

## **Fremont River, Utah: Watershed approach toward reduction of phosphorus concentrations**

### **Waterbody Improved**

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.

The Fremont River water quality improvement project was launched with the formation of a local steering committee to oversee the development of the Fremont River Water Quality Management Plan. The plan was completed in 2002. These stream restoration projects focused on re-contouring stream banks, installing in-stream rock structures, and planting riparian vegetation. In addition to stream restoration, landowners have voluntarily installed many other best management practices such as the relocation of animal feeding operations, implementing sprinkler irrigation systems to eliminate irrigation return flows to the river, and riparian fencing. These practices all help control erosion and reduce runoff of sediment and nutrients into the Fremont River.

### **Problem**

The upper Fremont River was included on the Utah 303(d) list of impaired waterbodies in 2000. Low dissolved oxygen concentrations and elevated phosphorus concentrations were impairing the 3A Cold Water Fishery beneficial use for the upper segment of the river.

Anthropogenic activities throughout the watershed resulted in excess loading of phosphorus into the Fremont. 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. There were also many stretches of streambank with significant amounts of erosion occurring.

### **Project Highlights**

The Fremont River Conservation District implemented several of the goals of the Fremont River Watershed Management Plan. Over 2.5 miles of streambank have been shaped, stabilized and revegetated. Two animal feeding operations that were located in close proximity to the river were relocated, while seventeen additional animal feeding operations installed measures to prevent animal waste from entering the river.

The District worked with local landowners to identify agricultural practices and streambank areas needing improvement. Through partnerships with several agencies, the funding was secured for the work, which took place between 2003 and 2011. One additional streambank project is planned and funding has been secured for 2015.



*Figure 1: Before. Raw vertical banks with significant erosion.*



*Figure 2: After: Practices installed included bank shaping, rock rip rap, rock barbs and willow planting.*

## Results

Water quality grab samples were collected from October 2012 - September 2013 at a location downstream of where BMPs were implemented for an animal feeding operation. Utah uses a phosphorus indicator value of 0.05 mg/L total phosphorus as an indicator of stream health. As shown in Figure 3, there is a significant decrease in percent exceedance of the indicator value as well as the average phosphorus concentrations when comparing pre project and post project phosphorus results.

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

*Figure 3: Summary of phosphorus data at target monitoring location*

Macroinvertebrate samples have also been collected at several locations along the impaired reach. While there was no change in observed/expected population scores between 2006 and 2007, additional macroinvertebrate samples were collected in the fall of 2013 (pending analysis).

## Partners and Funding

The Fremont River Conservation District provided oversight of project planning and implementation. The Utah Division of Water Quality administered \$400,000 of Section 319 funding for implementing a portion of the work, with NRCS EQIP dollars and stakeholder in-kind match covering the remaining \$282,000. 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 EPA.

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