



UTAH DEPARTMENT of  
ENVIRONMENTAL QUALITY  
**WATER  
QUALITY**

# *Strawberry Reservoir Restoration Success Story*

*Collaborative Effort between Agencies Yields Amazing Water Quality Benefits*

## **Introduction**

Strawberry Reservoir is a large man made reservoir located in Wasatch County in Northern Utah. It is considered to be one of Utah's premier trout fisheries in terms of angler hours and number of fish produced. It is also home to the Bonneville Cutthroat Trout, which is native to Utah.

In 2004 it was determined that due to low oxygen levels in the water column as a result of elevated phosphorous concentrations Strawberry Reservoir was not fully supporting its Class 3A Cold Water Fishery beneficial use. As a result, Strawberry Reservoir was listed on Utah's 303(d) list of impaired waters for total phosphorous and dissolved oxygen, and a TMDL was completed on July 9, 2007.

The TMDL determined that the majority of the phosphorous loading to the reservoir was coming from the tributaries, specifically the Strawberry River, the largest tributary to the reservoir, which contributed 22% of the annual phosphorous load.

Historically, the Strawberry River Watershed had been heavily grazed, and the riparian vegetation was eliminated to help increase the amount of feed available to cattle. As a result, stream banks began to slough off, and excess sediments high in phosphorus were washed into the Reservoir.

## **Restoration Highlights**

In 2001 several partners came together and began working to restore the Strawberry River Drainage. Restoration objectives included reducing streambank erosion, narrowing channel width, increasing habitat complexity, and lowering of water temperature by implementing several Best Management Practices (BMPs) such as grazing management plans, re-vegetation, installation of stabilization fabrics, stream bank protection structures, and channel realignment.

Strawberry River restoration efforts include stabilizing 13 miles of streambank with approximately 33,630 feet of erosion fabric and 452 structures, creating 22 oxbow pond habitats, and improving channel sinuosity. Meanders were installed in straightened reaches pulling banks back to a 3:1 slope. Invasive woody species were removed and native vegetation (7,900 container stock, 19,000 cuttings, and 250 clumps) were planted in the floodplain. Grazing pressure was decreased by installing 3 miles of enclosure fencing to prevent unrestricted cattle access in the

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Strawberry River Restoration  
Project 2015

headwaters.

## Results

Since restoration efforts began, the average TP load from the Strawberry River is 1,446 lbs/yr which is well below the TMDL allocation for the Strawberry River of 3,025 lbs/year (see Figure 1). As a result of the reduced phosphorous loading from the Strawberry River phosphorous concentrations in the reservoir have also declined. Figure 2 shows a significant reduction in average phosphorous concentrations in 2014 as compared to average concentrations observed at the same sites at the same time in 2009 and 2011. Since the phosphorous concentrations collected in 2014 are well below the TMDL phosphorous endpoint of 0.025 mg/l, the Utah Division of Water Quality is collecting additional oxygen data, and it is anticipated that this reservoir will be removed from the State's 303(d) list of impaired waterbodies in the 2016 Integrated Report.

Figure 1- Phosphorous Loading from Strawberry River

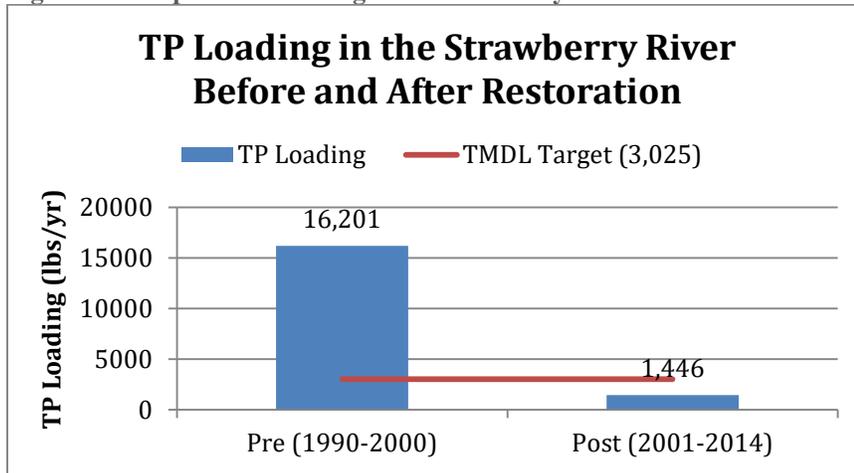
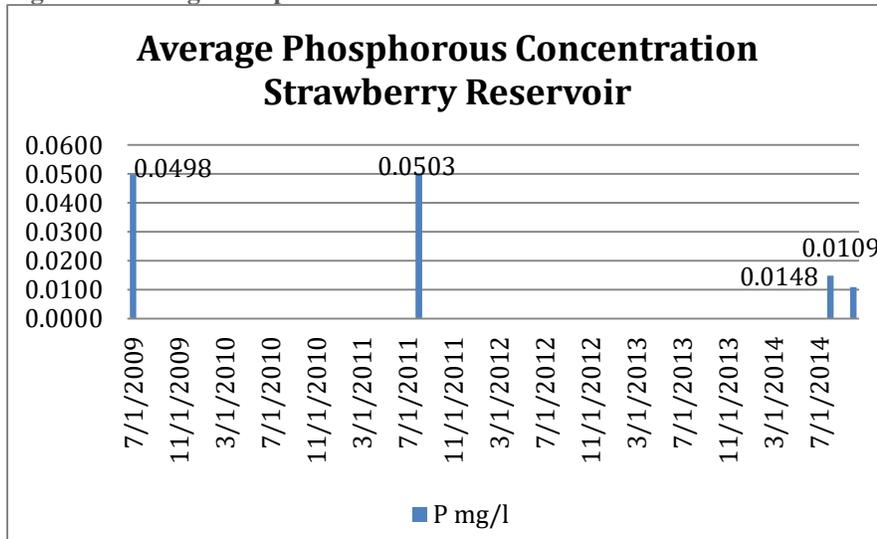


Figure 2- Average Phosphorous Concentrations



## Partners and Funding

Partners involved in the Strawberry River Restoration Project include:

- Utah Division of Water Quality
- Utah Division of Wildlife Resources
- Trout Unlimited
- Friends of Strawberry Valley
- U.S. Forest Service

- Environmental Protection Agency

Since 2001 nearly \$2 million has been spent on restoration activities in the Strawberry River Restoration Project. Table 1 Shows a summary of all funds used over the course of this project.

**Table 1- Funding Sources of the Strawberry River Restoration Project**

| Year               | BRFAC            | HC               | EPA 319          | ARRA             | WRI              | Utah NPS        | USFS (NEPA)      | In-kind          | Yearly Total       | Miles (river) completed |
|--------------------|------------------|------------------|------------------|------------------|------------------|-----------------|------------------|------------------|--------------------|-------------------------|
| 2002               |                  | \$94,000         |                  |                  |                  |                 | \$20,000         | \$23,258         | \$137,258          | 0.87                    |
| 2005               | \$39,952         | \$29,210         |                  |                  |                  |                 | \$20,000         | \$2,750          | \$91,912           | 0.92                    |
| 2008               | \$50,583         | \$50,583         | \$61,231         |                  | \$40,000         |                 | \$20,000         | \$148,205        | \$370,602          | 1.05                    |
| 2009               | \$38,500         |                  |                  |                  |                  |                 | \$30,000         | \$7,100          | \$75,600           | 0.4                     |
| 2010               |                  |                  |                  | \$539,787        |                  |                 |                  | \$5,600          | \$545,387          | 4.7                     |
| 2012               |                  | \$30,500         |                  |                  |                  | \$20,927        |                  | \$1,200          | \$52,627           | Repairs                 |
| 2013               | \$40,000         | \$40,000         | \$115,000        |                  | \$40,000         |                 | \$30,000         | \$7,400          | \$272,400          |                         |
| 2014               | \$60,000         | \$60,000         |                  |                  | \$60,000         |                 |                  | \$4,200          | \$184,200          |                         |
| 2015               | \$20,000         | \$20,000         | \$156,000        |                  | \$20,000         |                 |                  | \$4,300          | \$220,300          | 5.2                     |
| <b>Totals</b>      | <b>\$249,035</b> | <b>\$324,293</b> | <b>\$332,231</b> | <b>\$539,787</b> | <b>\$160,000</b> | <b>\$20,927</b> | <b>\$120,000</b> | <b>\$204,013</b> | <b>\$1,950,286</b> | <b>13.14</b>            |
| <b>Grand Total</b> |                  |                  |                  |                  |                  |                 |                  |                  |                    |                         |