Section 319 Nonpoint Source Pollution Control Program

Watershed Project Final Report

Middle Sevier River Watershed

By

Lynn M. Koyle
Middle Sevier River Watershed Coordinator

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This project was conducted in cooperation with the State of Utah and the United States Environmental Protection Agency, Region 8.

Grants #: 9998187-06, 9998187-07

UDAF Contract # 07-1034,08-1218,09-1031,10-0421 UACD Job # 661, 682, 710,723

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1.0 EXECUTIVE SUMMARY

Table 1-1. Grant Budget Summary

Project Title:	**Sevier River**		
Start Date:	**5/29/2007**	**Completion Date:**	**10/1/14**
Funding:	**EPA funds**	**Budget by funding year:**	**319 funds + Match**
FY-06	$104,680	07-1034	$174,467
FY-06	$34,790	Transferred From: San Pitch Watershed = 24,875.58 Virgin River WS = $9,914.42	$57,983
FY-06 Total	**$139,470**		**$232,450**
FY-07	$100,000	08-1218	$166,667
FY-07	$5,210	Transferred from Virgin River = $5,210.00	$8,683
FY-07 Total	**$105,210**		**$175,350**
FY-08 Total	**$137,085**	**09-1031**	**$228,475**
FY-09 Total	**$60,000 - $15,016.74= $44,983**	**10-0421 --$15,016.74 transferred to the Western Colorado Watershed**	**$74,972**
Grant Total	**$426,748**	**Total Budget (319 + Match):**	**$711,247**
		Total EPA 319 Grant	**$426,748**
		Total expenditures of EPA Funds to date	**$426,748**
		Total 319 match accrued	**$284,499**
		Total expenditures of 319 and accrued match	**$711,247**
		Non-disbursed 319 Grant funds by contract number: 07-1034, 08-1218, 09-1031, and 10-0421.	**$0.00**
		Total State NPS Expenditure	**$133,798**
		Total NRCS EQIP Expenditure	**$60,502**
		Project Total	**$905,547**

1.1 Summary Accomplishments

Watershed improvement projects in the Middle Sevier River watershed began in September 2007 and are complete as of 12/1/14. To date Middle Sevier River Watershed has received $426,748 in section 319 funds and has expended all of these funds to complete individual contracts.

The primary goals of projects in the Middle Sevier River watershed were to: reduce nutrient and sediment loading from animal feeding operations (AFOs) located directly on or adjacent to the river and to improve stability of the stream channel and enhance the riparian corridor to reduce sediment nutrient loading to the river and its tributaries. These goals have largely been accomplished through the implementation of the following Best Management Practices (BMPs):

- Fencing and dikes for animal feeding operations and install watering facilities.
- Restricting access to streambanks with protective/exclusion fencing
- Repairing eroding stream banks.

2.0 INTRODUCTION

The Middle Sevier River watershed is located in Sevier, Piute, Sanpete, Millard, Beaver, Juab and Tooele Counties in Utah. The Sevier River originates in the mountains of Kane County in southern Utah. It follows a sinuous path of over 260 river miles to reach a point 145 miles almost directly north of its origin. It then turns southwest for another 120 river miles but only 60 direct miles to end in Sevier Lake, one of the major terminal lakes in the Great Basin. The Sevier River drains over 9,900 sq. miles—larger than the state of Vermont—ranging in elevation from almost 12,000 ft to less than 4,540 ft above sea level. For watershed planning and management purposes, the Sevier River Watershed is divided into Surface water resources in the middle and lower Sevier River watershed, and includes network of streams, rivers and canals. Five major sub-regions; the Upper Sevier, East Fork Sevier, Middle Sevier, San Pitch, and Lower Sevier, with another 800 square miles of the watershed draining directly into the Sevier Lake. This plan encompasses the Middle and Lower Sevier sub-regions, over 6,600 sq mi, an area 36 percent larger than the state of Connecticut.

Most surface water runoff is produced by snow melt during the spring and early summer months. Tributary streams peak at different times depending on the watershed aspect and elevation. Major tributaries to the Sevier River include Clear Creek, Salina Creek, San Pitch River and Chicken Creek, Chalk Creek, Corn Creek and Ivie Creek are important tributaries that do not flow directly into the Sevier River. Much of the main stem surface water supply comes from the South Fork and East Fork of the Sevier River above Piute Reservoir. The San Pitch River watershed produces over one fourth of the total water yield in the basin.

Agricultural water supply and secondary contact recreation are designated beneficial uses for the Sevier River and its tributaries throughout the watershed. Current uses of the river and its tributaries include irrigation diversion, with much of the water in the Sevier and its tributaries diverted through irrigation canals. Fishing and recreation are important in the upper reaches. The river floodplain is used intensively for agricultural purposes: animal watering, pasture, and irrigated cropland.

The primary use of water is for irrigation and other agricultural purposes. The average annual amount of water diverted for cropland irrigation is 903,460 acre-feet. Of this amount, approximately 135,000 acre-feet are pumped from groundwater wells. About 40 percent of the water diverted for irrigation is supplied by return flows from upstream use. Other uses include industrial use (26,290 acre-feet) and stock water.

The climate of the Sevier River Basin reflects its location in the transition zone from the Basin and Range Province to the Rocky Mountain-Colorado Plateau Province. The high mountain valleys in the upper watershed areas blend into the semi-arid climate common to southwest deserts in the United States. The northern part of the basin reflects lower precipitation patterns than those found in the southern part of the basin.

The beneficial uses applied to water bodies in the project area include domestic water use, recreation, aquatic life, and agriculture. These beneficial uses apply to water bodies located on and flowing through both public and private land in the middle and lower Sevier River watershed. In addition to these uses, many water bodies located on National Forest System lands in the project area are classified as Category 1 waters and subject to anti-degradation laws that require water quality to be maintained at existing levels or higher.

Class 1 beneficial uses are assigned to high quality waters reserved for domestic use. Class 2 waters are associated with recreational use including primary contact (direct contact) and secondary contact recreation such as boating, wading, or other activities where water is not typically ingested. Class 3 beneficial uses include three levels that are designed to protect both game and non-game aquatic life. In general Class 3A requires higher water quality than Class 3B or Class 3C. Class 4 beneficial use protects irrigation and stock watering use. Impaired water bodies included on the 2002 303(d) list as shown in Table 1 (page 6). The beneficial use classes associated with impaired segments include Class 2B, Class 3A and 3B, and Class 4.

Table 2-1. Utah Beneficial Use Classification and Description

2B	Protected for boating, water skiing and similar uses excluding recreational bathing (swimming).
3A	Protected for cold water species of game fish and other cold water aquatic life, including the necessary aquatic organisms in their food chain.
3B	Protected for warm water species of game fish and other warm water aquatic life, including the necessary aquatic organisms in their food chain.
3C	Protected for non-game fish and other aquatic life, including the necessary aquatic organisms in their food chain.
3D	Protected for waterfowl, shore birds and other water oriented wildlife not included in classes 3A, 3B or 3C, including the necessary aquatic organisms in their food chain.
4	Protected for agricultural uses including irrigation of crops and stock watering

Identified concerns in the Sevier River include sediment, nutrients, and salinity. The Middle-Lower Sevier River Watershed Management Unit, Water Quality assessment report (DEQ, 2000) reported high loadings of dissolved nutrients in the upper watershed and total dissolved solids in the lower watershed.

The TMDL water quality study found that most of the water quality pollution in this watershed results from four nonpoint sources (NPS): land erosion, streambank erosion, Irrigation return flows, and animal waste. Reducing these pollutant loads will require specific management actions by both public and private managers.

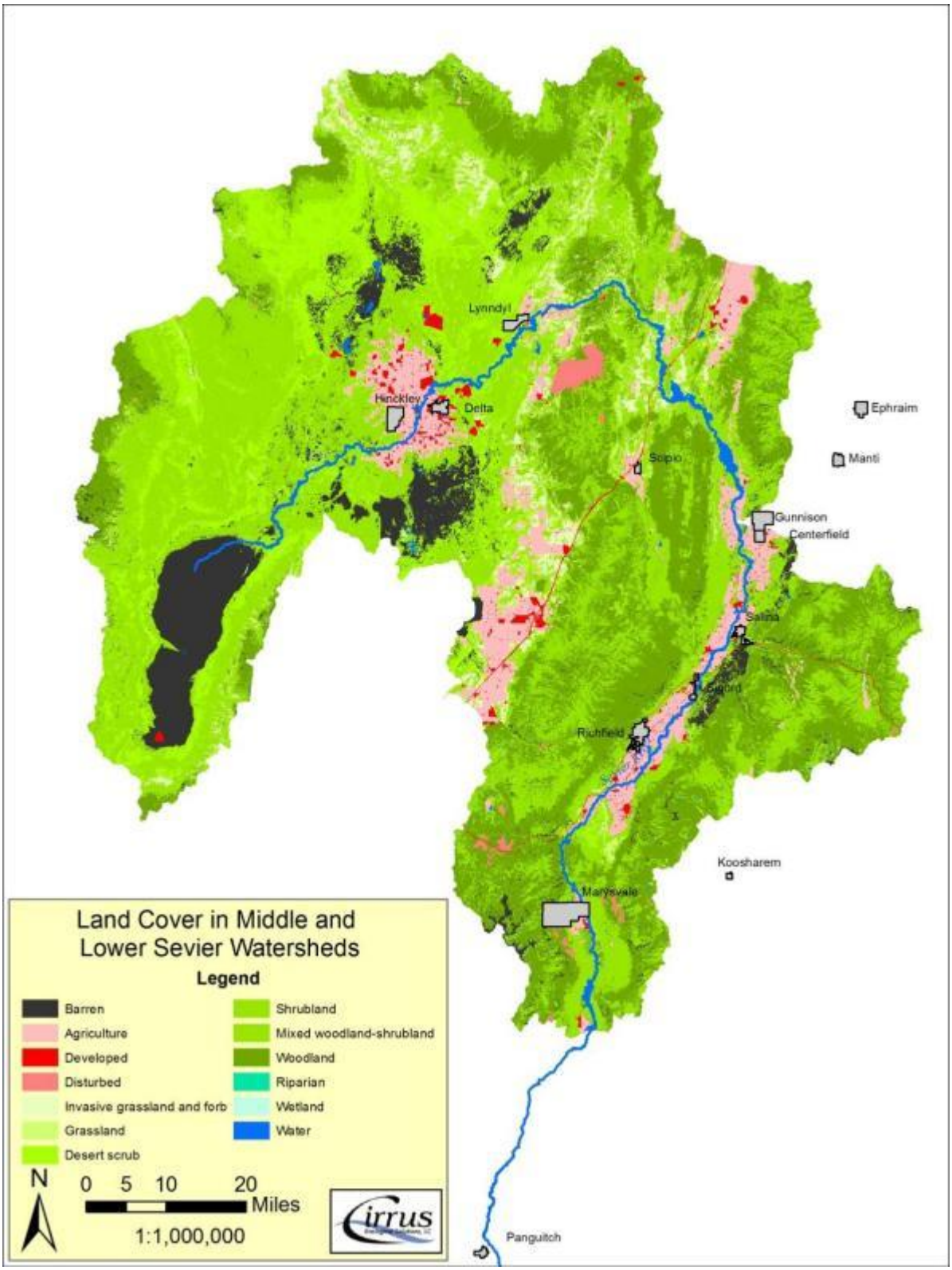

Figure 2-1. Land Cover in the Middle Sevier River Watershed.

3.0 PROJECT GOALS, OBJECTIVES, AND TASKS

GOAL 1: Improve stability of the stream channel and enhance the riparian corridor to reduce sediment and nutrient loading to the river and its tributaries.

Objective 1: Develop projects that reduce sediment and nutrient loading to the river through improved function of the stream bank and riparian area.

Tasks: Stabilize riverbanks by constructing rock barbs, rock rip rap, streambank shaping, willow planting. Also fence off River Corridor to protect riparian areas.

Outputs:

- Landowner # 1—943' streambank shape—4200 willow plantings—12 rock barbs & hauling—263 cy riprap & hauling—26000 sq ft flex membrane.
- Landowner # 2—490' of Dike—1600' streambank shape—600 cy of rock riprap & hauling—12,000 sq ft flex membrane—660 cy rock in 11 barbs & hauling—35 bundles of willows (1050 willows).
- Landowner # 3—390' streambank shaping—570 cy rock fill & riprap-300' fence-4 Rock barbs
- Landowner # 4—1350 ft. chan. Shaping—1617 ft. fence—13 rock barbs—69 clumps of willows (2070 willows)—4950 sq ft flex membrane.
- Landowner # 5—600' fence—360' pipeline & str.—300' shape streambank—3 rock barb & hauling—5 root wads & hauling—178 cy rock riprap—1 parshall flume—36" gate & 40' 36" pipe.
- Landowner # 6—2150' streambank shaping—27 Rock barbs & hauling—4000' fence—9720 sq ft flex membrane. 107 clumps of willows planted(2,100 willows)
- Landowner # 7—250' dike & channel shaping—360' fence—2 rock barbs & hauling—300 cy rock riprap & hauling.
- Landowner # 8—300' dike & channel shaping.—612' fence—3 rock barbs & hauling.
- Landowner # 9—AFO project, see below.
- Landowner # 10—9 rock barbs—1900' feet shaping chan.—Purchase 450 CY rock—525 sq yd flexmembrane—1765' 4-wire fence and tee posts—2 metal fence gates
- Landowner # 11—AFO project, see below.
- Landowner # 12—6 clumps of willows(180 willows)—5 rock barbs—200' fence—300' channel shaping.

Table 3-1 Stream Restoration Project Funding.

Project #	Contract #	319 Funds	Match	319 + Match	State NPS Funds	EQIP	Total Project Cost
1	07-1034	$5,071.50	$3,381.00	$8,452.50	$0	$43,349	$51,801.50
2	07-1034	$28,730.63	$19,153.75	$47,884.38	$0	$0	$47,884.38
3	07-1034	$33,062.72	$22,041.81	$55,104.53	$0	$0	$55,104.53
3	10-0421	$36,157.22	$24,104.81	$60,262.03	$0	$0	$60,262.03
4	07-1034, 08-1218	$39,363.78	$26,242.52	$65,606.30	$23,618.26	$0	$89,224.56
5	07-1034, 09-1031	$35,486.77	$23,657.85	$59,144.62	$16,531.00	$0	$75,675.62
6	07-1034, 08-1218, 09-1031, 10-0421	$83,606.74	$55,737.82	$139,344.56	$53,328.27	$0	$192,672.83
7	08-1218	$17,449.08	$11,632.72	$29,081.80	$10,469.45	$0	$39,551.25
8	08-1218	$14,053.19	$9,368.79	$23,421.98	$8,417.44	$0	$31,839.42
10	09-1031, 10-0421	$22,049.35	$ 14,699.56	$36,748.91	$11,024.68	$0	$47,773.59
12	09-1031	$9,810.00	$6,540.00	$16,350.00	$5,886.00	$0	$22,236.00
	Total	**$324,840.98**	**$216,560.63**	**$541,401.61**	**$129,275.10**	**$43,349.00**	**$714,025.71**

GOAL 2: Assist animal feeding operations on the Sevier River watershed to implement and demonstrate proper containment and application of animal waste using Best Management Practices.

Objective 1: Develop animal waste systems to ensure total containment of animal manure and reduce pollutants entering the Sevier River drainage.

Tasks: Identify and select project cooperators and assist them in the installation of animal drinking systems, construct fences as barriers to live water and other waste management practices, using BMP's and CNM

Outputs:

- Landowner # 9 FY-06--4 animal drinking troughs—1830' fence—5538' pipeline—1220' dike.
- Landowner # 11 FY-08 500'dike—500' Fence—250' pipeline—1 water trough system—300 willows

Table 3-2 AFO Project Funding.

Project #	contract #	319 funds	Match	319 + 319 Match	State NPS Funds	EQIP	Total Project Cost
9	07-1034	$ 14,484.24	$9,656.16	$24,140.40	$ 0.00	$ 17,152.50	$41,292.90
11	09-1031	$ 12,573.04	$8,382.03	$20,955.07	$ 4,523.00	$0	$25,478.07
	Total	**$27,057.28**	**$18,038.19**	**$45,095.47**	**$4,523.00**	**$17,152.50**	**$66,770.97**

GOAL 3: Improve pasture condition & implement BMP's as needed

Objective 1: Reduce nonpoint pollution, sediment and nutrients, from improved upland/pastureland management.

Tasks: Identify and select project cooperators and assist them in the installation of Upland/pastureland practices using BMP's.

Outputs: NA-- there were no pasture planning or planting

GOAL 4: Inform and educate the community concerning non-point source pollution and the importance of maintaining and improving water quality within the watershed.

Objective 1: Conduct tours of project cooperators focusing on: 1) animal waste system designs and proper manure application; 2) functioning riparian areas, stable streambanks, and properly managed uplands/pasture lands.

Tasks: Plan and conduct project tours.

Outputs: One tour was conducted. However, no section 319 funds were used for this tour.

Objective 2: Share general and technical information with producers and area stakeholders.

Tasks: Prepare and publish news articles and other informational documents.

Outputs: Landowner # 1. Prepare and publish newspaper article in local paper showing job completion.

No money required for news paper article.

Goal # 5 Complete the Final Watershed Management Plan.

Objective 1: Identify all related resource issues, prioritize problem areas, and target projects to address all sources of pollutants identified in the TMDL.

Task - Complete Watershed goals and objects, develop implementation and management strategies, public surveys, editorial tasks, compile existing information and make ready for final printing.

Output—Completed and delivered the Sevier River Watershed Management Plan

Table 3-3. Watershed Management Plan Budget Summary

Contract #	319 funds	319 Match	319 + 319 Match	State NPS Funds	Total Project Cost
09-1031	$60,000.00	$40,00.00	$100,000.00	$0	$100,000.00

Grant Administration Provide administrative services to project sponsors

Objective 1: Document matching contributions, track individual progress, coordinate team efforts, and generate reports and data in a timely manner.

Tasks: Track match; prepare and file semiannual, annual and final reports.

Outputs: Track match time and dollars. Prepare and file all needed reports. These services were done by the local watershed coordinator

Table 3-4. Administrative Project Funding Summary

Contract #	319 funds	319 Match	319 + 319 Match	State NPS Funds	Total Project Cost
07-1034	$0.00	$0.00	$0	$0	$0
08-1218	$5,000	$3,333.33	$8,333.33	$0	$8,333.33
09-1031	$6,850	$4,566.67	$11,416.67	$0	$11,416.67
10-0421	$3,000	$2,000.00	$5,000.00	$0	$5,000.00
Total	**$14,850.00**	**$9,900.00**	**$24,750.00**	**$0.00**	**$24,750.00**

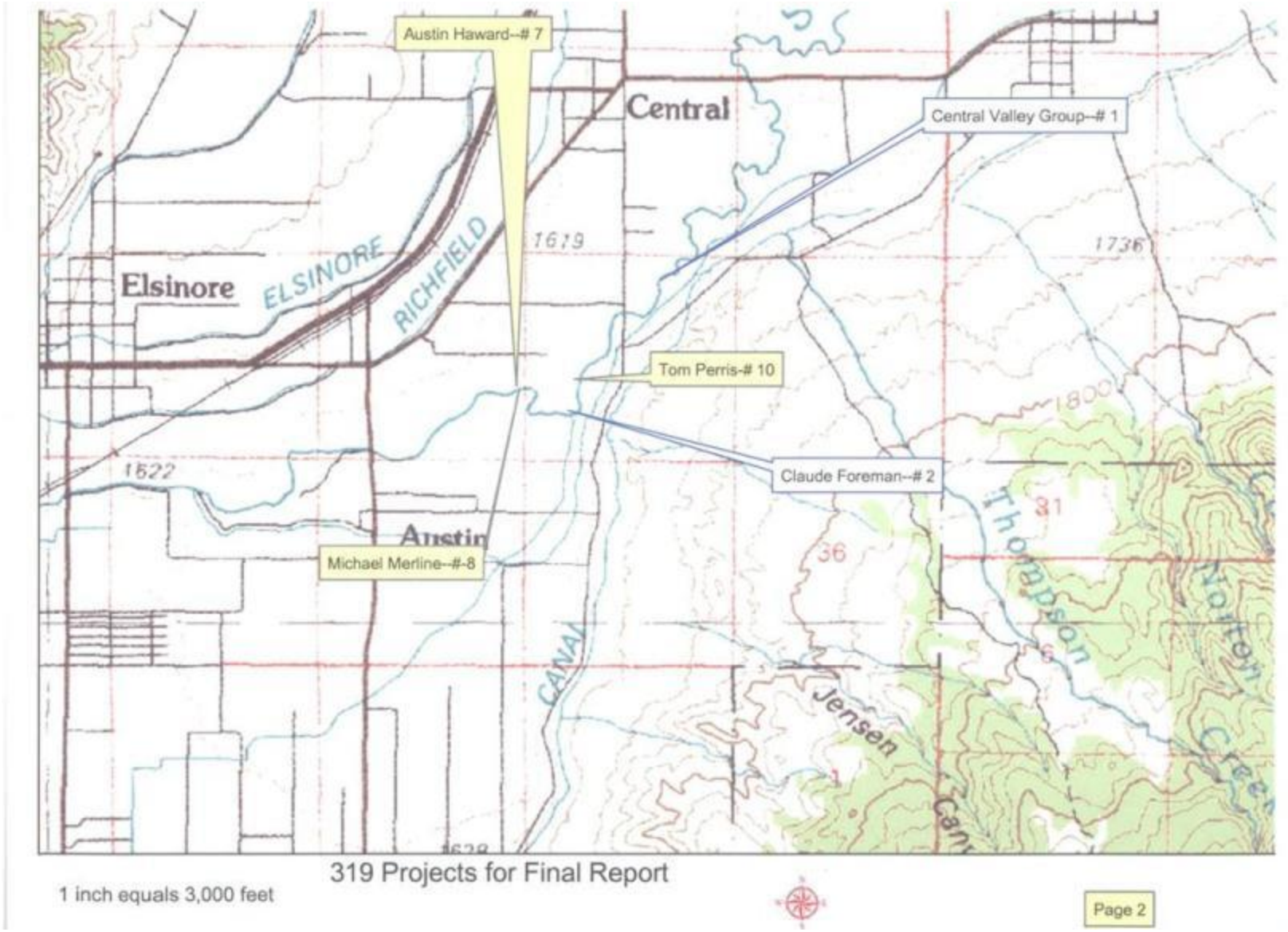

Figure 3-1. Location of Projects 1, 2, 7, 8 and 10.

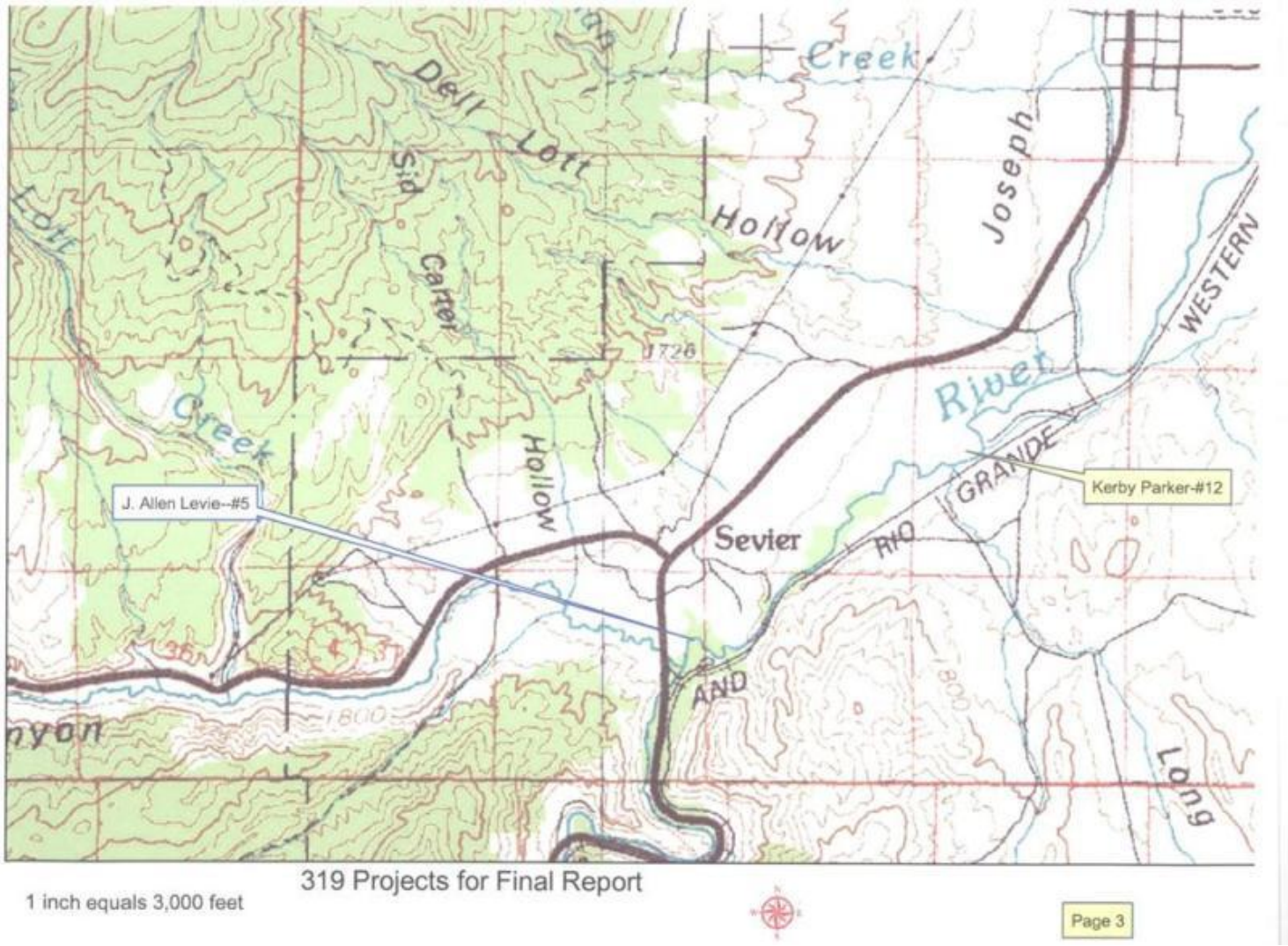

Figure 3-2. Location of Projects 5 and 12.

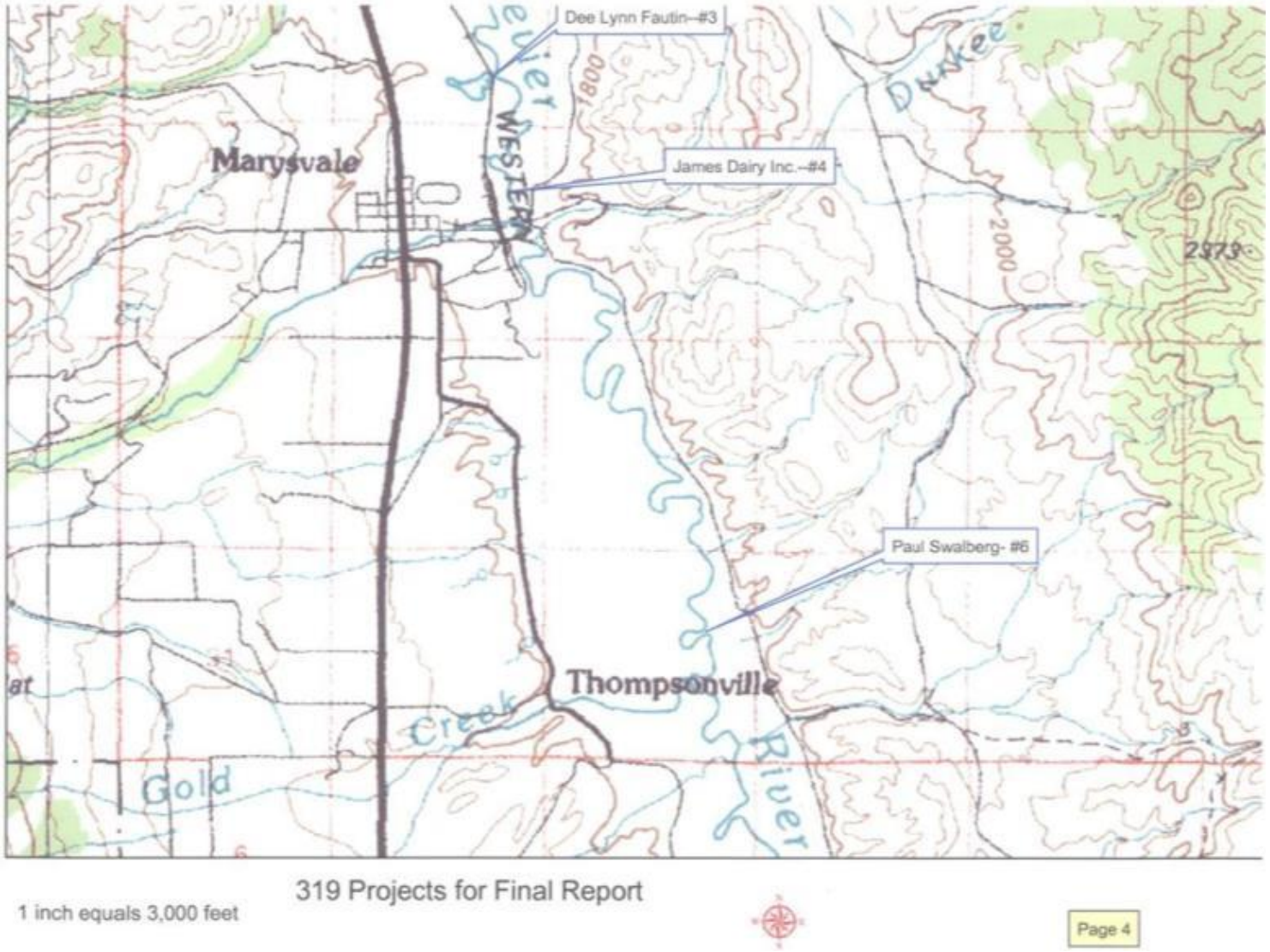

Figure 2-4. Location of Projects 3, 4, and 6.

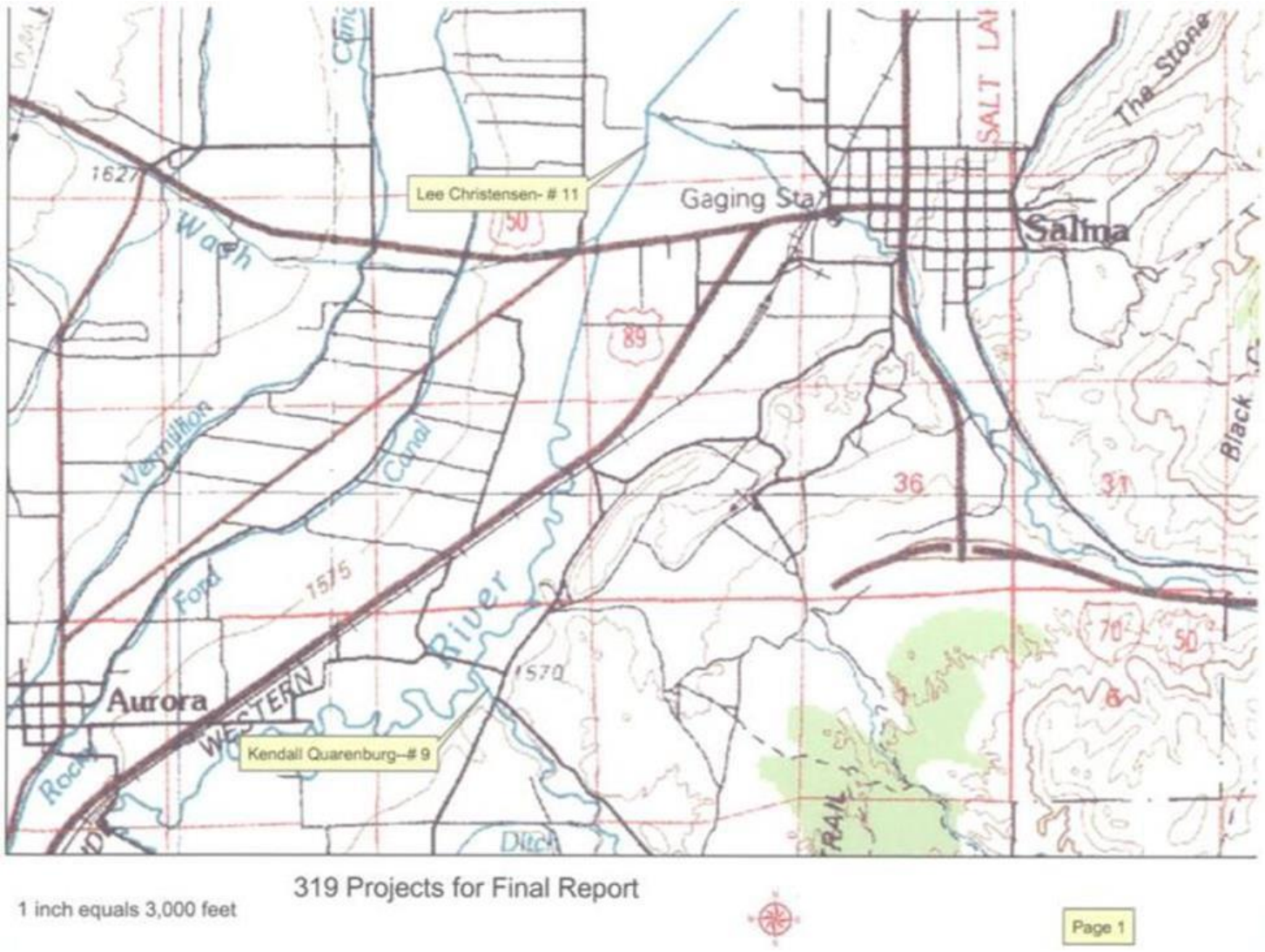

Figure 3-3. Location of Projects 9, and 11.

3.1 Planned and Actual Milestones, Products, and Completion Dates

Table 3-5 Planned and Milestones for Implemented Projects.

GOAL/OBJECTIVE/TASK	PLANNED OUTPUT/PRODUCT	PLANNED AMOUNT	ACTUAL OUTPUT	COMPLETION DATE
Goal 1: : Improve stream stability and riparian corridor **Objective 1:** Reduce Sediment and Nutrient Loading	Streambank projects	12 each	12 landowners	10/17/13
Task1: Streambank and Shoreline Protection:	Streambank Shaping	9100 ft.	9483 ft.	6/19/2012
Streambank and Shoreline Protection:	Rock Barbs	84 ea.	94 ea.	6/19/2012
Streambank and Shoreline Protection:	Rock Rip Rap	1700 cu. yards	1911 cu. yards	12/31/2011
Streambank and Shoreline Protection:	Dormant Vegetative Plantings (willows)	8180 ea.	9600 ea.	7/11/2012
Streambank and Shoreline Protection:	Fence	10727 ft	9454 ft.	6/19/2012
Develop AWM System and Implement project	Dikes & berms Str for water control Irrigation transmission Pipe	870 ft. 2 gates 360’	770 ft. 2 gates 360’	12/31/2011
GOAL 2: Assist animal feeding operation. **Objective 1**: Develop animal waste systems to ensure total containment of animal manure and reduce pollutants entering the Sevier River.	Animal waste systems	2	2	11/24/2010

GOAL/OBJECTIVE/TASK	PLANNED OUTPUT/PRODUCT	PLANNED AMOUNT	ACTUAL OUTPUT	COMPLETION DATE
Task 2:Select and identify project cooperators and Develop AWM System and Implement project	Cooperators needing to improve their systems	2	2	8/26/2010
Develop AWM System and Implement project	Corral fences	2830 Feet	2830 Feet	9/16/2010
Develop AWM System and Implement project	Pipeline & drinking facility.	4 Troughs and 5538'	4 Troughs and 5538'	11/24/2008
Develop AWM System and Implement project	Pipeline & trough	500' Pipe & 1 trough	500' pipe & 1 trough	9/1/2010
Goal 3: Improve pasture condition & implement BMP's as needed. **Objective 1:**Reduce TDS and nutrient loading & runoff from pasture lands.	None Implemented	NA	NA	NA
Task 3:Identify Project Cooperators and Implement Projects	None Implemented	NA	NA	NA
Goal 4: Objective 1: Share general information.	On going	NA	NA	NA
Administration: Provide administration to project sponsor. **Objective 1:**Track cooperator support				
Task 11: Track Match	Document funding records	Ongoing	Ongoing	Ongoing
Task 12: Prepare and file reports	Semiannual, annual and final reports	Ongoing	Ongoing	Ongoing

3.2 Evaluation of Goal Achievement and Relationship to the State Non-Point Source (NPS) Management Plan

The State of Utah nonpoint source management plan stresses several elements necessary to achieve orderly and comprehensive planning such as the following: Private landowners, water right owners, public interest group, and local, state, and federal government agencies all play a role in the process. Coordinated Resource Management Group has met monthly for a number of years looking at the management of natural resources and the management practices to improve them.

The (6) six Conservation Districts located within the Sevier River Watershed have played a key role in the leadership of locally-led conservation and directing local work group meetings. They have focused on providing direct communication between landowners and federal agencies. Considerations of resource concerns have been developed. A resource assessment was developed and a long-range plan implemented. All the above activities are consistent with the intent and scope of Utah's NPS Management Plan.

3.3 Supplemental Information

project # 8. Before picture-Narrow plugged channel.

Project # 8. After picture--Channel opened up with bank protection.

Project # 7Before Picture – More raw vertical banks, evidence of serious erosion.

Project # 7. After Picture- Streambank practices install included shaping, rock rip rap, rock barbs and fence,

Project #12. Before Picture – raw vertical banks, erosion has cut into the bank where a fence was once installed.

Project # 12. After picture showing fence, rock barbs, and willows.

Project # 6. Before picture showing major erosion.

Project # 6. After Picture-Practices install include shaping, rock rip rap, rock barbs and fence.

Project # 10. Before Picture- looking downstream-River Bank Restoration- 9-28-2011.

Project # 10. After photo, before fence was completed, looking upstream- 1-3-2012.

Project # 9. Before picture of Animal feeding Operation showing cattle watering in the Sevier River.

Project # 9. After picture of Animal Feeding Operation.

Project # 11. Before picture of animal feeding operation 7-28-2010.

Project # 11. After photo of animal feeding operation- 9-15-10.

Project # 4. Before picture of eroded banks and broken down fences.

Project # 4. After picture of repaired channel with rock barbs and rocky fill to slope banks and new fence.

4.0 BEST MANAGEMENT PRACTICES DEVELOPED AND/OR REVISED

Projects in the Sevier River Watershed were designed to demonstrate reduction in sediment and nutrient loading as well as streambank stabilization and restoration. Best Management Practices used to achieve these goals include to date: livestock exclusion fencing; off-site stock watering; rock barbs; rock rip rap; and willow plantings.

The feed lots that were moved were located on or within 50 meters of the river. They have now been moved to a distance of 100 meters or more, or fenced where the slope of the feed lot does not enter into the river. The operations that have been implemented have been between 100-1000 animals. Besides the feed lots, off site watering structures have been installed instead of watering cattle directly in the river.

5.0 MONITORING RESULTS

5.1 Water Chemistry Monitoring

Figure 5-1 shows monitoring and implementation locations for the Sevier River between Piute Reservoir and Richfield, UT. Please cross reference project numbers with Section 2.0 for project descriptions. The monitoring stations are DWQ long-term ambient locations and intensive basin locations with site visits between 1990 and September 2014. Table 5-1 shows the number of monitoring visits for each station before, during, and post- project implementation and demonstrates that there is a good frequency of site visits pre-implementation. Each monitoring station was also visited monthly during the Intensive Basin monitoring cycle during the 2014 water year. Results from the Sevier intensive cycle are not yet available for review.

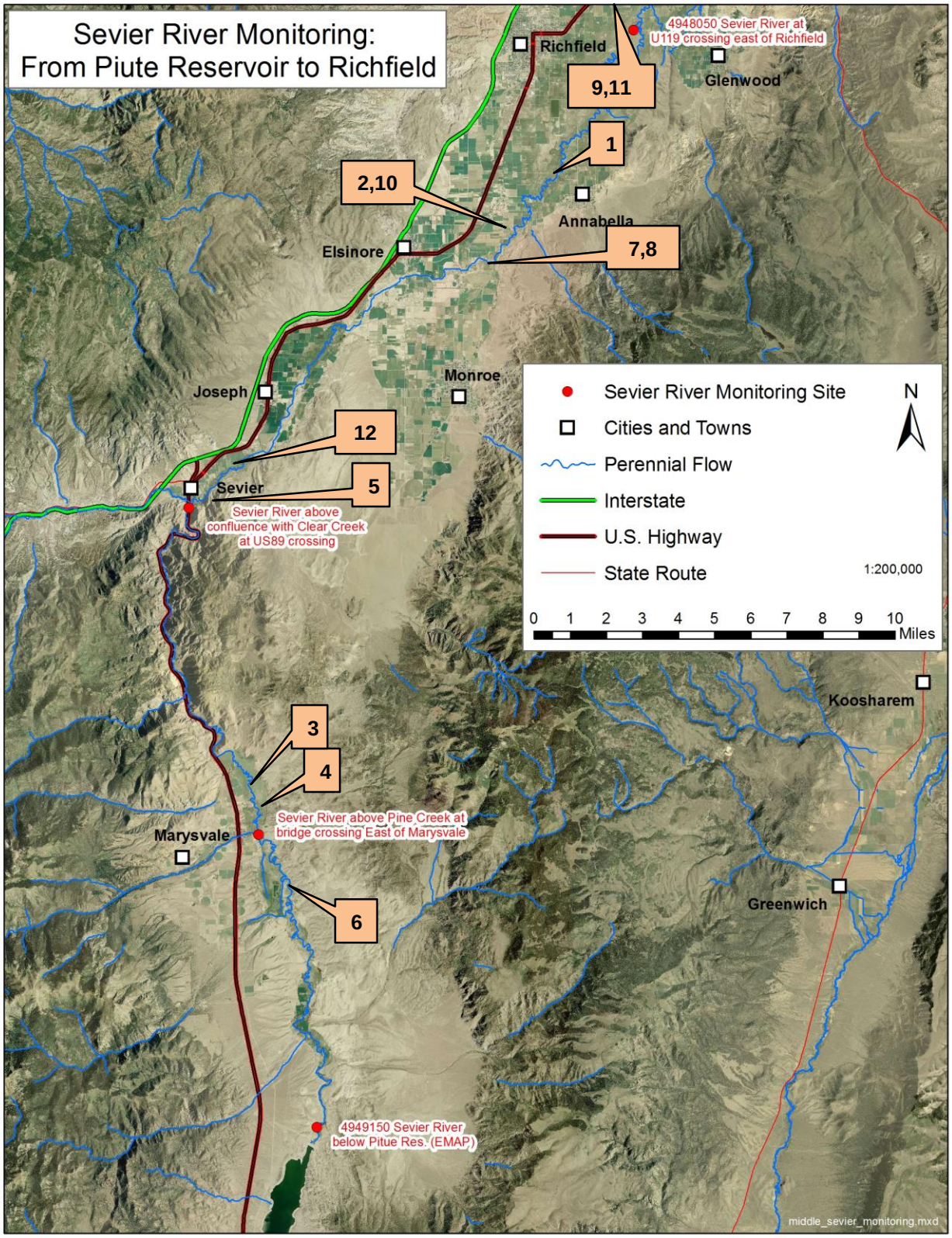

Figure 5-1. Water Quality Monitoring Locations on the Sevier River.

Table 5-1. Monitoring Frequency in Relation to Project Locations (Ordered Upstream to Downstream).

Location ID	Location	Pre-Implementation	During Implementation	Post - Implementation	2013/2014 Monitoring[1]
4949150	SEVIER R BL PIUTE RES	05/03/1990 to 3/17/1993 (n=19)		10/23/2013 to 11/19/2013 (n=2)	10/23/2013 to 9/18/2014 (n=12)
4949131	Sevier R above Pine Ck at Bridge Xing E of Marysvale			10/23/2013 to 11/19/2013 (n=2)	10/23/2013 to 9/18/2014 (n=12)
4948950	SEVIER R AB CNFL / CLEAR CK AT 89 XING	01/01/1990 to 12/14/2006 (n=89)	02/01/2007 to 01/14/2009(n=8)	10/23/2013 to 11/19/2013 (n=2)	10/23/2013 to 9/18/2014 (n=12)
4948050	SEVIER R AT U119 XING E OF RICHFIELD	04/04/1996 to 12/14/2006 (n=32	02/01/2007 to 06/26/2007(n=4)	10/23/2013 to 11/19/2013 (n=2)	10/23/2013 to 9/18/2014 (n=12)

1. 2013/2014 intensive monitoring data not yet available for analysis

Table 5-2 and Figure 5-2 summarize total phosphorus observations, the parameter of concern defined by Sevier River TMDL. The table and figure shows that min, mean, and max total concentrations are very similar from station to station throughout the monitoring period of record with average concentrations ranging between 0.02 and 0.09 mg/L total phosphorus. Total phosphorus concentrations are similar throughout the period of record and do not show any significant increasing or decreasing trend (Figure 5-3). The figure does demonstrate a grouping of lower concentrations for both above and below monitoring locations for 2013 samples. However, this is not significantly different than mean concentrations observed throughout the period ($p>0.05$) and is observed above implementation locations.

Figure 5-4 demonstrates a similar relationship exists with TP loading. Both loading and concentration increase between location 4949150 and 4948950 indicating more implementation work is needed in the Marysvale reach of the Sevier River. Average concentration and load are lower at station 4949131, however, this site was created for the 2014 intensive event and does not have a long term dataset associated with it. .

A statistical comparison of pre- and post-implementation TP concentrations and TP load at STORET 4948950 did not detect changes in water quality associated with project implementation in the Marysvale reach of the Sevier River ($p>0.05$). The same result was observed for an analysis of pre- and post-project implementation TP observations at STORET 4948050, the most downstream monitoring location in the implementation area. While not statistically significant, there is a slight visual decrease in loading for most samples during the 2013/2014 intensive monitoring as compared to pre-implementation loading.

Table 5-2. Total Phosphorus Summary Statistics for Monitoring Locations in Proximity to the Project Location (1990-Present).

Location ID	Location	Start	End	Count	Min (mg/L)	Avg (mg/L)	Max (mg/L)
4949150	SEVIER R BL PIUTE RES (EMAP)	5/3/1990	9/18/2014	29	0.01	0.06	0.24
4949131	Sevier R above Pine Ck at Bridge Xing E of Marysvale	10/23/2013	9/18/2014	12	0.01	0.07	0.17
4948950	SEVIER R AB CNFL / CLEAR CK AT 89 XING	1/9/1990	9/18/2014	109	0.01	0.09	0.75
4948200	SEVIER R N OF ANNABELLA	4/6/1994	4/6/1994	1	0.09	0.09	0.09
4948050	SEVIER R AT U119 XING E OF RICHFIELD	4/4/1996	9/18/2014	48	0.01	0.09	0.99

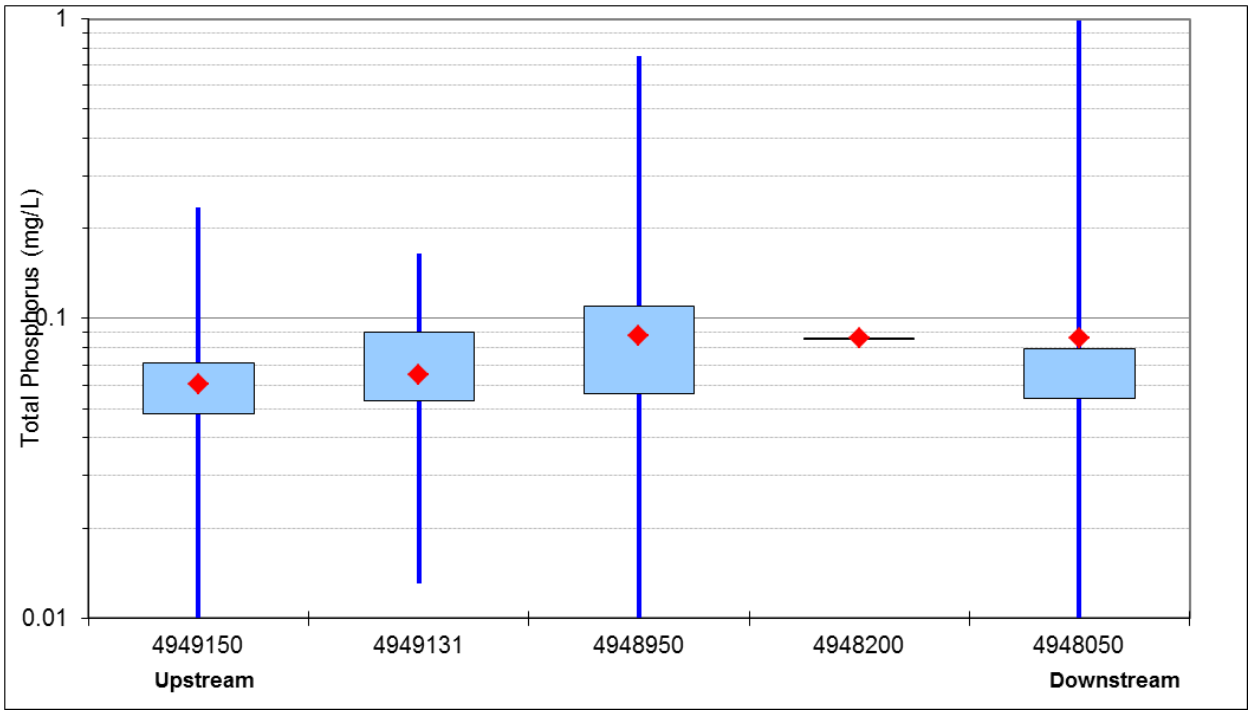

Figure 5-2. Total Phosphorus Summary Statistics for STORET Stations in Proximity to the Project Locations (1990 to Present).

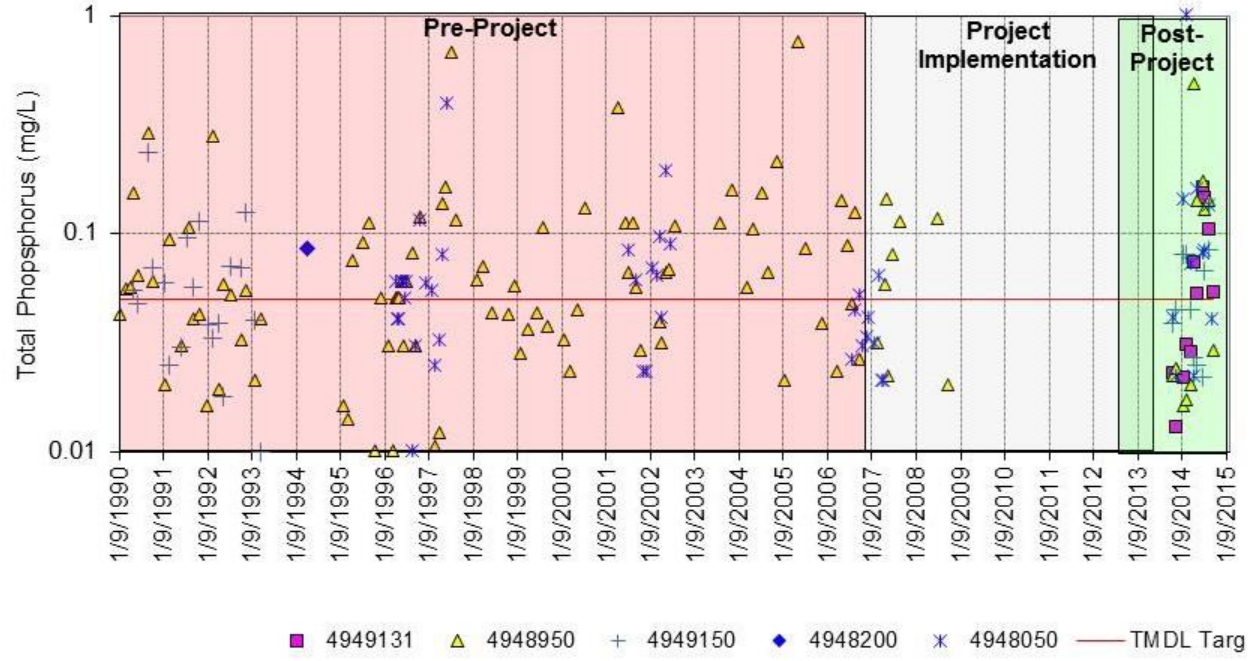

Figure 5-3. Total Phosphorus Concentrations for sites along the Sevier River (1990 to Present).

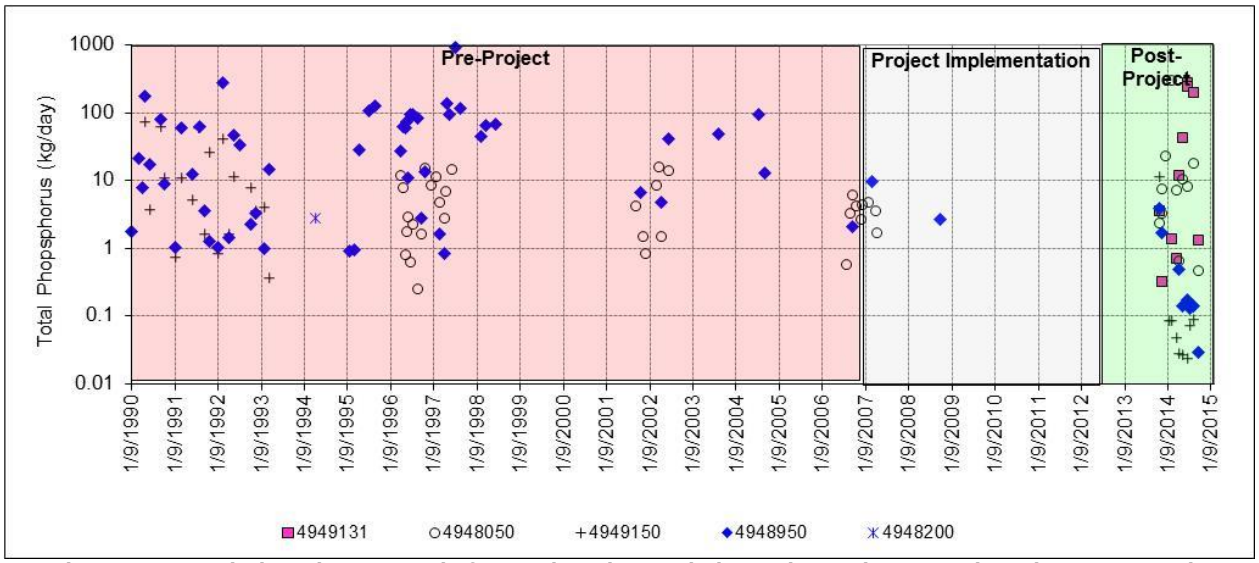

Figure 5-4. Total Phosphorus Loads for Stations in Proximity to the Project Locations (1990-Present).

5.2 Best Management Practice (BMP) Implementation Effectiveness

To help estimate the effectiveness of the feedlot repairs or replacements we used the Utah Animal Feedlot Runoff Risk Index (UAFRRI) worksheet. This Worksheet estimates the amount of nutrients taken out of the system through the improvements, and is attached in the Appendices. Also to estimate the

effectiveness of the streambank repairs we use the Spreadsheet Tool for the Estimation of Pollutant Load (STEPL). The following table shows these calculations:

Table 5-3. BMP Effectiveness for Implemented Projects.

Project #	Goal	Risk before	Risk after	Nitrogen Reduction (lbs/year)	Phosphorous Reduction (lbs/year)	Sediment (ton/yr)	BOD Reduction (lbs/year)
9	AFO	High	Low	374	1669	NA	15,232
11	AFO	High	Low	507	247	NA	1843
1	Streambank	High	Low	167.4	64.5	43.0	334.9
2	Streambank	High	Low	318.3	122.6	87.0	636.7
3	Streambank	High	Low	92.5	35.6	18.0	185.1
4	Streambank	High	Low	201.5	77.6	148.0	NA
5	Streambank	High	Low	1.3	0.5	0.53	NA
6	Streambank	High	Low	21.1	8.1	15.5	NA
7	Streambank	High	Low	44.8	17.2	32.9	NA
8	Streambank	High	Low	36.6	14.1	26.9	NA
10	Streambank	High	Low	35.0	13.5	25.7	1329.1
12	Streambank	High	Low	48.8	18.8		97.7
			Total	**5,216.3**	**2,288.5**	**3,97.53**	**19,658.5**

5.3 Surface Water Improvements

5.3.1 Chemical

As animals are removed from the corridor and stream banks are stabilized the amount of nutrients in the system will continue to decrease. With this decrease in nutrients other water quality standards will also improve such as dissolved oxygen.

5.3.2 Biological

With the implementation of the projects that have taken place the nutrients in the system should decrease. This decrease in nutrients should decrease algal blooms and improve dissolved oxygen conditions for other living organisms such as macroinvertibrates and fish.

5.3.3 Physical/Habitat

By stabilizing the banks of the rivers and allowing for vegetation to increase along the banks of the rivers, the habitat for fish and other riparian dwelling organisms will improve. Water temperatures could possibly decrease due to better shading along the river.

5.4 Other Monitoring

Utah Association of Conservation Districts (UACD) through the Sevier River Watershed Coordinator will continue to follow-up with cooperator to make sure proper management practices are implemented and to resolve any problems.

5.5 Results of BMP Operation and Maintenance Reviews

Best Management Practices (BMPs) for the Sevier River projects have focused on excluding animal access to the Sevier River and its tributaries. BMPs include fencing, improved watering systems, stream bank restoration and re-vegetation, and feedlot relocation projects. Managing manure and nutrient runoff has also been a priority BMP.

6.0 COORDINATION EFFORTS

The Sevier River Conservation Districts (District)through the Sevier River Watershed Coordinator provided oversight of project development, planning, implementation, approval, creation of fact sheets, administration and reporting. The following specific duties were transferred, as per Memoranda of Understanding, to the following agencies:

- Conservation Districts within the Sevier River Watershed approval as per project location.
- Natural Resources Conservation Service: technical assistance and follow-up when EQIP money is used.
- Department of Environmental Quality: oversight, project management.
- Utah Association of Conservation Districts through the Sevier River Watershed Coordinator administers contract, implementation, education, reporting, technical assistance.

6.1 Coordination with State and Local Agencies

The state and local agencies listed below helped carry out the projects by providing support in the following areas:

- Utah Department of Agriculture and Food (UDAF): I&E, technical assistance
- Utah Association of Conservation Districts (UACD): Administration, contracting, staff and technical support

6.2 Coordination with State Environmental Programs

The following State Environmental Programs supported the projects in the following areas:

- Utah Division of Water Quality: Standard program monitoring, technical assistance, 319 Grant Management
- Utah Division of Water Rights: Permits, advisory and monitoring assistance
- Utah Division of Water Resources: Advisory assistance

6.3 Coordination with Federal Agencies

The following federal agencies made key contributions to the project:

- EPA: Financial assistance, Clean Water Act Section 319
- USDA: Coordination with NRCS
- NRCS: Technical planning, design, and oversight in conjunction with EQIP participation.

7.0 SUMMARY OF PUBLIC PARTICIPATION

On October 5, 2010, a summer tour was sponsored by the NPS committee.? The group spent the day in Peterson creek, Salina creek and the Sevier valley area to observe and discuss the effects of excluding livestock from the streams by fencing, see the advantages of chaining the mountain pastures, to look at a completed animal feed lot with on-site watering facilities to see how the work will keep feed lot nutrients from the river channel. The tour also included a visit to the local oil field shipping site where the oil is loaded on trucks and shipped to the refineries. We also visited some of the sites where NRCS through the National Emergency Watershed Protection (EWP) river program made major river bank repairs.

8.0 ASPECTS OF THE PROJECT THAT DID NOT WORK WELL

At this time all aspects of the projects are working very well. All practices are functioning as designed and the owners are satisfied.

9.0 FUTURE ACTIVITY RECOMMENDATIONS

As funding becomes available there will be more projects to complete.

10.0 APPENDICES

1. Summary of UACD contracts

Table 10-1 . Summary of UACD Contracts and 319 Grants.

Project	Contract #	From	To	EPA	Match	Total	Projects	EPA Remaining
FY 06	07-1034	3/21/07	12/31/11	**$139,470**	**$92,980**	**$232,450**	7	$0
FY 07	08-1218	7/21/10	12/31/11	**$105,210**	**$70,140**	**$175,350**	4	$0
FY 08	09-1031	5/27/09	6/19/12	**$137,085**	**$91,390**	**$228,475**	2	$0
FY 09	10-0421	7/26/10	10/17/13	**$44,983.26**	**$27,988.84**	**$72,972.10**	3	$0
Totals:				**$426,748.26**	**$284,498.84**	**$709,247.10**	16	$0

*Utah Animal Feedlot Runoff Risk Index Worksheet

Landowner:	WF Ranches-#09	**Weather Station:**	Richfield Radio
Location:	Aurora	**HUC:**	14070003
Planner:	Monte Turner & Lynn Koyle	**Precipitation:**	8.6
Date:	April 26, 2012		

Lot Description:	Dirt w/concrete feed bunks			
Planning Scenario:	**Before**	**After**	**Before**	**After**
Lot Size (Sq. Ft.):	875000	613000		
Surface Type:	Dirt	Dirt		
Animal Type:	Beef (Feeder)	Beef (Feeder)		
No. of Animals:	450	450		
Avg. Weight:	700	700		
Days Confined:	150	150		
Sq.Ft./Animal:	1944.4	1362.2		
Feedlot Features				
Runoff Containment	40	0		
Distance to Water	16	16		
% Slope	6	6		
Vegetation	8	1		
Clean H_20 Diversion	4	0		
Index and Risk Level				
Index:	74.0	23.0		
Risk Level:	High	Low		
Manure Management and Conservation Practices				
Haul/Scrape Frequency	Annually	Annually		
Practices to be implemented	Dike has been installed. Pipeline and water troughs have also been installed. River is now fenced off.			
Loading Calculations				
Fresh Manure (tons)	1,392	1,392		
Total N Available (lbs)	8,056	8,056		
Total P Available (lbs)	3,872	3,872		
Total BOD_5 Available (lbs)	35,343	35,343		
Precipitation Factor	0.68	0.68		
Lot Surface Factor	0.90	0.90		
Risk Factor	0.80	0.10		
Total N Loading (lbs)	3,968	496		
Total P Loading (lbs)	1,907	238		

Total BOD_5 Loading (lbs)	17,408	2,176		

*Individual high risk features should be evaluated and conservation practices applied where Possible. All runoff from a 25-year, 24-hour storm event must be contained on the lot.

Practices that might be implemented:

Move Lot	Install Dike	Install Filter Strip
Regrade Lot	Install Diversion	Roof Runoff System
Build Storage	Increase Sq.Ft./Animal	Change Hauling Frequency
Increase Storage		

*Utah Animal Feedlot Runoff Risk Index Worksheet

Landowner:	Lee Christensen	**Weather Station:**	Richfield Radio
Location:	1 mile West of Salina	**HUC:**	16030003
Planner:	Lynn M. Koyle	**Precipitation:**	8.6
Date:	July 25, 2012		

Lot Description:	Soil, on bank of Sevier River			
Planning Scenario:	**Before**	**After**	**Before**	**After**
Lot Size (Sq. Ft.):	44,800	44,800		
Surface Type:	Dirt	Dirt		
Animal Type:	Beef (Cow)	Beef (Cow)		
No. of Animals:	60	60		
Avg. Weight:	1200	1200		
Days Confined:	90	90		
Sq.Ft./Animal:	746.7	746.7		
Feedlot Features				
Runoff Containment	40	0		
Distance to Water	16	16		
% Slope	1.5	1.5		
Vegetation	8	8		
Clean H_20 Diversion	4	0.5		
Index and Risk Level				
Index:	69.5	26.0		
Risk Level:	High	Low		
Manure Management and Conservation Practices				
Haul/Scrape Frequency	Annually	Annually		
Practices to be implemented	Dike-356, Fence-382, pipeline-516, Water Trough-614			
Loading Calculations				
Fresh Manure (tons)	205	205		
Total N Available (lbs)	1,176	1,176		
Total P Available (lbs)	573	573		
Total BOD_5 Available (lbs)	4,277	4,277		
Precipitation Factor	0.68	0.68		
Lot Surface Factor	0.90	0.90		
Risk Factor	0.80	0.10		
Total N Loading (lbs)	579	72		
Total P Loading (lbs)	282	35		
Total BOD_5 Loading (lbs)	2,106	263		

*Individual high risk features should be evaluated and conservation practices applied where possible. All runoff from a 25-year, 24-hour storm event must be contained on the lot.

Practices that might be implemented:

Move Lot	Install Dike	Install Filter Strip
Regrade Lot	Install Diversion	Roof Runoff System
Build Storage	Increase Sq.Ft./Animal	Change Hauling Frequency
Increase Storage		