



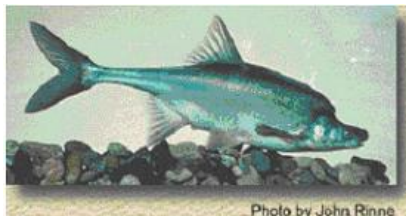
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 www.itrc.org

## Government Highline Canal – A Win-Win Solution

The Government Highline Canal is part of the U.S. Bureau of Reclamation's Grand Valley Project in the Colorado River Basin in west-central Colorado. The project is located near the confluence of the Colorado and Gunnison Rivers at Grand Junction, Colorado.

In the late 1980's, it was discovered that several native fish species in the area were nearing extinction due to inadequate stream flow (the Humpback Chub below is one of those identified). Dams, diversions, and other barriers had taken their toll on the fish's natural habitat, especially on a 15-mile reach of the Colorado River.

### ◆ Humpback Chub



In order to avoid further habitat damage, a coalition of agencies and organizations resolved to study ways to repair areas along the river. Among other projects, the Government Highline Canal was modernized to reduce the amount of water diverted from the Colorado River. The intent was to develop a design for which Colorado River diversions could be better matched to on-farm demands, while maintaining the current high level of water delivery service provided to customers, yet with less water lost in transportation.

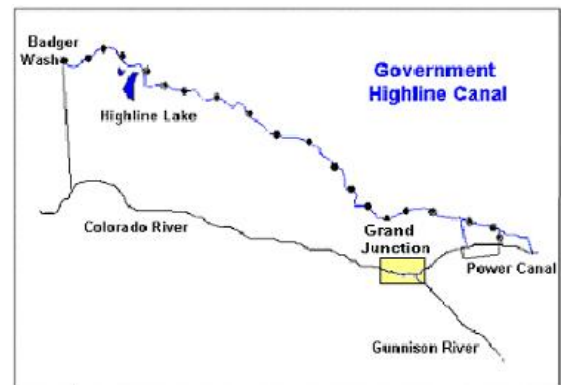


Figure 1. Map of Government Highline Canal

The Cal Poly ITRC was contracted to perform canal modernization in the form of automated canal structures, in-system storage, and new operational procedures that could significantly reduce operational spill. ITRC's initial evaluations of the existing Government Highline Canal identified a potential savings of **28,500 acre-feet** of water that could remain in the Colorado River or be returned to the river upstream of the problem area.

In the years since implementation, the Government Highline Canal has *far exceeded* initial expectations (Figure 5). In 2002, for example, water diversion savings reached **44,800 acre-feet**. In 2003, savings totaled **30,900 acre-feet**. The Government Highline Canal, and the Grand Valley Project in general, are excellent examples of successful cooperative efforts between federal and state agencies, environmental groups, and water and power-user organizations in Colorado, Utah and Wyoming.

## Program Overview

In 1987, the United States Fish and Wildlife Service developed the Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin, which identified a 15-Mile Reach of the Colorado River near Grand Junction, Colorado, as an area needing additional water supplies during the late summer and fall months (August through November) to maintain habitat conditions for several identified endangered fish species. The Grand Valley Water Management Project was established to evaluate potential improvements that could be incorporated into the U.S. Bureau of Reclamation's (USBR) Grand Valley Project in order to provide additional flows in the 15-Mile Reach.

Several of these improvements involved the USBR's Government Highline Canal. The canal is on the west and north side of the Colorado River and extends from the Grand Valley Project Diversion Dam south and west a distance of 55 miles.

Bureau of Reclamation Funding Recovery Program, Fiscal Year 2004 (Requested)	
Upper Colorado River	\$5,479,000
San Juan River Basin	851,000
Water and Energy Management and Development	50,000
Fish and Wildlife Management and Development	535,000
<b>Total</b>	<b>\$6,915,000</b>

A team of five agencies completed the Government Highline Canal Modernization Study, which recommended modifications. The project team included: USBR's Western Colorado Area Office in Grand Junction, Colorado; the Irrigation Training and Research Center (ITRC), California Polytechnic State University in San Luis Obispo, California; the Grand Valley Water Users Association (GVWUA) in Grand Junction, Colorado; the USBR Technical Services Center (TSC) in Denver, Colorado; and the University of Iowa's Hydraulic Research Laboratory (IHRL) in Iowa City, Iowa.

The goal of the suggested modifications was to drastically improve the canal's efficiency, with new and modernized check structures, new office controls, and enhanced monitoring and communication equipment to eliminate delays when rapid flow

changes are necessary. These modifications reduce the amount of water lost in conveyance, and in turn "save" tens of thousands of acre-feet of water yearly, which can now be returned to the fish habitat.



Figure 2. Completed installation of new check structure

### Modernization Project Main Features:

- ◆ Seven new check structures
- ◆ New pump station at Highline Lake and the use of Highline Lake as a buffer reservoir
- ◆ New Palisade Pipeline turnout to the Colorado River upstream of the 15-Mile Reach
- ◆ Implementation of SCADA—Supervisory Control and Data Acquisition
- ◆ Twenty-one new Remote Terminal Unit (RTU) sites connected by radio
- ◆ Modification to thirteen existing check structures
- ◆ New central office control/monitoring facilities
- ◆ Modification to the Orchard Mesa Power Canal turnout

Below are the diversion records for 1998, considered a base year by USBR, and the last 2 water years.

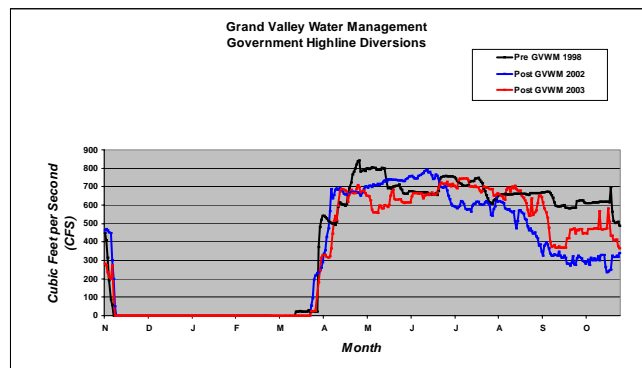


Figure 3. Daily diversions, before and after the Government Highline Canal modernization.

# Program Results

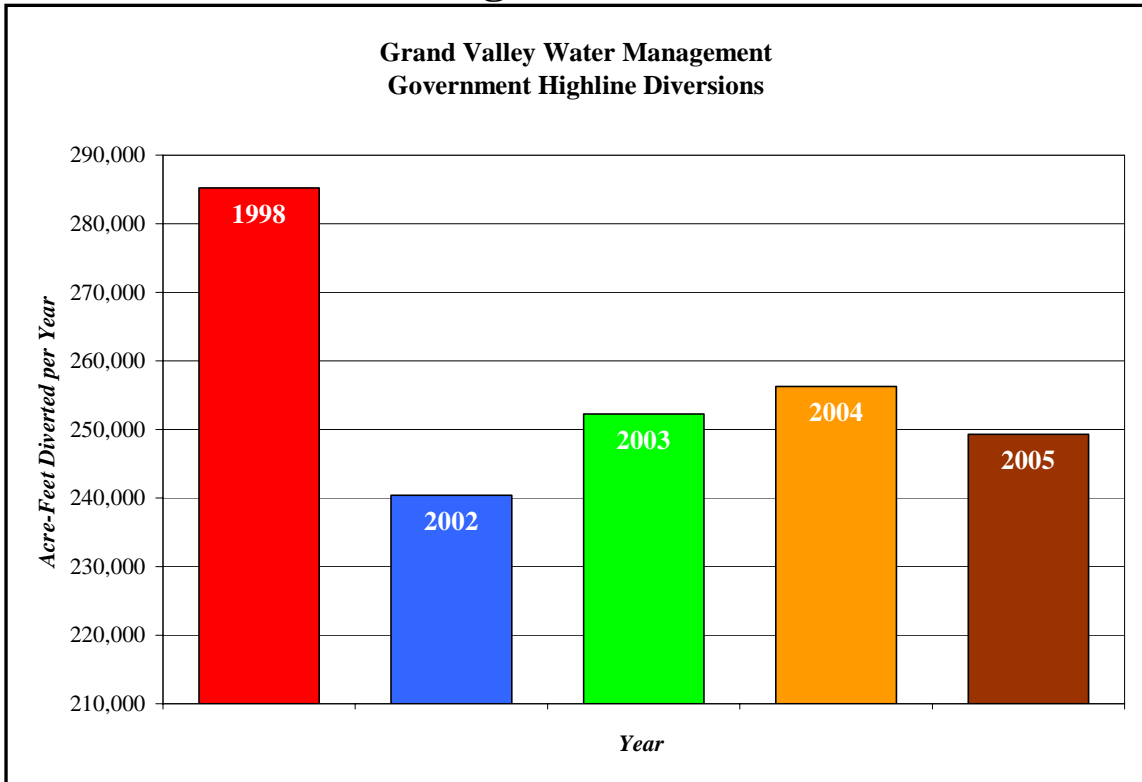


Figure 4. Yearly diversions, compared before and after implementation.

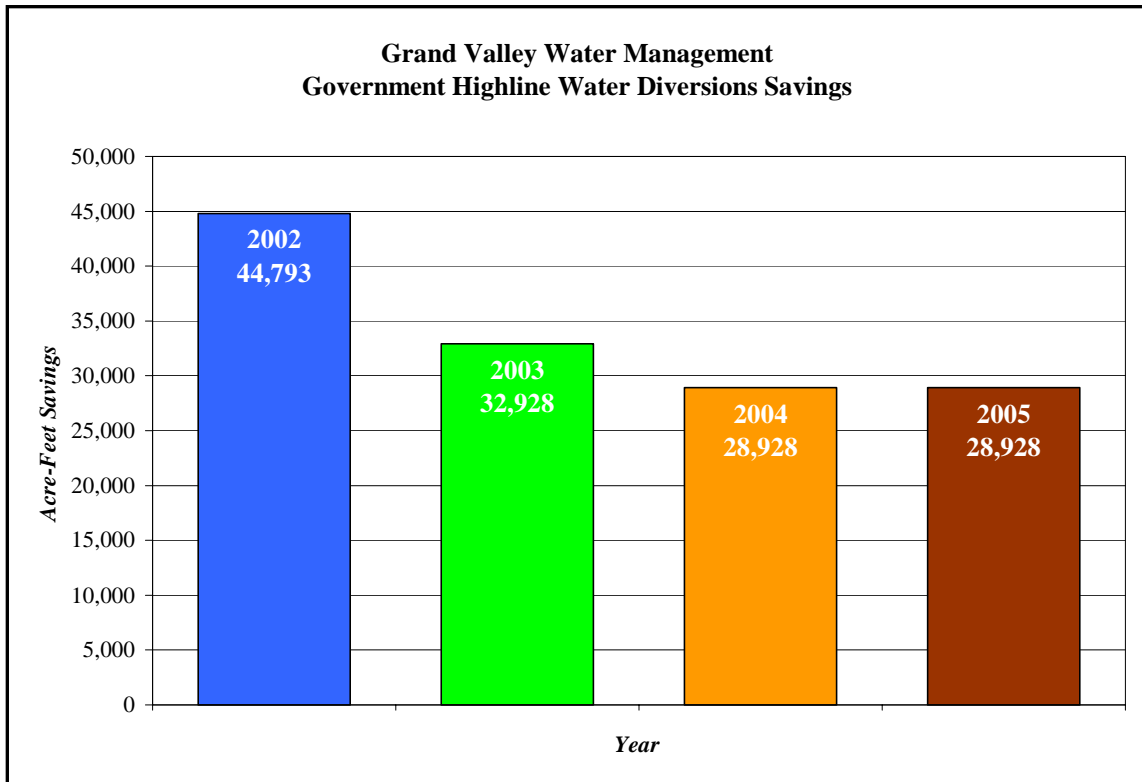


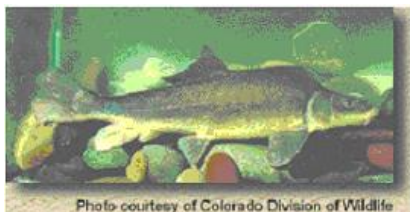
Figure 5. Yearly savings since implementation.

## Recovery Program's Endangered Fish

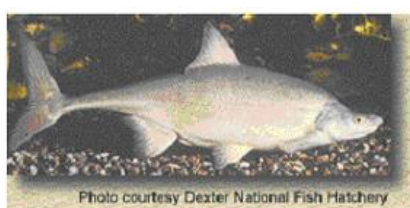
### ◆ *Colorado Pikeminnow*



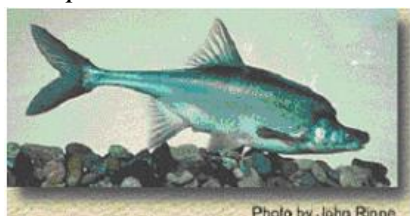
### ◆ *Razorback Sucker*



### ◆ *Bonytail*



### ◆ *Humpback Chub*



The success of this modernization program can be summarized as a “win-win” solution. First, the project did not hurt the growers with a decrease in the water delivery service to their farms. Second, there is more water left in the river for other uses.

## For Further Information

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## Upper Colorado River Endangered Fish Recovery Program Partners

- U.S. Fish and Wildlife Service
- U.S. Bureau of Reclamation
- National Park Service
- Western Area Power Administration
- State of Colorado
- State of Utah
- State of Wyoming
- The Nature Conservancy
- Western Resource Advocates
- Colorado Water Congress
- Utah Water Users Association
- Wyoming Water Development Assoc.
- Colorado River Energy Distributors Assoc.

## Helpful References

Bureau of Reclamation. 1998. “Grand Valley Water Management”. Final Environmental Assessment. Western Colorado Area Office, Grand Junction, Colorado.

Colorado River Recovery homepage:

<http://coloradoriverrecovery.fws.gov/>

Government Highline Canal Modernization Study by Khalsa, Styles, Burt and Norman (ITRC, 1999):

<http://www.itrc.org/papers/uscid/GJ.pdf>

Installation of Canal Control Structures on the Government Highline Canal by Khalsa, Styles, Burt and Norman (ITRC, 2000):

<http://www.itrc.org/papers/HighlineCanalControlStructures/installation.pdf>

U.S. Bureau of Reclamation's Grand Valley Project:

<http://www.usbr.gov/dataweb/html/grandvalley.html>



UPPER COLORADO RIVER  
ENDANGERED FISH  
RECOVERY PROGRAM