



This PDF file is a digital version of a chapter in the 2005 GWS Conference Proceedings. Please cite as follows:

Harmon, David, ed. 2006. *People, Places, and Parks: Proceedings of the 2005 George Wright Society Conference on Parks, Protected Areas, and Cultural Sites*. Hancock, Michigan: The George Wright Society.

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Snake River Restoration Efforts in Grand Teton National Park

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The Cooperative Conservation Initiative process

In the first year of its funding (2003), the Cooperative Conservation Initiative offered a very short time period in which to develop partnerships and obligate funds. Grand Teton National Park was made aware of the initiative in August. Partnerships had to be formed and funds obligated by 30 September of that year. In spite of the short time frame, Grand Teton managed to obligate \$120,000 (with a \$120,000 match from local partners), and developed partnerships that continue to this day. Eight projects were funded through the 2003 Cooperative Conservation Initiative.

Habitat restoration/enhancement at Bar BC Spring

Prior to the dedication of Grand Teton National Park, a fish hatchery was constructed on the East Fork of the Upper Bar BC Spring. Dams were constructed to provide rearing ponds. Some of the channel above and below the rearing ponds was widened for some unknown purpose. After the hatchery was abandoned, the dams were left intact and sediment continued to accumulate in the ponds. In 1984, in cooperation with the park, Wyoming Game and Fish Department personnel removed three of the dam structures, excavated sediments, and exposed gravels to a limited extent. This project continued the restoration work begun in 1984. Project tasks included removal of remaining dam structures, removal of accumulated sediments, narrowing the channel to normal width, excavation of natural gravels or placement of commercial washed gravels where natural gravels cannot be reclaimed, and placement of overhead cover (trees) for protection of spawning fish and escape cover for fry.

Two Ocean Lake culvert replacement

Two Ocean Lake has been stocked with 30,000 cutthroat trout annually by the Wyoming Game and Fish Department. A culvert on Two Ocean Creek was identified as a barrier to native fish migration. If this culvert were replaced or modified to allow upstream migration of fish, the need for stocking of Two Ocean Lake would be eliminated, and natural processes could be restored. This project modified the approach to the existing culvert by constructing a series of rock weirs to facilitate fish passage. Wyoming Game and Fish plans to discontinue stocking of Two Ocean Lake, allowing natural migration to maintain cutthroat trout populations.

Water use documentation project

Restoration of habitat for fish and other aquatic organisms depends, in part, on the availability of sufficient water within park water bodies. This project conducted an inventory of irrigation ditches within Grand Teton National Park. The ditches were mapped, flow in the ditches was measured, and an interactive database containing all the adjudicated water rights

within the park was constructed. The results of this project will help managers make decisions that comply with applicable laws and regulations pertaining to allocation and use of water, as well as provide the best protection of park resources.

Jackson Lake fisheries evaluation

Jackson Lake was originally stocked with lake trout (*Salvelinus namaycush*) in 1937, and is still being stocked today. Little research has been conducted to document the effects that stocking of introduced (exotic) lake trout may be having on the native Snake River cutthroat (*Oncorhynchus clarki* ssp.). The objective of this study was to analyze fisheries data and develop a bioenergetics model to use as a tool for assessing the current status and predicting future trends of the lake trout population in Jackson Lake. Initially, the bioenergetics model will be used to help define data gaps. The bioenergetics model will also provide a framework for future investigations of the status of native fishes within Jackson Lake, including Yellowstone cutthroat trout (*Oncorhynchus clarki bouvieri*). This study is on-going. Preliminary results include:

- Cutthroat, lake, and brown trout stomachs were dissected and frozen under dry ice conditions, and otoliths removed.
- Food items were removed from fish stomachs, weighed, and classified as: zooplankton, aquatic macroinvertebrate, terrestrial macroinvertebrate, and fish.
- No trout were observed in any fish stomachs.

Streambank restoration, Snake River at Moose

The west bank of the Snake River at Moose has retreated as much as five feet over the last six years in response to 1997 flood conditions. Undercutting of the bank is on-going, evidenced by several trees that have recently toppled into the river. In the past, park managers have used unsightly riprap to help reduce bank erosion in this reach of the Snake River. The Natural Resource Conservation Service, in cooperation with the local Conservation District, sponsored a “Riparian Ecology and Restoration” workshop in Moose, May 24–26, 2005. The workshop will consist of a one-and-a-half-day classroom exercise, followed by a one-and-a-half days of field work that will call upon attendees and other volunteers from the community, neighboring agencies, sister parks, etc., to complete the bank stabilization work. This project will utilize state-of-the-art bioengineering techniques to restore riparian vegetation, thereby restoring fish habitat to this area. In addition, this project will serve as a demonstration project for streambank restoration techniques.

Snake River and Yellowstone cutthroat trout subspecies distribution mapping

The goal of this project was to document the geographic distributions of Snake River cutthroat trout and Yellowstone cutthroat trout in the Snake River headwaters of Wyoming. The distribution of Snake River and Yellowstone cutthroat trout in the Snake River basin is unique. This is the only watershed where two subspecies of cutthroat trout are indigenous. Until this project, the range of Yellowstone cutthroat trout within the Snake River basin of Wyoming was unconfirmed. A systematic inventory was conducted to delineate the reaches

of streams that support Yellowstone cutthroat trout. Maps are now available that definitively display the present distribution of these subspecies of cutthroat trout in the Snake River headwaters in Wyoming.

Effects of Jackson Lake Dam on hydrology and geomorphology of the Snake River

The outlet of Jackson Lake was dammed in 1906. The original log-crib dam was replaced by a larger structure in 1918 that raised the lake level by 11.9 m (39 ft). The reservoir has since been operated to provide irrigation water to areas in Idaho during the growing season. In 1957 the Palisades Reservoir became the primary storage facility for irrigation agriculture. The release schedule for Jackson Lake Dam changed, with a decrease in the frequency and magnitude of the peak flows. These changes in flow regime have triggered channel and vegetation changes.

Jack Schmidt of Utah State University conducted an analysis of the hydrologic change that has occurred on the Snake River near Moran during the last century, using daily U.S. Geological Survey stream-flow data and synthetic natural stream-flow data representative of unregulated conditions.

The hydrologic regime of the modern Snake River is substantially different from the estimated natural flow regime and from the regulated flow regime that existed prior to 1957. Today's late-spring floods are much lower and late-summer flows much higher than if the dam did not exist. Today's fall and winter flows are approximately what they would be if there were no dam, and they are much higher than prior to 1957, when base flows were very low. Today's flood regime is much lower than those prior to 1957 but occur in a more "natural" season. Analyses were based on three techniques: traditional comparison of mean daily and instantaneous stream flow, continuous wavelet analysis, and analysis using the Indicators of Hydrologic Alteration software.

Fish Screen for large irrigation diversion near south boundary

A large irrigation diversion within Grand Teton National Park is removing a significant cutthroat trout population from the Snake River. While many of these trout are providing a supply of fish to creeks located further down the watershed, many fish are also lost (trapped) when the ditch is shut down in the fall. This project paid for a consultant to survey the diversion and design a system of fish screens to redirect the cutthroats back into the Snake River.

Conclusions

We concluded that Cooperative Conservation Initiative funding was a valuable resource for Grand Teton National Park. Properly written projects could get a lot of "bang for the buck," and the partnerships formed for these projects are lasting and continuing. Partners included the following:

- **One-Fly**, a local fly fishing organization with ties to the National Fish and Wildlife Foundation, participated in design and on-the-ground project implementation.
- **Trout Unlimited—Wyoming Water Project** worked collaboratively to inventory water uses of water bodies targeted for restoration efforts.

- The local chapter of **Trout Unlimited** partnered with several of project components.
- **Wyoming Game and Fish Department** fisheries biologists were involved in almost all projects to some extent, with mostly in-kind donations for professional expertise. They supervised most restoration work. Thirty years of fisheries data were compiled and analyzed, representing a significant cost share contribution.
- **Teton County Conservation District** staff provided significant in-kind contributions for workshop organization (advertisements in paper, meeting coordination) for the bank stabilization project at Moose. In addition, they will contribute tools and materials needed to complete the project.