden, Colorado was hired to design and oversee implementation of the project.

Design and Implementation

The primary objective of the design was to restore the area to provide optimal trout habitat and improved fishing opportunities. A design concept was developed that provided a range of habitat features that mimic a natural stream setting. The major difficulty that had to be overcome as part of the design process was the question of how to design the system to compensate for changes in flow and sediment while making the reach both an excellent trout habitat while being stable.

This problem required detailed geomorphologic and fluvial hydraulic analysis of the system to ensure that the reconstructed channel would both provide the desired habitat for the highly variable range of flows released from the dam and be stout enough to maintain in the sediment starved environment below the dam. It was found that the effective channel width, which ranged from approximately 60 feet to 135 feet before the project should be reduced to approximately 50 to 60 feet to be in balance with predicted future flows. Within this main channel, a meandering low flow channel was created to provide water depths and velocities needed to sustain a healthy trout population during low flow periods.

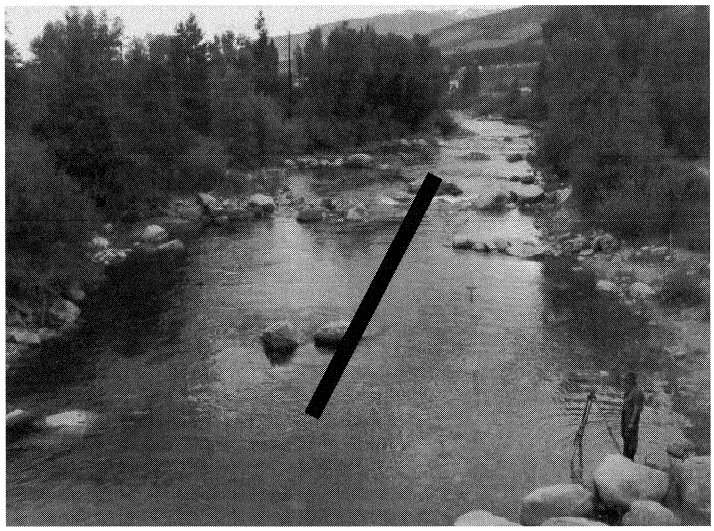
Riffles were developed in areas where the stream crossed over from one bank to the other. Pools were located below riffles on the outside of bends and glides to provide the natural transition between the end of one pool and the beginning of the next riffle sequence. Eight repeating riffle, pool and glide sequences were installed providing a great variety of habitat with each individual feature being designed and constructed uniquely from all others.

Riffle sections provided fast, oxygenated water. Deep pools added by the careful configuration of boulders at the head of the pools to control velocities and provided desired flow depths offer overwintering habitat. Specific placement of boulders of varying size in the glide sections increases the micro-habitat and provides a variation of flow depths and velocities and needed in-stream cover. These sequences of riffle/pool/glide provide needed habitat variety and were repeated throughout the project reach following natural patterns and spacing.

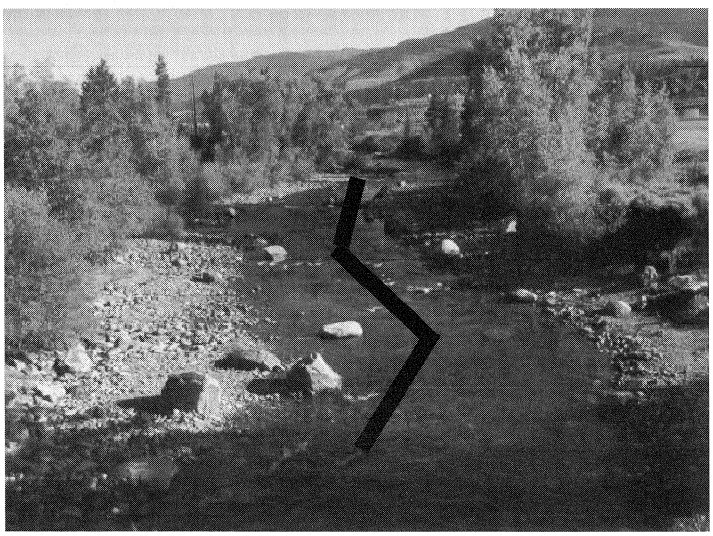
Materials in the channel bed and banks, which have been largely depleted of finer material in the upper zones, were found to be of adequate size to provide needed stability of the narrowed channel therefore no rock was imported for construction. Instead, larger rocks were sorted out as part of the rough channel grading and placed in areas of greater stress concentrations such as the outside of bends.

The photos below illustrate how the designed features were implemented to improve the overall aquatic habitat.

Pre Project

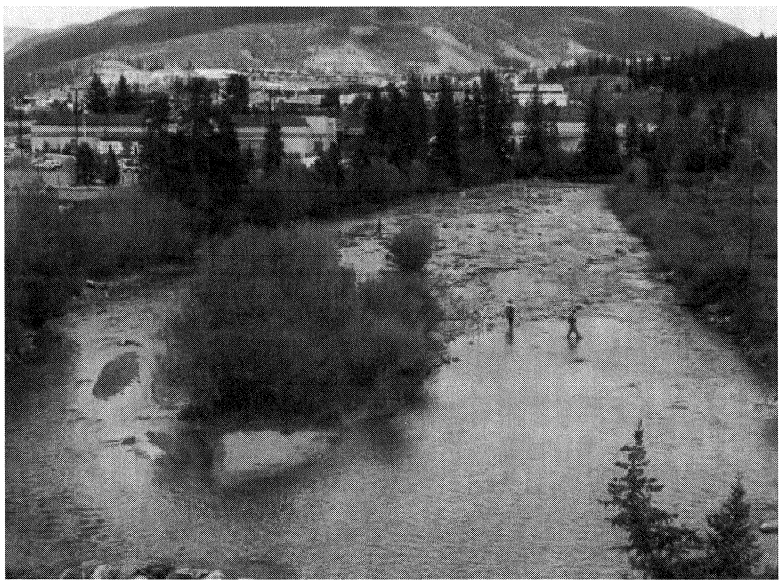


Post Restoration



Prior to the project, the channel was wide and relatively straight resulting in limited flow depth. A meandering shape was created during the restoration, increasing flow depths and habitat diversity in a natural manner.

Pre Project



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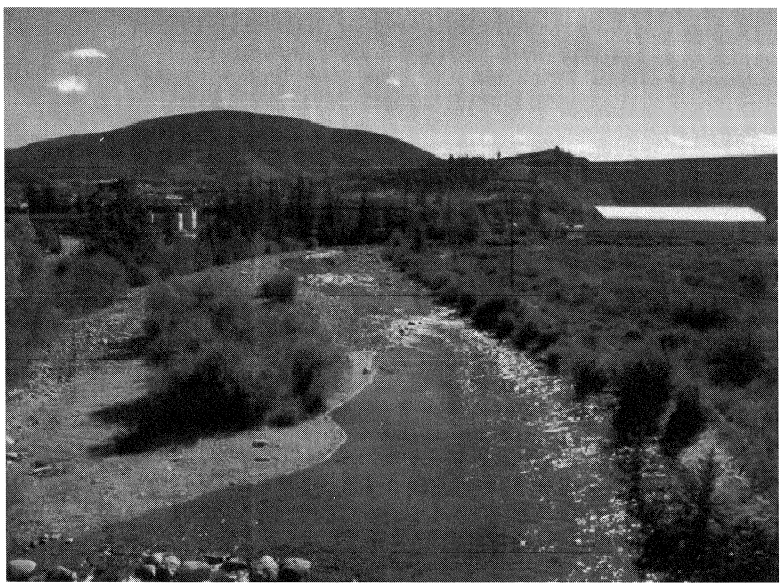
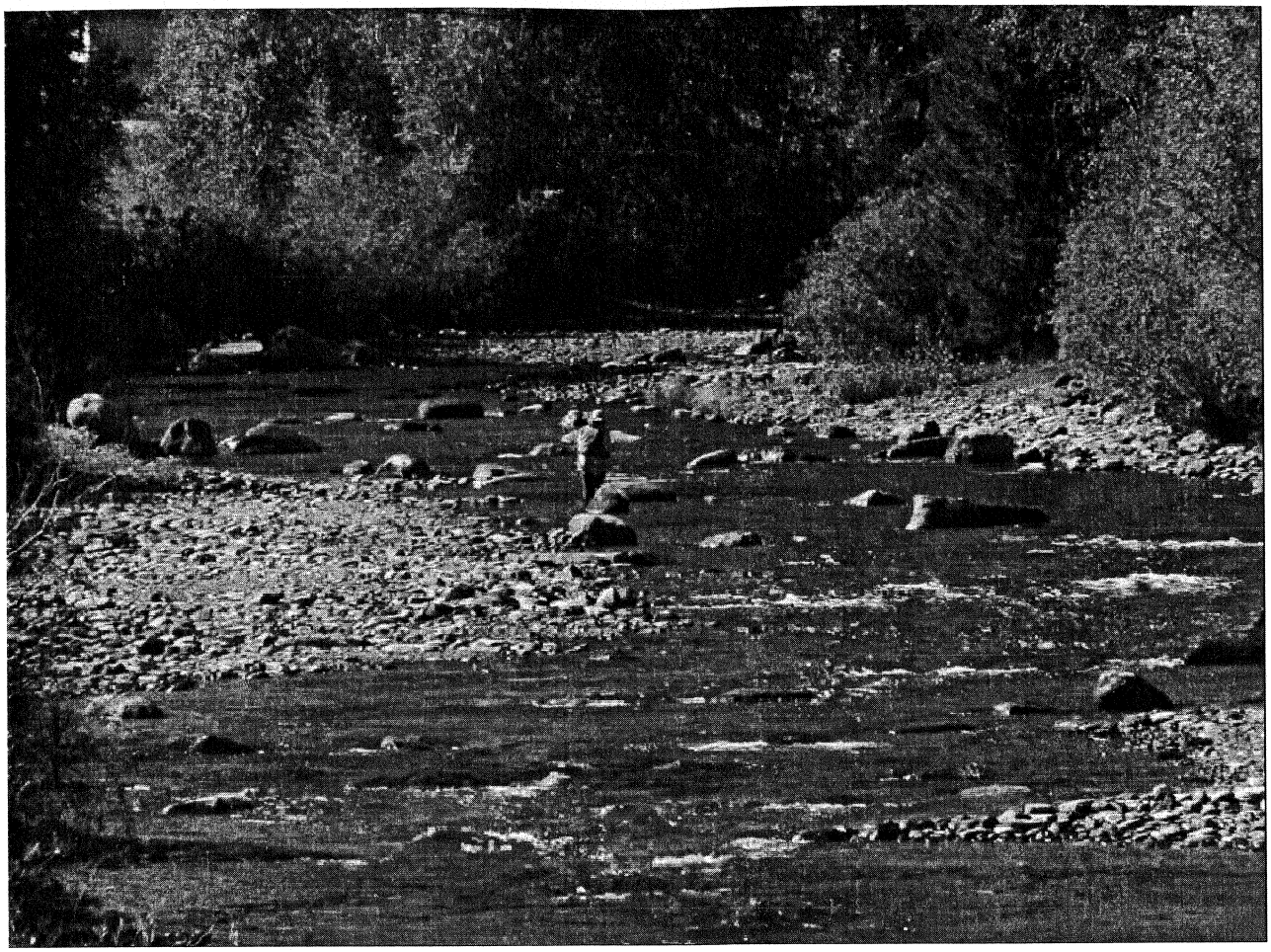


Prior to the project the channel was up to 135 feet wide in areas. During extended periods of low releases from the dam, the depth of water in these areas resulted in limited habitat. By reducing the width of the channel, flow depths and velocities were increased to the level preferred by trout and deep overwintering pools were established.



The establishment of repeating riffle, pool, glide sequences greatly increased the available trout habitat and careful placement of varying sized boulders provides pocket water that is natural in appearance.

The completed project achieved the primary objectives of the project sponsors by improving trout habitat and fishing opportunities. One of the great accomplishments of this project was the success of developing quality habitat using a natural approach for stream restoration noted Bill Atkinson. "This stream reach is situated in an urban setting in which you would typically see a very aggressive, "hard" approach to restoration, with several cross-channel boulder structures utilized to control gradient and produce pool habitat. ERC altered gradient profiles and reconfigured the channel by creating point bars using existing materials. The result is a much more natural and aesthetically pleasing profile. The approach ERC chose actually elongates the pool/run habitats and creates a much smoother transition between the riffle and pool segments. Their approach will be of a greater benefit as there is more riffle habitat leading into pools thereby increasing the availability of food items to the fish residing in these newly formed pools. The strategic placement of boulders in the glide or run sections extends feeding lanes beyond what you would typically see with a "harder" restoration approach. Overall this project produced a more aesthetically pleasing and beneficial restoration with regards to increasing salmonid adult habitat and productivity when compared to typical restoration work."

In addition to the benefits to the aquatic habitat derived from the project, the overall fishing experience was greatly enhanced as a result of the work.

"From an angler's viewpoint, one of the great benefits of the restoration project is the way that the improvements dispersed angling congestion," said Barry Kirkpatrick. "Where there used to be about three quality areas that received a significant portion of the fishing pressure, the entire 3,200 feet of river within the project area now offer great fishing opportunities. If you are willing to explore a bit, you may even find some solitude which was previously unthinkable."

So, the next time that you find yourself headed out to battle large fish from the shadows of Dillon Dam and are able to find a good spot that is holding fish and doesn't have a slough of anglers already in it, take a moment to look around and appreciate the benefits provided by the restoration work. Try to identify the work that was done and see the structure that was build to create the different riffles, pools and glides. If you have trouble identifying exactly what was done – all the better. That's the way the natural restoration process was intended!