

Section 319 Nonpoint Source Pollution Control Program Watershed Final Report

East Daniels Grazing Allotment Fencing Project

FY2008



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1.0 Executive Summary

1.1 Introduction

The land on which this project was implemented drains into the Strawberry Reservoir. In 2004 Strawberry Reservoir was listed on Utah's 303(d) List of Impaired Water bodies as a high priority TMDL for total phosphorus and dissolved oxygen thus impairing their cold-water fishery beneficial use. A study was conducted and in 2007 the EPA accepted the Strawberry Reservoir TMDL. To help improve water quality in the Strawberry Reservoir the Strawberry Watershed Restoration Report (2004) as well as the TMDL for Strawberry Reservoir recommended grazing management as a BMP. To assist with grazing management, approximately 4 miles of new fence were planned. To date, 3 miles of fence have been completed. Weather, terrain, and lack of volunteers slowed the work. The Forest Service will oversee the completion of this project.

1.2 Budget

Source	EPA 319 Grant	Match	Total
Amount	\$61,600	\$202,400	\$264,000

1.3 Schedule

Year	2009	2010	2011	2012	2013
Fence Installed (mi)	0.75	0.5	0.3	0.6	0.9
Total					≈3 miles

2.0 Background

A Total Maximum Daily Load (TMDL) analysis was completed for Strawberry Reservoir due to low dissolved oxygen and high nutrient concentrations (phosphorus) and approved by the Environmental Protection Agency (EPA) in July of 2007. This report addresses the primary sources of nutrients identified within the TMDL analysis, as well as the methods used to implement those TMDLs.

2.1 Project Water Quality Priority

As required by §26-11-6 of the Utah Code Annotated 1953, the waters of the State of Utah are grouped into classes to protect against controllable pollution. Pursuant to the §303(d) list Unified Assessment Category; Strawberry Reservoir has been identified as a High Priority watershed.

The designated uses for Strawberry Reservoir are 1C (Domestic with treatment) 2B (secondary contact recreation), 3A (cold water fishery) and 4 (agriculture).

Although Strawberry is one of the states premiere fisheries, the reservoir is listed on the State of Utah's §303(d) list as not supporting its designated beneficial use as cold-water fisheries due to low dissolved oxygen and high total phosphorus concentrations. Nutrient contamination (phosphorous loading) causes excessive algal growth and turbidity. Water with high biological productivity results in lower oxygen concentrations and stress to the aquatic community. Nutrients are delivered directly to the reservoirs during spring runoff and storm events. Both in the TMDL analysis and in the Utah's Lakes and Reservoirs Report, the source of nutrients (phosphorus loading) identified within the watershed included soil erosion from native soils, animal waste, as well as inadequate road design and drainage.

The TMDL was developed for Strawberry Reservoir with specified goals of shifting phytoplankton dominance away from blue-green algae, dissolved oxygen (DO) concentrations of no less than 4 mg/L in 50% of the water column, and trophic state index values of 40-50 (mesotrophy). A load reduction of total phosphorus (TP) of 15,100 lbs/yr was established as a requirement to achieve these goals. Implementation strategies identified within the TMDL include stream restoration and improved grazing management. Grazing management was addressed in this project by constructing fences to protect riparian areas.

2.2 Waterbody Information

Strawberry Reservoir is located in Wasatch County, 23 miles east of Heber City on the Strawberry River. At full capacity the reservoir sits at an elevation of 7,612 ft. can hold up to 1,106,500 acre/ft of water and covers an area of 17,164 acres. Strawberry Reservoir is considered to be Utah's premier trout fishery in terms of angler hours and number of fish produced. It is the destination for over 2 million visitors each year and is one of the most heavily used reservoirs in the state. In addition to being considered Utah's premier trout fishery, it provides residents of Wasatch and Utah Counties with culinary and irrigation water, as well as being a popular destination for anglers and other outdoor enthusiasts

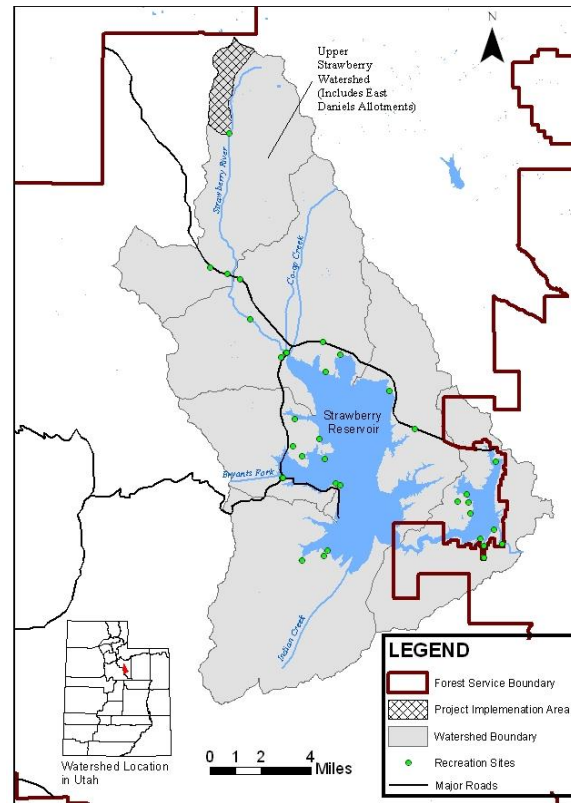
2.3 General Watershed Information

The Strawberry Reservoir watershed covers roughly 136,000 acres. Much of the inflow to Strawberry Reservoir comes from the Strawberry River, Co-op Creek, Indian Creek, and The Ladders (a trans-basin diversion from the upper Duchesne River watershed). There are several other minor inflows around the perimeter of the reservoir.

Average precipitation in the area ranges from 16 to 30 inches per year depending on the elevation. Various types of vegetation are found within the watershed including sagebrush/grass, mountain brush, aspen, Douglas fir, lodge pole pine, white fir, spruce, fir, and forb communities.

Aspen are the dominant species at higher elevations and sagebrush tends to dominate at lower elevations. Timber sales have been offered in the area. Forest vegetation is also managed using prescribed fire and mechanical treatments.

Figure 1: Strawberry Reservoir Watershed and Project Area



3.0 Project Goals

Goal: To improve water quality for downstream fisheries habitat and protect riparian areas from degradation.

Objectives:

1. Reduce nutrient contributions to the upper Strawberry River (headwaters) and downstream Strawberry Reservoir. This reduction will be accomplished by constructing approximately 4 miles of fence over five years to restrict cattle grazing to the western Strawberry pasture and eliminating grazing from the 1280 acre downstream pasture.
2. Improve grazing management practices by including the west side pasture in the current grazing management system, leading to less grazing impacts over the entire East Daniels Allotment. This will increase the current grazing system from a 7 pasture rest-rotation grazing system to 8 pastures. Work with the East Daniels Grazing Association and US Forest Service, Heber-

Kamas District to alter grazing management on the project area. Assist with creation of a formal Grazing Management Plan.

3. Establish a monitoring program including initial inventory of existing conditions by which to later evaluate effectiveness of fencing to achieve Objective 1.

4.0 Activities

Task 1 – Construct approximately 4 miles of fence.

Achievements:

- 2.2 miles of buck and pole fencing
- 0.2 miles of log worm fencing
- 0.5 miles wire fencing
- 0.12 miles block and pole fencing
- 3 gates
- 1 cattle guard

2014 Future Achievements:

- 0.8 miles buck and pole fencing
- 0.23 mile wire fencing
- 1 gate
- 0.5 mile trail removal

319: \$61,231 Match: \$183,355 (9557 volunteer hours, \$40,000 WRI) **Total: \$244,586**

The fence line was cleared by hand and then was used for the route to deliver materials. Most of the materials were delivered by ATV and snow machines. The construction of the fence was and is being completed with human resources such as Dedicated Hunters, Boy Scouts, Youth groups, clubs and Youth Conservation Corps. As of November 7, 2013 a total of approximately 3 miles of fence has been completed. In addition, 0.4 miles of buck and pole fence supplies are on site and ready to install. The remainder has not been started but the Forest Service will complete the project.

Task 2 – Create and Implement a formal Grazing Management System.

The East Daniels Grazing Association created a grazing management system that is dependent upon completion of the fences. The Association will regulate the system. In the summer of 2012 cattle were permitted to graze the Strawberry Pasture (to the west of the fence being constructed on the ridge) in conjunction with the rotation of the other East Daniels pastures. Cattle have not been permitted to graze the special use pasture) in the Head of the Strawberry River) and will not be permitted until the special use portion of the fence is completed, which is not part of this agreement.

5.0 Partners

The Wasatch Conservation District was the lead project sponsor and contracting agent. This agency has the appropriate authority to enter into conservation improvement contracts in Wasatch County. It should be noted that the Wasatch Conservation District is supported by staff of the Division of Water Quality (DWQ) (Uintah Basin TMDL Coordinator), the Duchesne County Conservation District (Uintah Basin Watershed Coordinator), representatives from the Utah Department of Agriculture and Food (UDAF) Grazing Improvement Program (GIP), and the United States Forest Service (USFS) to ensure that the project will be completed and meet Natural Resources Conservation Service (NRCS) standards.

The project design was completed in cooperation with the permittees, the USFS, UDWQ, Conservation Districts, and representatives of GIP. It met NRCS design standards. Maintenance of the project will be the responsibilities of the East Daniels Grazing Association and monitored by the USFS, Heber-Kamas District, a representative of the GIP and the Uintah Basin Watershed Coordinator.

The East Daniels Grazing Association was responsible for the implementation and maintenance of the fence. This association is comprised five members with Mac Jessen (President), and La Ren Provost owning the majority (approximately 90%) of the cattle.

Duchesne County Conservation District - The Uintah Basin Watershed Coordinator, an employee of the Duchesne County Conservation District, and Utah Division of Water Quality prepared the project proposal, obtained necessary permits, tracked costs and in-kind matches, prepared necessary interim and final reports, and provided general administration of the project/contract. Additional water quality analysis support was sought from the Division of Water Quality, TMDL coordinator.

USFS, Heber-Kamas District supported this program by acknowledging the benefits of the project for watershed health, including water quality, and approving implementation. They provided the necessary Environmental Impact Statement (EIS) documentation, and provided assistance in project implementation through the use of seasonal volunteers to construct the fence. They will provide future monitoring related to water quality, area analysis, range trend data, or other useful information gathered by the USFS as part of their regular monitoring that may be beneficial to the watershed coordinator to assess project success over time. The USFS will also coordinate with the East Daniels Grazing Association in the event they notice the need for fence repairs. The Uinta National Forest, Heber-Kamas District has also been instrumental in project planning.

6.0 Complications

Complications arose in several areas. The first was the weather. Work had to be scheduled around the weather that was typical for higher elevations, which would impeded project implementation or access to the project location. Lack of volunteers also slowed the progress of the work, though the volunteers that did participate were greatly appreciated. The terrain on which the fence was to be built was also a complication. The natural forest provided many obstacles that had to be removed before the fence could be built. The terrain was extremely steep and rocky in many places. Because of this, much of the work had to be done by hand.

7.0 Recommendations

The next steps for this project will be to finish the fence. Approximately 1 mile of fencing supplies has been purchased and is ready to be installed. The fence should be finished by end of 2014.

USFS and the East Daniels Grazing association will coordinate maintenance of the fence.

UDWQ will continue to sample Strawberry Reservoir to record possible changes in water quality data in the following years.

An initial SVAP has been done on Strawberry River. When the remainder of the fence is complete, the SVAP will be done again to determine if the project has indeed improved watershed health.

The native soils in the watershed are believed to be phosphoric in nature. A study should be done to characterize these phosphoric soils.

Sections of the Upper Strawberry River appear to be intermittent. Some sections of the river sub out then reappear in springs lower in the watershed. It is believed that the subsurface flow may be accumulating nutrients. Work done to maintain surface flow in all sections of the river may decrease TP as well as benefit the fishery by increasing aquatic passages.

8.0 Environmental Results

8.1 Chemical

The fencing from this project will both promote better grazing practices and protect riparian areas from further degradation. There were approximately 50 water samples collected between August, 2000 and September, 2011 from Strawberry River, which can be found below. A graph showing the trend of TP concentration and loading can be seen in figures 2 and 3. Although the data shows a slight increase in TP over time, once the project is complete a 12% reduction is expected from the BMPs. The Total Phosphorus (TP) load data from these samples was averaged and the reduction is taken from that average. Based on that data a load reduction of 70 lbs/year can be expected from this project. This number is based on a conservative 12% TP reduction for riparian fencing (Meals, 2002). The Strawberry TMDL calls for a watershed reduction of 1,015 lbs/year and 75 lbs/year from the Strawberry River.

Date	TP	TP Loading
8/15/2000	0.026	286.5772
9/21/2000	0.028	340.03487
10/17/2000	0.013	243.078875
1/9/2001	0.013	240.52015
2/6/2001	0.013	212.374175
4/5/2001	0.032	516.4688
5/22/2001	0.036	6943.986
6/7/2001	0.027	1105.3692
7/19/2005	0.028	1140.7977
8/16/2005	0.013	291.69465
9/13/2005	0.013	253.313775
10/11/2005	0.013	243.078875
11/8/2005	0.013	115.142625
12/13/2005	0.013	177.8313875
1/17/2006	0.03	555.0465
2/14/2006	0.02	326.7295
3/14/2006	0.013	399.9287175
4/11/2006	0.013	156.082225
4/25/2006	0.061	5073.872945
5/9/2006	0.04	8455.602
6/6/2006	0.029	3122.234975
6/20/2006	0.026	3275.168
4/23/2007	0.013	529.656075
5/15/2007	0.02	1758.43455

Date	TP	TP Loading
6/18/2007	0.013	245.3817275
7/17/2007	0.013	104.6518525
8/13/2007	0.013	51.1745
9/10/2007	0.021	86.799825
11/6/2009	0.043	380.856375
4/20/2010	0.0467	1884.304138
5/30/2010	0.048	5653.44384
6/17/2010	0.043	4350.22615
7/7/2010	0.059	1439.9717
8/24/2010	0.0462	836.58498
9/15/2010	0.05	640.665375
10/25/2010	0.048	897.522
11/15/2010	0.013	115.142625
12/6/2010	0.051	697.6462125
1/10/2011	0.0506	936.17843
3/14/2011	0.048	1476.65988
4/4/2011	0.044	1988.40488
4/25/2011	0.055	2485.5061
6/13/2011	0.07	7495.096
6/27/2011	0.061	6531.4408
7/18/2011	0.044	1073.8772
8/15/2011	0.026	360.780225
9/19/2011	0.033	400.7553825

Figure 2. Strawberry River TP Concentration

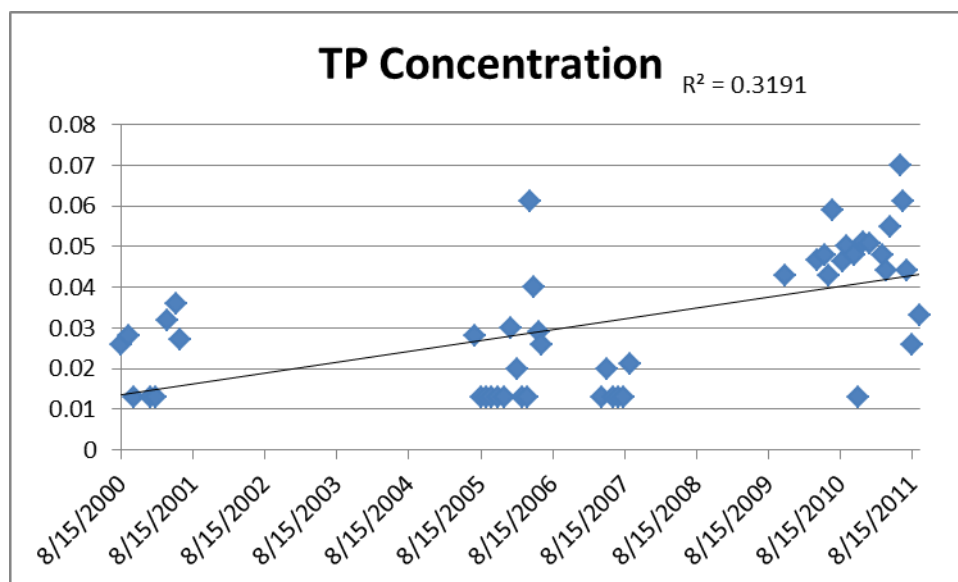
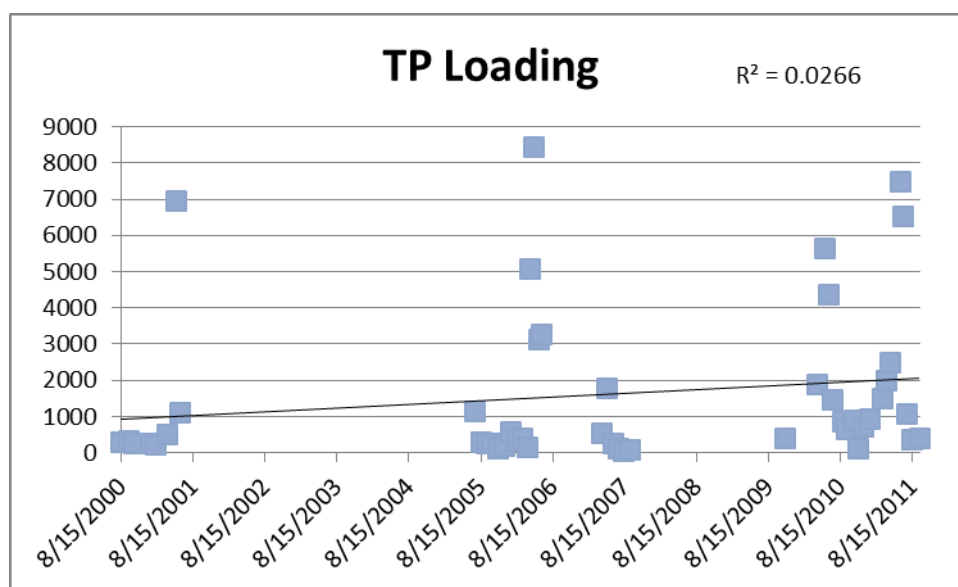


Figure 3. Strawberry River TP Loading



8.2 Benthic Macro Invertebrates

Recent studies show benthic macro invertebrates to be in good condition. In 2008, at AU UT14060004-014 on the Upper Strawberry River, the observed and expected (O/E) score for macro invertebrates was calculated at 1.1753.

8.3 Stream Visual Assessment Protocol (SVAP)

Before the fencing began UDWQ conducted an SVAP study. Four reaches on the Strawberry River were studied. The results are found in the following table.

Reach	Site	Score	Rationale
Trail Hollow	Start	9 (Excellent)	
	Eroding Bank 1	7 (Fair)	Concentrated Flow
	Eroding Bank 2	5 (Poor)	Trail
Upper Strawberry	Start	7.9 (Good)	
Strawberry River	Start	8.4 (Good)	
	Eroding Bank 3	9 (Excellent)	Concentrated Flow, Boulders
	Eroding Bank 4	6.5 (Fair)	Grazing Impacts
Strawberry River Below Corral	Start	8.7 (Good)	
	Eroding Bank 5	5.5 (Poor)	Exposed Root Mass
	Eroding Bank 6	5 (Poor)	Back Eddy

When the fence is complete another SVAP will be conducted at the same sites to show improvement.

9.0 Deliverables and Finances

Task	Deliverables	319 Funding Used	Additional Funding Used	Total
Task 1: Construct approximately 4 miles of fence.	3 miles of fence constructed to date.	\$61,231	\$40,000 WRI \$143,355 In-Kind	\$244,586

10.0 Conclusions

Planning for this project began in FY-08 and the project will continue for at least one year after this report is submitted until complete. 3 miles of fence have been constructed including 3 gates and one cattle guard. One more mile of fence has yet to be constructed, including one more gate. Approximately .5 mile of two track trail will also be removed.

The East Daniels Grazing Association will alter their grazing plan when the project is complete. Presently, cattle are permitted to graze the Strawberry Pasture (to the west of the fence being constructed on the ridge) in conjunction with the rotation of the other East Daniels pastures. Cattle have not been permitted to graze the special use pasture in the head of the Strawberry River, and will not be permitted to graze it until the special use portion of the fence is completed.

The Utah Division of Water Quality is continuing to monitor several sites within the Strawberry Watershed, as part of its long-term water quality monitoring efforts. Water quality samples and photos will be taken every 6 weeks for 3 years.

11.0 Attachments

11.1 Maps and Photos

Figure 4: Map of Fence Constructed and Planned

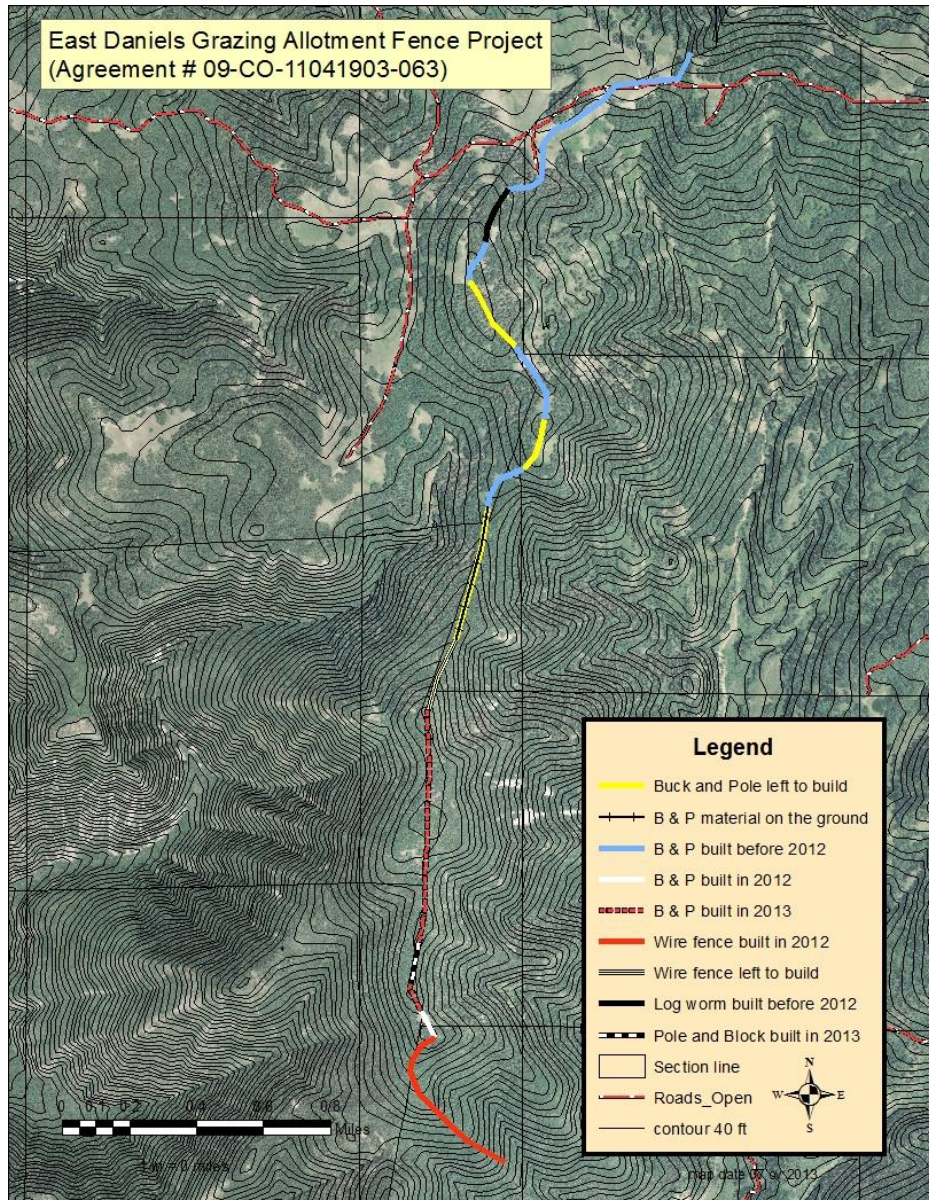


Figure 5: Buck and Pole



Fencing

Figure 6: Log Worm



Fencing

Figure 7: Buck and Pole



Fencing

Figure 8: Wire Fencing on steep, rocky



slope

Figure 9: Wire Fencing on steep



slope

Figure 10: Cleared Fence



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12.0 References Cited

Meals, D.W., 2002, Notes on watershed management—Riparian restoration improves water quality in Vermont's Champlain Valley: Nonpoint Source News, June 2002, issue 68, p. 15–16.