



# NONPOINT SOURCE SUCCESS STORY

# Utah

## The Watershed Approach Results in Reduced Phosphorus in the Fremont River

### Waterbodies Improved

Anthropogenic activities such as animal feeding operations resulted in excess loading of phosphorus into the Fremont River, prompting Utah to add the upper segment to the Clean Water Act (CWA) section 303(d) list of impaired waters in 2000 (for phosphorus and dissolved oxygen) and a second, downstream segment in 2008 (for benthic macroinvertebrates bioassessments). A local steering committee developed a Fremont River Water Quality Management Plan. Landowners completed stream restoration projects and implemented best management practices (BMPs) to control sediment and nutrients in runoff from animal feeding operations and irrigated cropland areas. These activities led to a reduction in phosphorus levels and an increase in dissolved oxygen levels, allowing two segments of the Fremont River to be removed from the 2016 CWA section 303(d) list of impaired waters.

### Problem

The Fremont River headwaters begin at approximately 11,200 feet in elevation on the Fish Lake Hightop Plateau in south-central Utah. The river winds through forest, agricultural and range lands, and then continues through Capitol Reef National Park before its confluence 95 miles downstream with Muddy Creek. The two rivers join to become the Dirty Devil River, which is a tributary to the Colorado River.

Anthropogenic activities throughout the watershed resulted in excess loading of phosphorus into the Fremont River. Several animal feeding operations were in close proximity to the river, allowing nutrient rich runoff to enter the river during snowmelt and significant precipitation events. In addition, significant erosion was occurring along many stretches of streambank (Figure 1, right).

The upper Fremont River (Fremont River-2, UT14070003-005) was included on the Utah's 2000 CWA section 303(d) list of impaired waters based on data collected in 1988–1999. Low dissolved oxygen concentrations and elevated phosphorus concentrations were impairing the 3A Cold Water Fishery beneficial use of the upper segment of the river. Another segment, Fremont River-2, UT14070003-005, was added to the impaired waters list in 2008 for benthic macroinvertebrates bioassessments.

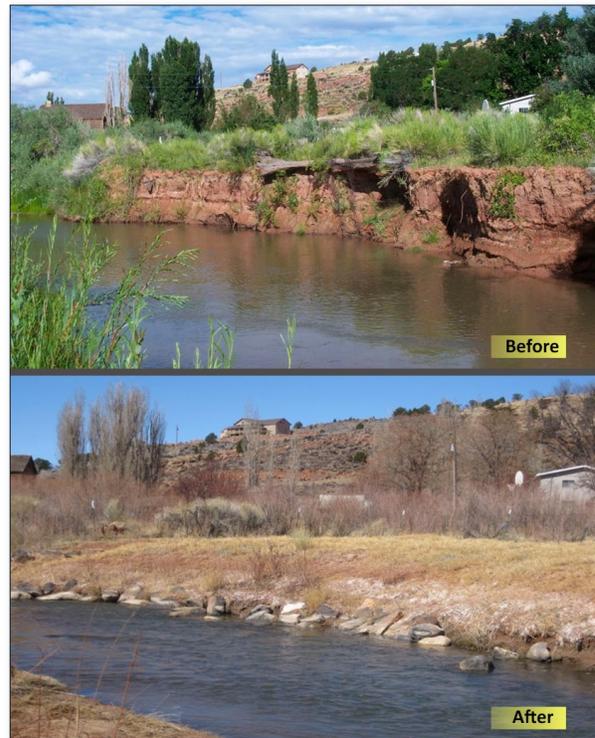


Figure 1. A stretch of the Fremont River, before (top) and after (bottom) partners completed the following streambank restoration work: shaping the streambanks, placing in-stream structures (rip-rap and rock bars), and revegetating the riparian area.

## Project Highlights

A local steering committee was formed to oversee the development of a Fremont River Water Quality Management Plan in 2002. The Fremont River Conservation District directed implementation of the completed watershed management plan, and partnered with several agencies to secure funding for work conducted between 2003 and 2011.

The Fremont River Conservation District worked with local landowners to locate streambank areas needing improvement and to identify appropriate agricultural BMPs. The implementation effort included shaping, stabilizing and revegetating over 2.5 miles of streambank (see Figure 1). Funding has been secured for one additional streambank project planned for 2016.

Landowners have also voluntarily installed agricultural BMPs: relocating two animal feeding operations away from the river, installing BMPs at 17 additional animal feeding operations to prevent animal waste from entering the river, implementing sprinkler irrigation systems to eliminate irrigation return flows to the river, and adding riparian fencing. These practices help control erosion and reduce runoff of sediment and nutrients into the Fremont River.

## Results

Water quality grab samples were collected in October 2012 through September 2013 at a site downstream of where BMPs were implemented at several animal feeding operations. Utah uses a phosphorus indicator value of 0.05 milligrams per liter (mg/L) total phosphorus as an indicator of stream health. As shown in Table 1, phosphorus levels significantly decreased after project implementation. Less than 10 percent of phosphorus data showed concentrations higher than the indicator value of 0.05 mg/L, indicating that the Fremont River is no longer impaired for phosphorus.

**Table 1. Summary of phosphorus (P) data at a target monitoring location on the Fremont River**

Date Range	n	n>0.05 mg/L	%>0.05 mg/L	Min. P (mg/L)	Max. P (mg/L)	Avg. P (mg/L)
2003–2009	55	11	20	0.01	0.67	0.050
2012–2013	11	1	9	0.01	0.07	0.039

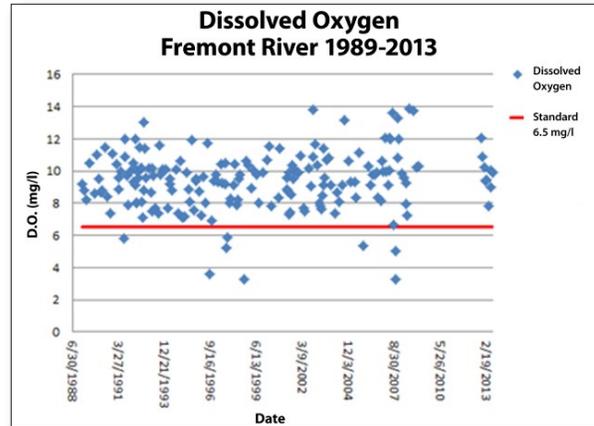


Figure 2. Dissolved oxygen levels in the river have improved over time.

In addition, macroinvertebrate samples have been collected at several locations downstream of the project implementation area. Although observed/expected population scores between 2006 and 2007 did not change, additional macroinvertebrate samples collected in fall 2013 show improving scores.

As a result of the reduction in phosphorus levels and the increase in dissolved oxygen levels (Figure 2), the Fremont River (Fremont River-2, UT14070003-005) will be removed from the 2016 CWA section 303(d) list for these parameters. The Fremont River below this segment (Fremont River-3, UT14070003-008) will also be removed from the section 303(d) list in 2016 for observed/expected benthic macroinvertebrate bioassessments as a direct result of the project implementation work that was completed upstream.

## Partners and Funding

The Fremont River Conservation District provided oversight for project planning and implementation. The Utah Division of Water Quality administered \$425,600 of CWA section 319 funding for implementing a portion of the work, and stakeholder in-kind match totaled \$305,838. The Natural Resources Conservation Service also contributed \$20,597 in Environmental Quality Incentives Program funding for project implementation within the watershed. Other partners included local landowners, the Utah Department of Agriculture and Food, Utah Association of Conservation Districts, Utah Division of Water Rights, Utah Division of Water Resources and the U.S. Environmental Protection Agency.



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