CLEAN WATER ACT SECTION 319
NONPOINT SOURCE POLLUTION CONTROL PROGRAM
WATERSHED OR DEMOSTRATION PROJECT FINAL REPORT

UPPER SEVIER RIVER WATERSHED

BY

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

Grant # 10-0422

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1.0 Executive Summary

Projects in the Upper Sevier Watershed have been going on the ground for over ten years. The first projects were implemented in 2004. The Upper Seveir Watershed project was a collaboration of many different entities and partnerships. The initial funding for watershed coordinator positions and initial project implementation came from a EPA Targeted Watershed grant. From there the Upper Sevier Watershed Committee, Upper Sevier CD, Utah DWR, and Garfield County kept the ball rolling through 319 and other funding, although 319 has been the main contributor to the on the ground projects and Watershed Coordinator funding.

Water quality improvements under the Upper Sevier Watershed began in October 2004. The need for funding arose as more attention was given to how much various agricultural practices within the watershed impacted water quality within the Upper Sevier watershed. Due to the importance of the Upper Sevier Watershed the majority of the grant funding was used to directly reduce sedimentation and nutrient loads (primarily phosphorous) into the head waters of the Sevier River.

The primary goals of this grant have been to reduce nutrient and sediment loading through irrigation practices, cattle management, and riparian area enhancements to further reduce sediment and nutrient runoff. These goals have largely been accomplished through the implementation of the following Best Management Practices (BMPs):

- providing off-stream watering facilities for livestock
- installing water conveyance pipelines
- fencing off and vegetating of critical riparian areas
- improving efficiency of irrigation systems in areas with high erosion rates
- informing and educating the community about non-point source pollution
- promoting improving water quality improvements within the watershed

Most projects in the Upper Sevier Watershed have focused on removing livestock from stream banks by installing livestock management fence and developing off stream water sources. The installation of livestock management fence kept livestock from continually being located on the stream banks and reduced nutrient and sediment loading. Several bank stabilization projects have been implemented reducing sediment loads into the river system. The installation of improved irrigation systems has also reduced runoff and soil erosion.

The primary informational and educational activities for Upper Sevier projects have been the distribution of a semiannual news letter letting local producers and the general publics know about the successful projects that have been implemented in the watershed. Public meetings were held regarding the availability of financial assistance to local producers. There has also been a natural resource field day established, a fall watershed tour, and an Upper Sevier Watershed Days. These field days focus on watersheds including water quality, wildlife, and soils.

The above goals were achieved through several resilient partnerships. The Upper Sevier Conservation District has been very vocal in their support of projects that target water quality and they have continually encouraged local producers to make water quality a priority within their operations. The Utah Division of Water Quality has been a strong supporter in this cause through supplying monitoring equipment and lab analysis support. Many of the BMP’s installed within these projects have come from producer contracts with the Natural Resources Conservation Service (NRCS), who provided planning and engineering support. Utah State University Extension has worked side by side with the conservation districts and NRCS to provide technical support and outreach education in an effort to raise awareness of the impacts that agricultural practices has on water quality. Stan Beckstrom of the Utah DWR has been instrumental in helping plan, engineer, and recruit producers for water quality projects completed with these funds.

Figure 1-1. Location and Extent of Projects completed for FY 2004 through FY 2009.

1.1 Project Funding Summary

UDAF contract # 05-1643 (Fiscal Year 2004)

Start Date: July 6, 2005 Completion Date: December 31, 2007
Total Budget ..... $ 491,000.00
Total EPA 319 Grant ..... $ 249,600.00
Total Expenditures of EPA Funds ..... $ 49,600.00
Total 319 Match ..... $ 196,400.00

UDAF contract # 06-1021 (Fiscal Year 2005)

Start Date: November 15, 2007 Completion Date: September 30, 2010
Total Budget ..... $ 375,000.00
Total EPA 319 Grant ..... $ 225,000.00
Total Expenditures of EPA Funds ..... $ 225,000.00
Total 319 Match ..... $ 150,000.00

UDAF contract # 08-1219 (Fiscal Year 2007)

Start Date: July 1, 2008 Completion Date: September 30, 2012
Total Budget ..... $ 381,666.67

Total EPA 319 Grant ..... $ 229,000.00
Total Expenditures of EPA Funds ..... $ 229,000.00
Total 319 Match ..... $ 152,666.67

UDAF contract #10-0422 (Fiscal Year 2009)

Start Date: November 23, 2010 Completion Date: November 1, 2013
Total Budget ..... $ 204,650.00
Total EPA 319 Grant ..... $ 122,790.00
Total Expenditures of EPA Funds ..... $ 122,790.00
Total 319 Match ..... $ 81,860.00

1.2 FY 2009 Project Expenditures and Match.

Table 1-1. FY 2009 OTG, Technical Assistance, I&E Project Expenditures, and Match.

10-0422	Invoice Number	Date	Amounts	Match	Total
On-the-ground			$111,470.00	$77,429.82	$188,899.82
UACD Admin			$11,320.00	$4,093.33	$15,413.33
Total		**5/4/2014**	**$122,790.00**	**$81,523.15**	**$204,313.15**
Steve Garrett	11080	11/23/2010	$7,967.11	$5,311.41	$13,278.52
Tim Westwood	11186	5/11/2011	$71,419.36	$47,612.91	$119,032.27
UDWR – UT Watershed Restoration Initiative	12109	1/25/2012	$30,035.25	$20,023.50	$50,058.75
Greg Excell Maintenance			$2,048.28	$4,482.00	$6,530.28
On the Ground Total			**$111,470.00**	**$77,429.82**	**$118,899.82**
Admin FY 07			$5,180.00	$0.00	$5,180.00
Admin	12165	6/19/2012	$6,140.00	$4,093.33	$10,233.33
Technical Assistance/Admin			**$11,320.00**	**$4,093.33**	**$15,413.33**
Total Spent			**$122,790.00**	**$81,523.15**	**$204,313.15**

2.0 Introduction

2.1 General Location

The Upper Sevier River Basin is a 1,324,899 acre area covering the headwaters of the Sevier River in Beaver, Garfield, Iron, Kane, Wayne and Piute Counties of south-central Utah. The upper reaches of the Sevier River drain much of the southern portions of the High Plateaus section of the Colorado Plateau Province. The Sevier River and its main tributary, the East Fork Sevier River, flow northward cutting a trough through the center of the High Plateaus section with a broad, flat north-south trending fault-controlled valley (Fig. 1-1).

2.2 Basin Location and Classification

The basin is classified according to Hydrologic Unit Code (HUC). The Upper Sevier River Basin is part of the Great Basin Region (3rd Level HUC Unit 160300) and is bordered to the south by the Lower Colorado Region and to the East by the Upper Colorado Region (Figure 1-1). The Upper Sevier River Basin is important to local communities for commodity production as well as for recreational opportunities. People from urban areas such as the Wasatch Front (Salt Lake City area) and Las Vegas use the area mainly for recreation, while livestock grazing is among one of the oldest land uses in the region, contributing important cultural and social values to the area.

2.3 Major Land Resource Areas

Almost 94 percent of the basin is within the Wasatch and Uinta Mountains Plateau Major Land Resource Area (MLRA), while the remaining 6 percent falls within the Great Salt Lake Plateau MLRA. MLRA's are classified by the U.S. Department of Agriculture (USDA) according to geographically associated units with dominant physical characteristics of topography, climate, hydrology, soils, land use, and potential natural vegetation.

2.4 County Location

Although 73 percent of the basin is located in Garfield County, it accounts for only 28 percent of the total county acres. Garfield County derives 20 percent of its income from agriculture. Only 9 percent of the watershed is located in Piute County (26 percent of total county acres), 8 percent in Kane County (4 percent of total county acres), 8 percent in Iron County (5 percent of total county acres), and less than one percent in Beaver and Wayne Counties (less than 1 percent of total county acres) (**Error! Reference source not found.**). Major communities within the watershed include: Panguitch, Antimony, Hatch, Circleville, Kingston, and Long Valley Junction. Urban-interface type subdivisions within the Dixie National Forest include those at Panguitch Lake, Mammoth Creek, and Duck creek.

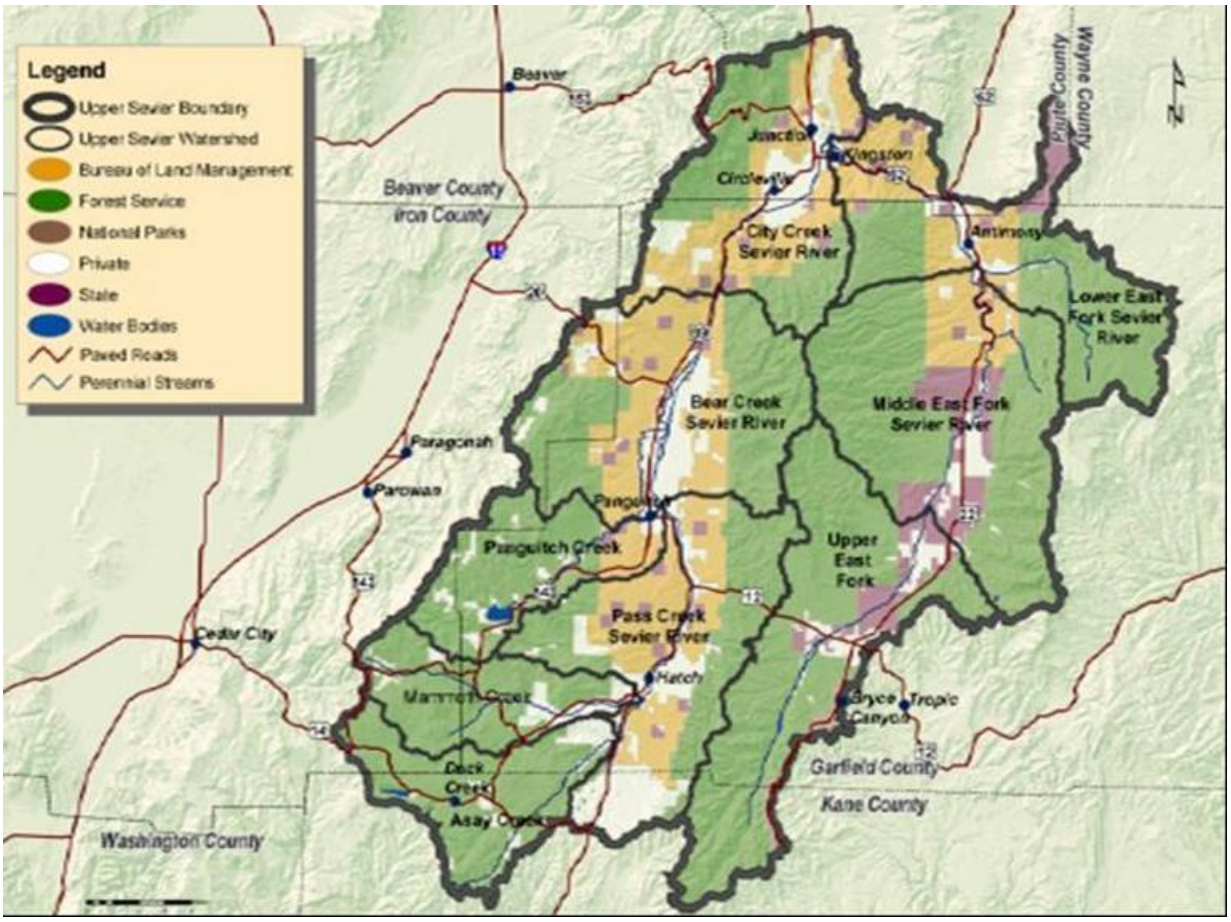


Figure 2-1. Location of the Upper Sevier River Watershed.

2.5 Water Quality Priority

The Upper Sevier River is on Utah's Department of Environmental Quality (DEQ) list of priority watersheds in need of action to resolve non-point source water quality impacts. Several water bodies within the watershed are on the state's 303(d) list; identified as partially supporting of one or more of its beneficial uses. 303(d) listed waters within the watershed are the Sevier River from near Circleville to the confluence of Mammoth Creek (~113 miles), the East Fork Sevier River from the confluence with the Sevier River to Antimony Creek (~25 miles), Otter Creek Reservoir, Piute Reservoir, Panguitch Lake and Navajo Lake (the first three are eutrophic lakes). The Utah DEQ, Division of Water Quality has completed EPA approved Total Maximum Daily Load (TMDL) plans for these waterbodies in the Upper Sevier River Watershed.

The impaired beneficial use for waters on the 303(d) list is 3A – cold water fishery. The Utah Division of Water Quality has identified impairment causes to be high concentrations of total phosphorus and sediment, and habitat alterations for the streams, and total phosphorous and dissolved oxygen for the lakes.

This Project Implementation Plan (PIP) outlines actions and several specific projects to address reducing inputs and sources of phosphorus and sediment, and restoring habitat alterations. With the support and direction of the Upper Sevier Steering Committee, demonstration projects were implemented to restore and enhance fish habitat and riparian vegetation, stabilize eroding stream banks, apply BMPs for livestock management, and improve irrigation systems and vegetation on rangelands and pastures to reduce sediment and nutrient runoff. These strategies will lead to the recovery and enhancement of the cold water fishery. By successfully demonstrating the benefits of these practices to area landowners,

producers, and stakeholders, we have encouraged them to adopt and implement similar activities to address water quality problems in additional areas.

2.6 Project Goals

The overall project goals are to implement actions that improve water quality and restore and enhance the cold water fishery and aquatic life by: Goal 1) stabilizing stream banks, enhancing riparian vegetation creating fish habitat; Goal 2) improving upland vegetative cover; Goal 3) improving pasture condition, installing irrigation systems, using management practices, and improving livestock management in riparian areas. These actions will reduce sediment and phosphorous loads from eroding stream banks, uplands, pastures and irrigation returns. It will also help restore habitat alterations on streams to a more natural condition with functioning floodplains correct patterns, profiles, and dimensions, as well as creating in stream cover and structure for fish habitat.

As restoration and enhancement projects are completed and exhibited to the public through tours, workshops and newsletters, we hope to encourage the adoption and implementation of additional activities and projects to address water quality problems in the entire watershed. Eventually, continued project implementation will lead to these waters being fully supportive of cold water fisheries and associated water quality standards.

The two TMDLs developed for the watershed list end points and NPS load reductions necessary to achieve water quality objectives. Actions and projects that will reduce phosphorous and sediment inputs and restore aquatic habitat will help achieve the goals of the TMDL. A shift in macro invertebrate species composition from group 3 taxa, tolerant of pollutants (sediment), to group 2 taxa that are somewhat tolerant of pollutants and are found in good to fair water quality, would indicate a reduction in sediment and phosphorous. Reductions in sediment can also be related to the miles of eroding stream banks that have been stabilized. Improvement in habitat alterations can be measured by miles of stream bank restored and fish habitat improved, as well as increases in abundance, distribution and reproduction of fishes. Acres of treated rangelands and pasture can be related to reductions in sediment and phosphorous inputs. These are measurable objectives that will be achieved by demonstration projects. Baseline data on fisheries and macro invertebrates will be collected to help determiner TMDL and objective endpoints.

3.0 Project Goals, Objectives, and Accomplishments

3.1 Goal #1: Improve the stability of the stream channel and stream banks and create fish habitat that will improve water quality and reduce and restore habitat alterations. Restore at least 25 miles of stream over the next ten years such that they are fully supportive of a cold water fishery.

Objective 1: Plan, design and implement stream restoration projects in five locations. These projects will restore the natural geomorphic conditions of the river including: the correct and functional stream channel width/depth ratios, meander pattern and floodplains, stable vegetated banks with undercut banks, woody riparian vegetation, in-stream rock and woody structure and cover for fish habitat, and improved livestock management. BMPs for livestock management will include fencing, watering sites, rest/rotational grazing, management of timing and season of use, off-stream watering, etc. These specific projects will reduce pollutant loading by 27,000 kg of sediment and ~150 kg phosphorus and improve the cold water fishery habitat on ~ 6.5 miles of river over the next three years. Stream restoration practices to be implemented will utilize heavy machinery to slope back and stabilize vertical eroding banks, construct new meanders, install rock vanes and barbs, root wads, large logs, juniper and willow revetments, coconut erosion control fabric, dormant willow cuttings and bare root stock planting, reseeding, and fencing for livestock management.

3.1.1 FY 2004

Task 1 Project 1: East Fork Sevier River, Black Canyon #8 on UDWR and BLM Lands.
Vertical eroding stream banks were sloped back and rock vanes, cross-vanes, root wads, large logs, erosion control fabric and juniper revetment were placed or anchored along outside banks to stabilize soils and prevent erosion and allow new vegetation to become well established. Several floodplains were built and the stream narrowed and deepened. 4,000 feet of stream had improvement work completed. About 6 acres of ground disturbed during construction was reseeded. Dedicated Hunter volunteers planted hundreds of bare root trees and shrubs of narrow leaf cottonwood, red-osier dogwood, water birch, chokecherry and golden current and several thousand willow stake cuttings along stream banks and disturbed areas.

Project funding:

UDWR Habitat Council	$ 49,692.00
EPA 319	$ 32,808.00
Total	$ 82,500.00

Task 1 Project 2: East Fork Sevier River, Black Canyon #9 on UDWR Easement Property. In fall 2006 two excavators and a front-end loader were used remove sediment and gravel deposited in the stream channel during spring 2005 flooding and restore channel widths, depths and meander pattern. Eroding stream banks were sloped back and shaped and floodplains constructed at appropriate elevations and locations. UDWR Dedicated Hunter volunteers planted about 3,000 seedling trees and shrubs and hundreds of willow cuttings along stream banks on the project area and on upstream projects. Species planted included water birch, red-osier dogwood, cottonwood, box elder, chokecherry and golden current. The total length of stream that had some type of enhancement work completed was about 3,500 feet.

Project funding:

UDWR Blue Ribbon Fisheries program	$ 26,420.00
UDWR Habitat Council	$ 26,420.00
EPA 319	$ 35,181.00
Total	$ 88,021.00

Task 1 Project 3: East Fork Sevier River, Kingston Canyon-Neary Property. Project work was begun in fall of 2006, but cold winter weather shut the project down. The project was completed in spring of 2007. Approximately 1,000 cubic yards of large rock was moved from the UDWR rock quarry in Kingston Canyon to the Neary Property. Two excavators, a front-end loader and dump trucks were used to slope back and shape eroding stream banks, install large rock along banks as J-hook vanes, install a combination of rock and large logs (24" DBH X 50' long) as vanes and bank protection, shape channel to appropriate widths and depths and construct floodplains. The total length of stream that had some type of work completed was about 6,000 feet. 8,000 feet of fence was built, with livestock water lane, stream crossing and gates, to enclose about 25 acres of riparian and to manage livestock grazing along the stream while vegetation establishes and matures. All disturbed ground was reseeded with a native grass mixture. UDWR Dedicated Hunter volunteers planted 1,200 seedling trees and shrubs and hundreds of willow cuttings along the stream banks. Species planted included water birch, red-osier dogwood, cottonwood, box elder, chokecherry and golden current.

Project funding:

EPA 319	$ 37,500.00
NRCS EQIP	$ 46,375.00
UDWR Habitat Council	$ 31,697.00
Targeted Watershed Grant	$ 2,020.00
Total	$117,592.00

Task 1 Project 4: John Orton River Restoration main stem Sevier River. During the flood of 2005 the Orton Ranch had several acres of land wash down the Sevier River due to record high runoff. Several tons of sediment were washed into the river system when ten to fifteen foot cut banks sheared off leaving a huge oxbow out into the landowner's alfalfa field. Project work began in the fall summer of 2007, and the project was completed in the fall of the same year. A bulldozer and a large excavator were brought in and used to revert the river into the original channel, slope banks, and shape eroding banks, shape channel to appropriate widths and depths and construct a large flood plain. A small lay back wall was installed in the upper end of the river stretch to help hold the river in the channel until proper vegetation could be established. Several Rock Barbs were then installed along the river stretch to help keep volatile banks from eroding away until vegetation could be established to help stabilize banks. The particular stretch was approximately a thousand feet long. 750' of fence was installed to limit cattle access to the river and manage cattle grazing throughout the lifetime of the project. Approximately 2.5 acres of ground was reseeded with native riparian grasses, trees and shrubs were also planted along the river corridor.

Project funding:

EPA 319	$37,374.49
In-kind match	$24916.33
Total	$62,290.82

Task 1 Project 5: Lamar Jolley River Restoration Project main stem Sevier River.
During the flood of 2005 the East Panguitch Irrigation Company lost their diversion dam due to record high runoff, this made it impossible to control the amount of water entering their canal structure which flows through the Lamar Jolley property. This coupled with record high spring flows throughout the river system completely flooded Lamar's' property and eroded banks throughout the river stretch. In the fall of 2007 a front end loader and large excavator were used to slope banks, reconstruct the river channel, reconstruct flood plane, and install rock veins, j-hooks, and grade control structures (cross veins) to keep the river from eroding. The project was completed in two phases, an upper phase and a lower phase. The Upper phase (above bridge) is approximately 2,800 feet, whereas the lower portion (below bridge) is approximately 2,545 feet. Bank sloping above bridge consisted of approximately 1,360 feet of eroding banks, whereas the lower portion consists of 1,930 feet, giving us total of 3,290 feet of banks that were sloped, seeded, and stabilized with rock structures.

Seven hundred and twenty tons of rocks were installed in the upper section. These were placed in several rock veins, a lay back wall, and one jay hook. These should help stabilize the eroding banks that were also shaped at a two to one slope until the new riparian grasses, willows, and trees can have a chance to establish.

The lower section included over a thousand tons of rocks strategically placed in twenty-two rock veins. Several logjams were also installed to provide shading for fish habitat. They will also help stabilize eroding banks that were sloped to help dissipate the energy created during high spring and monsoon flows. The riparian corridor was also fenced to create a rotational grazing scenario that will help the banks recover and create additional pastures for sheep and other animals. Thus animals can use riparian grasses in opportune times of the year without being in the key riparian areas year round.

Landowner participation was a key element to the success of this project. Lamar worked very hard to improve the riparian corridor through his property. This will help fish and wild game habitat for years to come. It should also improve riparian vegetation on Lamar's farming operation.

Project funding:

EPA 319	$79,374.00
In-kind match	$52,916.00
Total	**$132,290.00**

Task 1 Project 6: Rick Gleave/ Earth Quake Ranch in Black Canyon Project. Project work began in the spring of 2007 while flows were still low before spring runoff. 2,000 feet of eroding stream banks were stabilized by installing about 29 rock vanes or barbs, about 140 feet of juniper tree revetment and sloping the banks to a minimum 2:1 slope. All disturbed areas were reseeded and willows and other woody riparian vegetation planted. The area was rested from livestock grazing for 2 years or until new vegetation is well established. The stream alignment will not be changed. All banks needing treatment will be stabilized at their current location. An excavator with thumb attached was used for placing rock and sloping banks. The piece of land is so long and narrow that it seemed not to be cost effective or practical for the landowner to fence off the river, both sides would have to be fenced in order for the landowner to utilize the pasture land. The landowner agreed to rest the pasture for two years and then fall graze thereafter.

3.1.2 FY 2005

Task 1 Project 1: East Fork Sevier River, Black Canyon on private landowner Creston Blacks property. The project should improve water quality and stream functions, aquatic habitat, riparian vegetation, and the overall health of the watershed. Fish populations should increase because of improved habitat, riparian vegetation and overall stream condition. Eroding stream banks will be stabilized. Willows and woody riparian trees and shrubs were planted.

Product: During fall of 2009, excavators, front-end loader and 10-wheel dump trucks were used to complete the stream improvement project. Dump trucks hauled approximately 1,300 yards of rock from the BLM Red Canyon rock pit to Black Canyon. Vertical eroding stream banks were sloped back and rock vanes, cross-vanes, root wads, large logs, erosion control fabric and juniper revetment were placed or anchored along outside banks to stabilize soils and prevent erosion and allow new vegetation to become well established. Several floodplains were built and the stream narrowed and deepened. 3,680 feet of stream had improvement work completed. Hundreds of willow clumps and willow stakes were planted as the project progressed. Water Birch and Dogwood that was displaced during construction was also replanted. Several thousand willow stake cuttings were also planted along stream banks and disturbed areas. Both sides of the river corridor were fenced to protect stream length from cattle grazing. Watering lanes were added to give cattle access to water. The fenced enclosure will be rested from cattle grazing for five seasons then be grazed for short durations thereafter.

Project funding:

In-kind match	$ 49,692.00
EPA 319	$ 57,010.20
Total	$ 82,500.00

Task 1 Project 2: Greg Excell main stream Sevier River Project.

Product: In fall 2010 an excavator and a front-end loader were used remove sediment and gravel deposited in the stream channel. Eroding stream banks were sloped back and shaped and floodplains constructed at appropriate elevations and locations. Approximately 345 tons of large rock was placed along banks as J-hook vanes and a combination of rock, large logs (24" DBH X 50' long) and root wads were used as vanes and bank protection. All disturbed ground was reseeded with a native grass mixture. Willows, trees, and riparian woody species will be planted on both sides of the stream bank this spring. About 1,055 feet of stream bank was treated.

Project funding:

In-kind match	$ 13,212.00
EPA 319	$ 19,818.00
Total	$ 33,030.00

Objectives:
The project should improve water quality and stream functions, aquatic habitat, riparian vegetation, and the overall health of the watershed. Fish populations should increase because of improved habitat, riparian vegetation and overall stream condition. Eroding stream banks will be stabilized. Willows and woody riparian trees and shrubs were planted.

Project summary:

During fall of 2005, excavators, front-end loader and 10-wheel dump trucks were used to complete the stream improvement project. Dump trucks hauled approximately 1,300 yards of rock from the BLM Red Canyon rock pit to Black Canyon. Vertical eroding stream banks were sloped back and rock vanes, cross-vanes, root wads, large logs, erosion control fabric and juniper revetment were placed or anchored along outside banks to stabilize soils and prevent erosion and allow new vegetation to become well established. Much of the stream channel was reshaped to the proper width/depth ratios. Several floodplains were built and the stream narrowed and deepened. 4,000 feet of stream had improvement work completed. About 6 acres of ground disturbed during construction was reseeded. In April Dedicated Hunter volunteers planted hundreds of bare root trees and shrubs of narrow leaf cottonwood, red-osier dogwood, water birch, chokecherry and golden current and several thousand willow stake cuttings along stream banks and disturbed areas.

Project funding:

UDWR Habitat Council	$ 49,692.00
EPA 319	$ 12,830.43
In-kind match	$ 8,553.62
Total	$ 71,076.05

Project funding:

EPA 319	$ 37,500.00
NRCS EQIP	$ 46,375.00
UDWR Habitat Council	$ 31,697.00
Targeted Watershed Grant	$ 2,020.00
Total	$117,592.00

3.1.3 FY2007

Task 1 Project 1: Horton/Westwood Project. The project should improve water quality and stream functions, aquatic habitat, riparian vegetation, and the overall health of the watershed. Fish populations should increase because of improved habitat, riparian vegetation and overall stream condition. Eroding stream banks will be stabilized. Willows and woody riparian trees and shrubs were planted.

Product: During fall of 2012, excavators, front-end loader and 10-wheel dump trucks were used to complete the stream improvement project. Dump trucks hauled approximately 1,200 cubic yards of rock from a private property owner near the project. Vertical eroding stream banks will be sloped back and rock vanes, cross-vanes, root wads, large logs, erosion control fabric and juniper revetment will be placed or anchored along outside banks to stabilize soils and prevent erosion and allow new vegetation to become well established. 3,680 feet of stream had improvement work completed. Hundreds of willow clumps and willow stakes will be planted as the project progresses. Water Birch and Dogwood that was displaced during construction was also replanted. Several thousand willow stake cuttings were also planted along stream banks and disturbed areas. Both sides of the river corridor were fenced to protect stream length from cattle grazing. Watering lanes were added to give cattle access to water. The fenced enclosure will be rested from cattle grazing for five seasons then be grazed for short durations thereafter. Project photos are presented in **Error! Reference source not found.**and **Error! Reference source not found.**.

FY 2007 Project funding:

In-kind match	$ 3,520.00
EPA 319	$ 74,000.00
State NPS	$ 50,000.00
Total	$127,520.00

Figure 3-1. Horton/Westwood Stream Restoration Project Location.

3.1.4 FY 2009

Task 1 Project 1: East Fork Sevier River, Tim Westwood property. The project should improve water quality and stream functions, aquatic habitat, riparian vegetation, and the overall health of the watershed. Fish populations should increase because of improved habitat, riparian vegetation and overall stream condition. Eroding stream banks will be stabilized. Willows and woody riparian trees and shrubs were planted.

Product: Excavators, front-end loader and 10-wheel dump trucks were used to complete the stream improvement project. Dump trucks hauled approximately 1,200 yards of rock from the BLM Red Canyon rock pit to Black Canyon. Vertical eroding stream banks were sloped back and rock vanes, cross-vanes, root wads, large log revetment were placed or anchored along outside banks to stabilize soils and prevent erosion and allow new vegetation to become well established. Several floodplains were built and the stream narrowed and deepened. 3,680 feet of stream had improvement work completed. Hundreds of willow clumps and willow stakes were planted as well as 600 trees and woody plants were planted by dedicated hunters and youth conservation core employees as the project progressed. Water Birch and Dogwood that was displaced during construction was also replanted. Several thousand willow stake cuttings and native grasses were also planted along stream banks and disturbed areas. Both sides of the river corridor were fenced to protect stream length from cattle grazing. Watering lanes were added to give cattle access to water. The fenced enclosure will be rested from cattle grazing for five seasons then be grazed for short durations thereafter.

FY 2009 Project funding:

In-kind match	$ 47,612.91
EPA 319	$ 71,419.36
Total	$ 119,032.27

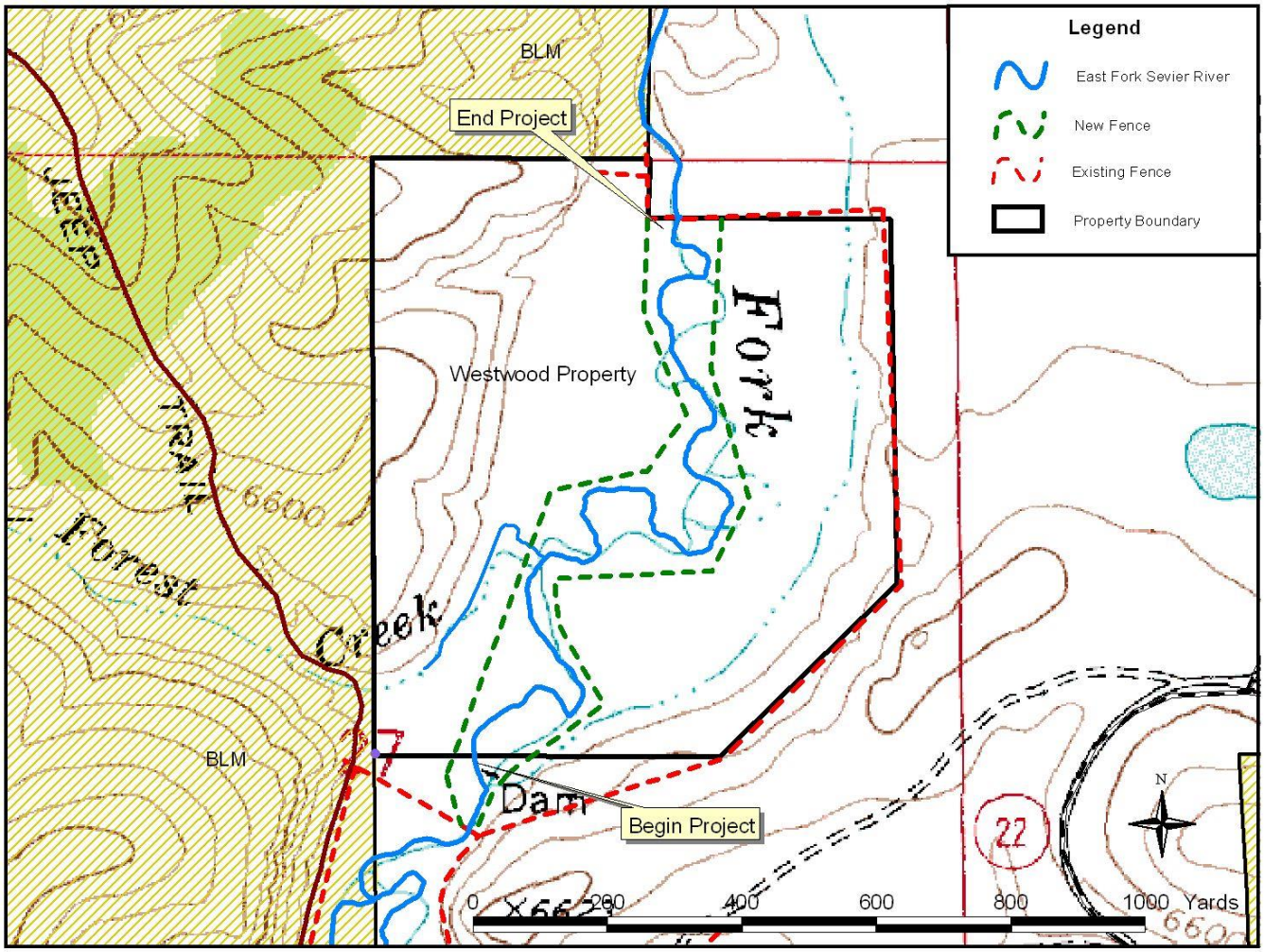


Figure 3-2. Westwood Stream Restoration Project Map.

Tasksk 2 Project 1. Black Property Stream Enhancement, East Fork Sevier River. In the original PIP, the Black property was also included as a potential project. During this time the Upper Sevier received a Targeted Watershed Grant and this project was completed with these monies.

Project 2. Division of Wildlife Resources Watershed Restoration Initiative Project.

Upper Sevier River Enhancement - RB

Utah's Watershed RESTORATION INITIATIVE

Project ID: 1743 **Status**: Complete **Fiscal Year Completed:** 2011

Description: Implement actions to stabilize eroding stream banks, improve fish habitat in the stream and plant and establish woody riparian vegetation.

Location: 7 miles south of Panguitch on the Sevier River, Garfield County

Project Manager: Stan Beckstrom
PM Agency: Utah Division of Wildlife Resources
PM Office: Southern Region

Lead Agency/Organization: Utah Division of Wildlife Resources
UWRI Region: Southern
Start Date: 10/12/2010 **End Date**: 6/30/2011

Final Methods: UDWR heavy equipment crew used 10-wheel dump trucks to haul rock from a stockpile site 3 miles to the project and dumped the rock at several locations along the Sevier River project area. A front-end loader was used to move the rock to specific locations on the stream banks where structures would be built. A Cat 320 sized excavator with thumb attachment was used to place rock and logs in the stream to build rock vanes and other habitat features and for sloping back vertical banks. Two logging truck loads of large logs were purchased through the state bid process and delivered to the project site. Some large juniper trees from the project area were dug up and placed in the stream for fish habitat. The Utah Conservation Corp was hired to plant willow stake cuttings and bare root seedlings. Bare root seedlings were purchased from Lawyer Nursery in Montana. Disturbed areas were seeded with a grass/forb mixture and covered by dragging a chain harrow around behind an ATV. New fencing was constructed to implement livestock grazing management. Fencing was bid out through state purchasing.

Project Narrative: The project was completed as planned except for the last meander bend, which did not have any work completed. We ran out of rock and time to complete work on the last outside meander bank that was vertical and eroding. The last bank was sloped back, but high water in spring of 2011 eroded all sloping and moved the bank back so it is vertical and continues to erode. Approximately 3,500' of vertical eroding banks were sloped back and rock and log structures built to prevent further erosion and create fish habitat. Approximately 70 rock and large log J-hook vanes were constructed. Many of these features were improved for habitat by adding additional logs and juniper trees to the structures. Two logging truck loads of logs, 20 large root wads and ~20 large juniper trees were placed in the stream for habitat and erosion control. Several wide riffle sections with mid-channel bars were narrowed down and willow clump transplants, logs and rock used to keep the channel at proper width. Pools were excavated below structures and point bars built out to narrow the channel. All soils and work areas were smoothed out and blended into adjacent contours. All disturbed areas were reseeded and the seed covered by dragging a chain harrow, except some banks were too steep and tall to cover with the chain harrow. Seeding was very successful the following summer. The Utah Conservation Corp planted several thousand 2' long willow stake cuttings in the fall and more again in spring 2011. The UCC crew also planted about 2,000 woody riparian bare root trees and shrubs. With the wet spring and early summer the seedlings have done very well. A private fence contractor was hired and constructed 6,750' of new fencing for livestock grazing management. The fence included steel gates, three stream crossings, one cattle guard and climb-over access stiles. Spring runoff in 2011 peaked at 1,200 cfs; normal peak is 500-700 cfs. The high runoff over topped terrace banks and flooded areas that rarely get covered with water. When there is a much higher than average runoff the first year after completing a project it can cause problems, especially since there is no vegetation growth yet. Spring runoff did do some damage to structures and banks. One log vane was completely washed out and in two other locations the stream cut behind log and rock vanes and eroded the banks so the structures are out in the river. Most of the project handled the high flows very well, but areas that had problems needs to be repaired or the problems will get worse and other adjacent structures will wash out in following years. Out of 70 structures installed

there are problems with 7 vanes covering about 450' of bank. It is important to repair these small sections before they get worse and to complete work on the last bank where we ran out of rock and time. The high flows also washed out some of the new fencing that was constructed. Temporary fencing has been built to control livestock, but the damaged fence sections need permanent repair. The project greatly improved fish habitat in this section of the Sevier River and fingerling trout were stocked for the first time this summer. New vegetation growth is looking very good.

Final Management Prescription: New fencing that was built is designed to excluded livestock form along the stream. The landowner would like to keep all livestock off of the stream. The first summer there has been no grazing within the project reach.

Monitoring Methods: Periodic electro-shocking surveys of fish populations will be completed by UDWR as necessary to assess the fishery. Visual inspection and assessment of riparian vegetation success and growth will be completed during summer and fall for the first three years to be sure riparian vegetation is moving towards goals. Then random periodic checking will be completed. Repeat photos will be taken. Annual fence maintenance of the stream corridor fence will occur by UDWR. Livestock grazing within the fenced stream corridor will be regularly monitored.

Table 3-1. Budget Table for DWR WRI Project.

Source	Approved	In-Kind	Spent	In-Kind Spent	FY
DNR Watershed	$6,620.00	$0.00	$6,620.00	$0.00	2012
Target Watershed Grant	$17,978.03	$0.00	$17,978.03	$0.00	2011
Habitat Council Account	$15,000.00	$0.00	$15,000.00	$0.00	2011
UDWQ	$9,609.05	$0.00	$9,609.05	$0.00	2011
DNR Watershed	$17,912.92	$0.00	$10,510.49	$0.00	2011
Blue Ribbon (Restricted)	$10,000.00	$0.00	$10,000.00	$0.00	2011
EPA 319	$30,035.25	$0.00	$26,083.70	$0.00	2011
UDWQ	$10,000.00	$0.00	$10,000.00	$0.00	2011
DWR	$0.00	$17,600.00	$0.00	$17,600.00	2011

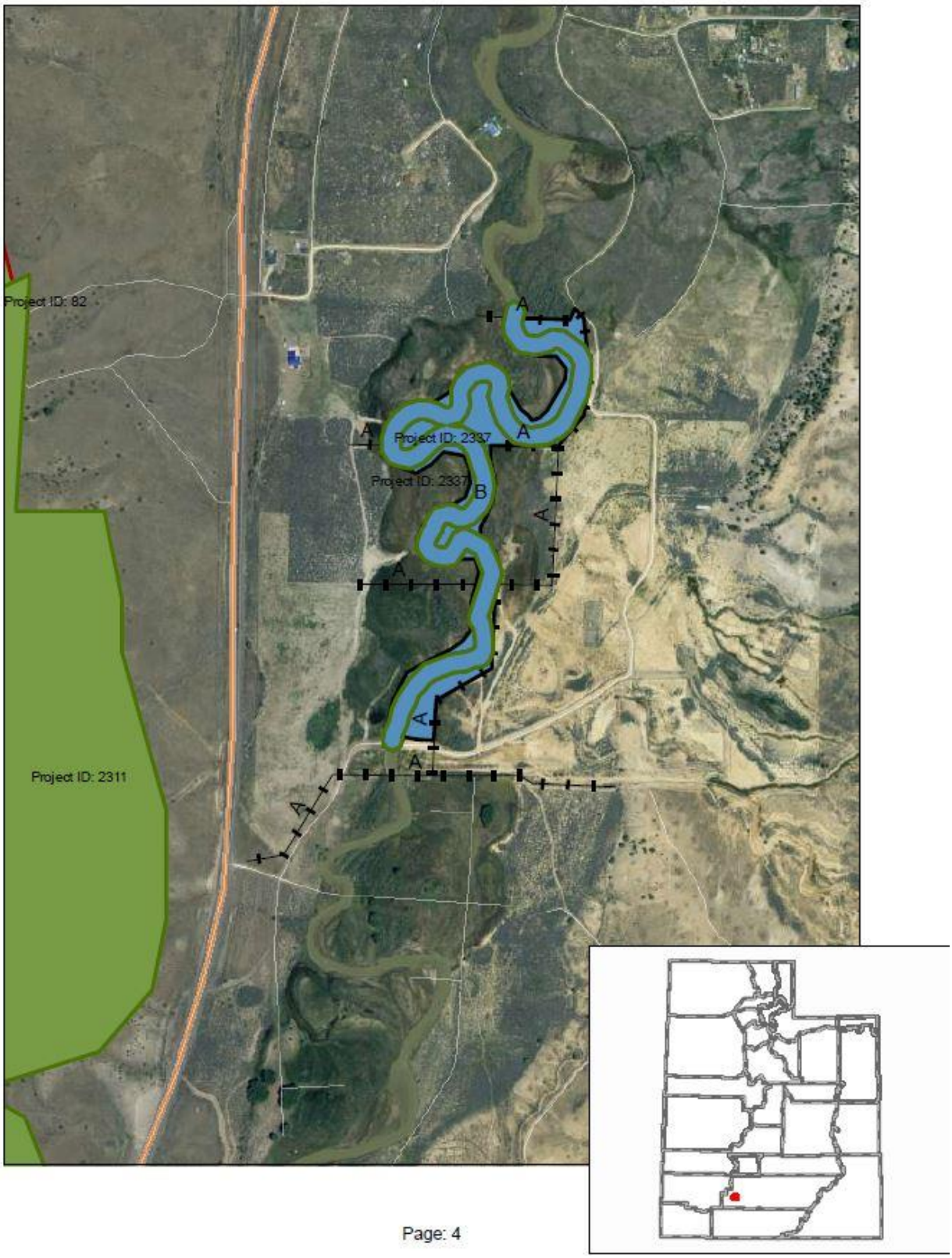


Figure 3-3. DRW WRI Project Location

Project funding:

In-kind match	$ 20,023.50
EPA 319	$ 30,035.26
Total	$ 50,058.76

Project 3: Greg Excell Sevier River Project Repair. This project was implemented as a riparian restoration project funded by FY2005 319.

Product: In fall 2010 approximately 1,055 feet of stream bank was treated with rock structures, riparian plantings, and riparian fencing for grazing management. The spring following the installation of this project produced an extremely large amount of run off and several places that work was completed got washed away. The remaining money in this contract was used to repair these failed structures. We also had 35 high school freshmen come and plant willows, native grasses, and woody riparian species to help control erosion.

Project funding:

In-kind match	$ 4,482.00
EPA 319	$ 2,048.28
Total	$ 6,530.28

3.2 Goal #2: Improve upland vegetative cover and condition to reduce sediment and nutrient runoff to the river and its tributaries.

Objective 1: Select a critical area and implement actions to reestablish protective/filtering ground cover on rangelands. The project will focus on decadent sagebrush or encroaching Pinion/Juniper woodlands that have little or no under story with sheet and rill erosion occurring. BMP will be implemented that will include brush/tree treatment, reseeding, fencing and grazing management practices.

Task 6. Develop desired ground vegetative cover on 1,070 acres of rangeland to achieve a range site condition of good/excellent by implementing BMPs.

Product: Vegetative ground cover on 1,070 acres of rangelands will be improved, which will reduce sediment and phosphorous loading in the Sevier or East Fork Sevier Rivers.

3.2.1 FY 2004

Product: No projects were completed for this goal to due to a lack of interested cooperators during the project sign up period.

3.2.2 FY 2005

Product: No projects were completed for this goal to due to a lack of interested cooperators during the project sign up period.

3.2.3 FY2007

Objective 1: Select a critical area and implement actions to reestablish protective/filtering ground cover on rangelands. The project will focus on decadent sagebrush or encroaching Pinion/Juniper woodlands that have little or no under story with sheet and rill erosion occurring. BMP will be implemented that will include brush/tree treatment, reseeding, fencing and grazing management practices.

Task 6. Develop desired ground vegetative cover on 1,070 acres of rangeland to achieve a range site condition of good/excellent by implementing BMPs.

Product: No projects were completed for this goal to due to a lack of interested cooperators during the project sign up period.

3.2.4 FY 2009

No projects were requested or implanted with the FY2009 grant.

3.3 Goal #3: Improve pasture condition and replace flood irrigation with sprinkler or gated pipe systems to reduce water usage and runoff, which will reduce sediment and phosphorous inputs to the river and its tributaries.

Objective 1: Reduce sediment and phosphorous loading in the Sevier River from improved irrigation techniques and management. This will likely entail conversion from flood irrigation to sprinkler systems and gated pipe. Reseeding and BMP for livestock may also be implemented.

Task 7: Identify project cooperators, develop irrigation water management plan and use BMPs to improve pasture vegetation and livestock management.

3.3.1 FY 2004

Objective 1: Reduce sediment and phosphorous loading in the Sevier River from improved irrigation techniques and management. This will likely entail conversion from flood irrigation to sprinkler systems. Reseeding and BMP for livestock may also be implemented.

Task 1: Replaced approximately 2,100 feet of open earthen ditches with underground pipe to feed a gated pipe system. Replaced approximately 5,200 feet of open earthen ditches with gated pipe. This reduced sedimentation and phosphorous loading into the Sevier River System by decreasing the amount of wild runoff into the river and doing away with erosion from open ditches and excess runoff.

Product: One (1) irrigation efficiency and pasture improvement project. Improved pasture and irrigation system on 100 acres.

3.3.2 FY 2005

There were no projects completed this fiscal year.

3.3.3 FY2007

Objective 1 Project 1: Reduce sediment and phosphorous loading in the Sevier River by improving irrigation techniques and management. This will likely entail conversion from flood irrigation to sprinkler systems or gated pipe. Reseeding and BMP for livestock may also be implemented.

Task 1 Project 1: Reduce sediment and phosphorous loading into the main stem of the Sevier River by changing wild flood systems to controlled flood through the addition of a gated pipe system. Approximately 3,670 feet of open earthen ditches will be replaced with gated pipe. BMP's will also be used to manage grazing through removal of livestock on summer pastures.

Product:

Task 1 Project 3: Reduce sediment and phosphorous loading into the main stem of the Sevier River by changing wild flood systems to controlled flood through the addition of a gated pipe system. Replace approximately 3,700 feet of open earthen ditches with gated pipe. BMP's will also be used to manage grazing through removal of livestock on summer pastures.

Product: 2,700 feet of gated pipe and 1,000 feet of 18 inch underground pipe was installed on Steve Garrett's property just North of Panguitch on the main stem of the Sevier River. This property is just below the last property worked on in the Panguitch Valley reach of 319 projects. Gated pipe and underground pipe replaced open earthen ditches that were eroding and contributing to sediment input into the Sevier River system. Livestock and horses were removed from the property to reduce phosphorous loading into the Sevier River

Project Funding:	
319	$ 10,250.00
Cooperator Match	$ 6,833.33
Total	$ 17,083.33

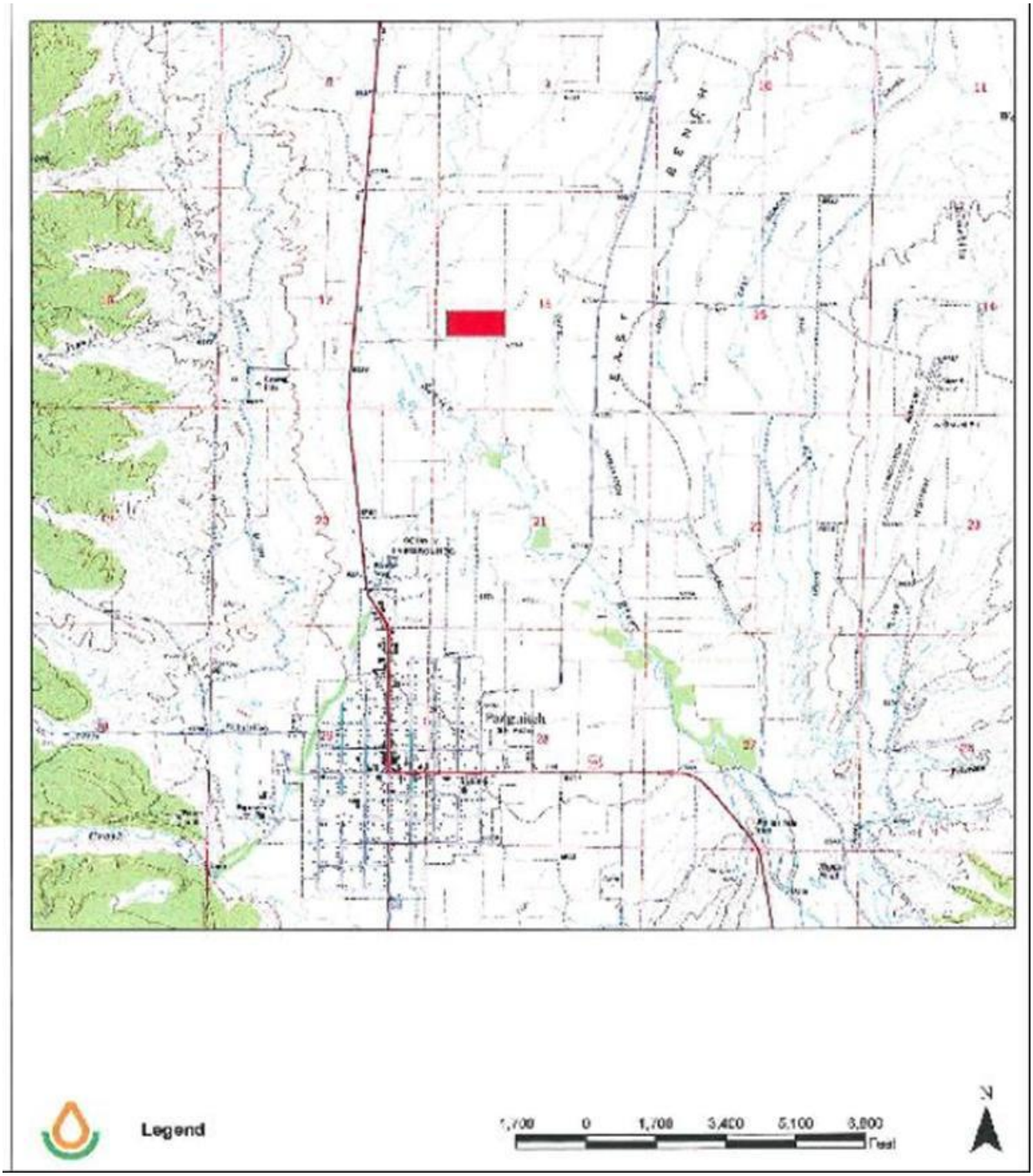


Figure 3-4. Steve Garrett Irrigation Project Location.

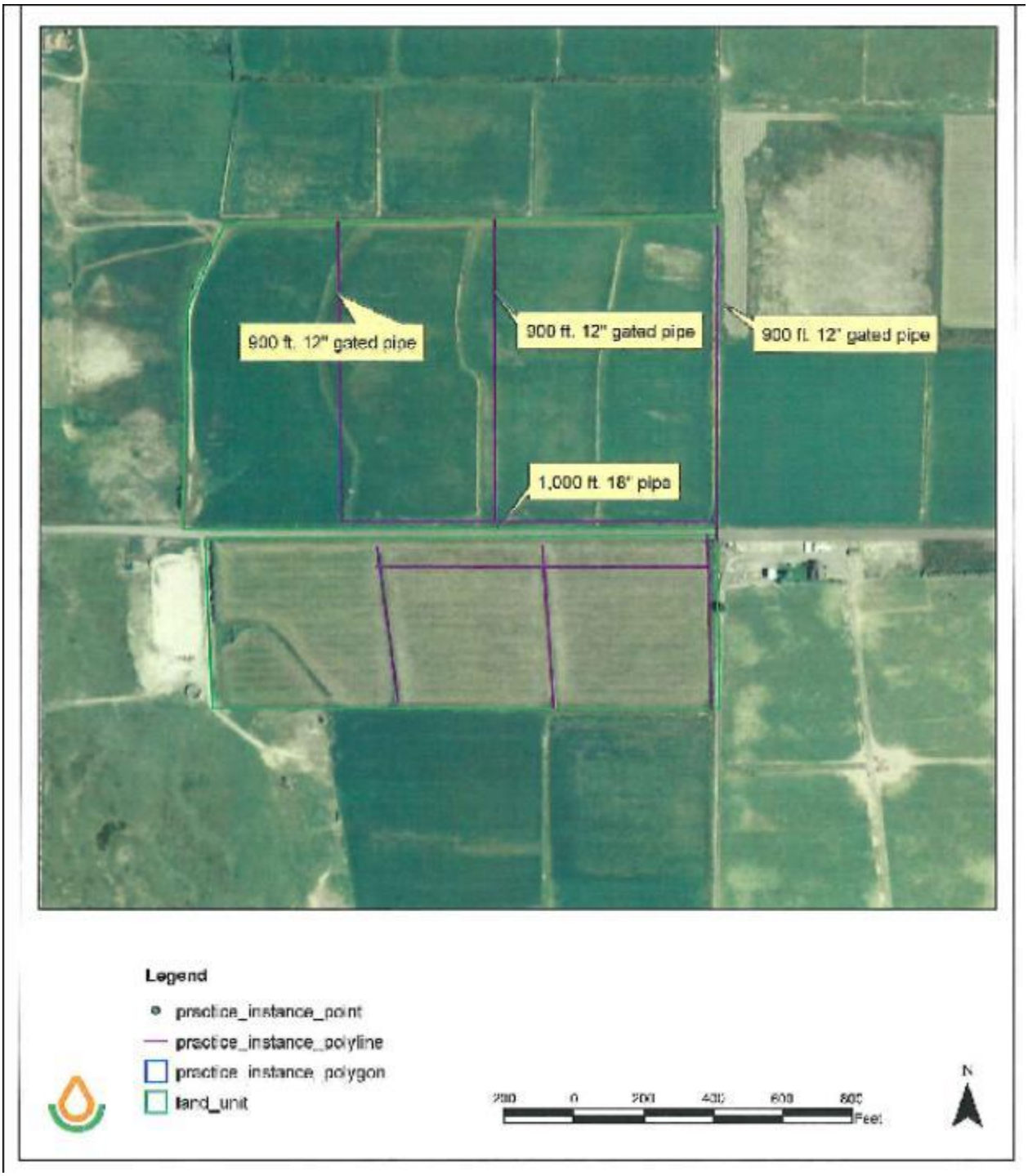


Figure 3-5. Steve Garrett Irrigation Project Overview.

3.3.4 FY 2009

The FY2009 PIP did not propose project implementation for this Goal. However, FY2009 funding was used to finish implementation of the FY 2007 Steve Garrett pasture improvement project (see Section 3.3.3). Load reductions for this project are reported in the FY 2007 portion of the load reduction table (Table 5-1)

Project Funding:	
319	$ 7,967.11
Cooperator Match	$ 5,311.41
Total	$ 13,278.52

3.4 Goal #4: Inform and educate local communities and citizens concerning non-point source pollution and the importance of maintaining and improving water quality within the watershed.

Objective 1: Educate and inform the public concerning the benefits and importance of maintaining and improving water quality. Keep all interested individuals, groups, stakeholders and the public informed of projects, progress, monitoring, and technical information.

Task 8 - Continue with the NPS information and education programs currently being practiced. Conduct yearly tours to demonstration projects, produce quarterly newsletter, plan and carry out community watershed days for school and citizen participation, host one planning and education NPS workshop yearly and produce newspaper articles as needed.

Product: A more informed and aware public and participation in reduction of NPS pollution, two annual newsletters, newspaper articles, and one NPS workshop.

3.4.1 FY 2004

Product:

1. Held the annual fall watershed tour with local producers to showcase successful projects.
2. Held the Upper Sevier Watershed days with Panguitch High School freshman where the students planted willow and riparian trees for half a day and conducted water quality sampling with USU Extension for the second half of the day.
3. Compiled and sent two watershed newsletters homes in watershed
4. Held the annul Conservation Field Day with the local elementary schools in Garfield County.

3.4.2 FY 2005

Product:

1. Held the annual fall watershed tour with approximately 40 producers to showcase successful projects.
2. Held the Upper Sevier Watershed days with Panguitch High School freshman where the students planted willow and riparian trees for half a day and conducted water quality sampling with USU Extension for the second half of the day.
3. Compiled and sent two watershed newsletters per year sent to 1500 homes in watershed
4. Held the annul Conservation Field Day with the local elementary schools in Garfield County.

3.4.3 FY2007

Objective 1: Educate and inform the public concerning the benefits and importance of maintaining and improving water quality. Keep all interested individuals, groups,

stakeholders and the public informed of projects, progress, monitoring, and technical information.

Task 8 - Continue with the NPS information and education programs currently being practiced. Conduct yearly tours to demonstration projects, produce quarterly newsletter, plan and carry out community watershed days for school and citizen participation, host one planning and education NPS workshop yearly and produce newspaper articles as needed.

Product:
1. Held the annual fall watershed tour with approximately 40 producers to showcase successful projects..
2. Held the Upper Sevier Watershed days with Panguitch High School freshman where the students planted willow and riparian trees for half a day and conducted water quality sampling with USU Extension for the second half of the day.
3. Compiled and sent two watershed newsletters per year sent to 1500 homes in watershed
4. Held the annul Conservation Field Day with the local elementary schools in Garfield County.

3.4.4 FY 2009

No projects were proposed or completed under this goal with FY 2009 funding.

3.5 Goal #5: UACD zone coordinator will assist in development of leadership skills essential to the local watershed coordinator to provide technical assistance to landowners to implement planned BMPs that will resolve NPS problems.

Objective 1: Provide leadership to help new watershed coordinator learn and take over watershed coordinator duties, and provide technical assistance to landowners to plan and implement BMPs that will resolve NPS problems. The watershed coordinator will require additional technical assistance until fully trained where after the coordinator will assume full responsibilities for technical assistance in the Upper Sevier River watershed.

Task 9 - Trained district planner/technicians will provide technical planning and assistance expertise for landowners in the watershed to develop NPS conservation plans and implement BMPs listed under Goals #2 and #3 that will mitigate NPS pollution into the Sevier River and its tributaries. Technical assistance for stream bank restoration and fishery habitat projects in Goal #1 will be provided by DWR.

Product: Technical and planning assistance for landowners participating in NPS cost-share projects for irrigation, rangeland and pasture improvements identified in the PIP. Preparing conservation plans that meet NRCS standards and specifications, coordinating planning assistance with NRCS, BLM, FS and DWR and plan and develop BMPs implemented. Work under the direction of the local Steering Committee and SCD in conjunction with the local watershed coordinator to employ proper planning and approval requirements in planning process. UACD will be reimbursed for technical assistance on 319 PIP projects (Tasks 6 &7) in the Upper Sevier Watershed as projects are fully implemented (not to exceed 10% of the actual project cost.)

3.5.1 FY 2004

Product: UACD certified planners provided technical assistance and project planning for the projects described in the previous Goals. The principal products included engineering design on irrigation projects for the FY 04 grant.

3.5.2 FY 2005

Product: UACD certified planners provided technical assistance and project planning for the projects described in the previous Goals. The principal products included engineering design on irrigation projects for the FY 05 grant.

3.5.3 FY2007

Objective 1: Provide leadership to help new watershed coordinator learn and take over watershed coordinator duties, and provide technical assistance to landowners to plan and implement BMPs that will resolve NPS problems. The watershed coordinator will require additional technical assistance until fully trained where after the coordinator will assume full responsibilities for technical assistance in the Upper Sevier River watershed.

Task 9 - Trained district planner/technicians will provide technical planning and assistance expertise for landowners in the watershed to develop NPS conservation plans and implement BMPs listed under Goals #2 and #3 that will mitigate NPS pollution into the Sevier River and its tributaries. Technical assistance for stream bank restoration and fishery habitat projects in Goal #1 will be provided by DWR.

Product: UACD certified planners provided technical assistance and project planning for the projects described in the previous Goals. The principal products included engineering design on irrigation projects for the FY 05 grant

3.5.4 FY 2009

Product: A 7% UACD administrative fee was charged to manage contracts, invoices, and cooperator reimbursements for implementing this grant. This goal accounted for $6,140.00 of 319 and $4,093.00 matching funds for FY2009. A 7% administrated fee in the amount of $5,180 for $74,000 FY2007 funding for the Orton/Westwood project was also charged to this grant.

Project funding:	
In-kind match	$ 4,093.33
EPA 319	$11,320.00
Total	$15,413.33

4.0 Planned and Actual Milestones, Products, and Completion Dates

Table 4-1. Milestone Table.

TASK/RESPONSIBLE ORGANIZATIONS	OUTPUT	QTY	YEAR 2008	YEAR 2009	YEAR 2010	YEAR 2011	YEAR 2012
GOAL 1, Objective 1, Task 1 Horton/Westwood Stream Restoration Project (Group 1, 2, 3, 4, 7)	Streambank stabilization, re-vegetation, and grazing management.	40 acres and 3,680 feet riparian restoration					7/1-9/30
GOAL 3, Objective 1, Task 1 Vince Salvato, Gated Pipe Project (Group 1, 2, 3, 4, 6, 7)	New irrigation system and water management plan and improved pasture land.	51 acres	01/08 12/08				
GOAL 3, Objective 1, Task 2 Kingston Irrigation Company, pipe project (Group 1, 2, 3, 4, 6, 7)	New irrigation system and water management plan and improved pasture land.	500 acres	01/08 12/08				
GOAL 3, Objective 1, Task 3 Steve Garrett, Gated Pipe Project (Group 1, 2, 3, 4, 6, 7)	New irrigation system and water management plan and improved pasture land.	35 acres			01/10 12/10		
GOAL 4, Objective 1, Task 8 Inform and Educate Local Citizens (Group 2, 3, 6, 7)	Informed public, 2 newsletters, public tour, NPS Workshop		01/08 12/08	01/09 12/09	01/10 12/10		
GOAL 5, Objective 1, Task 9 Provide Technical Assistance to Cooperators	Develop conservation plans to implement BMPS to mitigate NPS pollution.	5 conservation plans	01/08 12/08	01/09 12/09	01/10 12/10		
GOAL 5, Objective 1, Task UN Provide leadership, support, administration	Administer contract, track match, submit required reports, assist in supervision of watershed coordinator.	5 contracts submit semiannual/ annual reports trained coordinator	01/08 12/08	01/09 12/09	01/10 12/10		

TASK/RESPONSIBLE ORGANIZATIONS	OUTPUT	QTY	YEAR 2008	YEAR 2009	YEAR 2010	YEAR 2011	YEAR 2012
Project 1743 (DWR)	Approximately 3,500 apos of vertical eroding banks were sloped back and rock and log structures built to prevent further erosion and create fish habitat.			01/09 12/09			

Group 1 - Natural Resources Conservation Service - Provide technical assistance to plan, design, and implement BMPs. Group 2 – Landowners/private groups - Make land management decisions and provides cash and in-kind match for projects. Group 3 – Upper Sevier SCD & Steering Committee - Local project manager and sponsor, including responsibilities for project coordination, reimbursement payments, match tracking, and progress reporting to the State DEQ. Group 4 – Utah Division of Water Quality - Statewide Section 319 program management including over site of local 319 planning and expenditures. Group 5 – Utah Division of Wildlife Resources - Provide technical and project implementation assistance and funding match. Group 6 – USU Extension Service – Planning assistance, information & education. Group 7 – Utah Association of Conservation Districts - Local project manager and sponsor, including responsibilities for project coordination, reimbursement payments, match tracking, and progress reporting to the State DEQ. Group 8 – BLM. Group 9 – USFS.

5.0 Load Reduction Estimates and TMDL Progress

5.1 Load Reduction Estimates

Table 5-1 shows the estimated total phosphorus, nitrogen, sediment, and BOD load reduction for each project implemented. The estimates were generated using the Spreadsheet Tool for Estimating Pollutant Loads (STEPL) and project specific input parameters. STEPL estimated load reductions are 874 kg/year nitrogen, 491 kg/yr TP, 1,641 kg/yr BOD, and 249 ton/yr sediment.

5.1.1 TMDL Load Reduction Progress

For the Upper Sevier River and East Fork Sevier River watersheds, respectively, BMP implementation resulted in an estimated TP reduction of 158 kg/yr and 340 kg/yr (Table 5-2). Since these estimates were generated by the STEPL model and TMDL prescriptions are based on observed water chemistry, a direct comparison of the two is not appropriate. However, estimated BMP reductions can be used generally to track progress toward meeting TMDL endpoints. Table 5-2 indicates that more BMP implementation is needed to meet TMDL endpoints. This is also supported by the unmet implementation goals identified in the Upper Sevier River Watershed Plan. Continued water chemistry monitoring will provide a more direct comparison of load reductions with TMDL endpoints.

Table 5-1. Estimated Load Reductions for BMP Implementation Projects.

		Nitrogen				Phosphorus				BOD				Sediment			
	Cooperator (Location)	Pre-Implementation (kg/yr)	Load Reduction (kg/yr)	Post-Implementation (kg/yr)	% Reduction	Pre-Implementation (kg/yr)	Load Reduction (kg/yr)	Post-Implementation (kg/yr)	% Reduction	Pre-Implementation (kg/yr)	Load Reduction (kg/yr)	Post-Implementation (kg/yr)	% Reduction	Pre-Implementation (ton/yr)	Load Reduction (ton/yr)	Post-Implementation (ton/yr)	% Reduction
Streambank	**FY 2005**																
	UT DWR (1)	16	10	5	69%	1	1	0	100%	50	1	49	2%	0	0	0	0%
	Greg Excell (4)	10	8	1	90%	3	3	0	100%	22	13	10	55%	9	8	1	89%
	Creston Black (5)	22	15	7	68%	1	0	1	0%	5	0	5	0%	19	18	1	95%
	FY 2007																
	Horton/ Westwood	185	164	21	89%	65	59	6	91%	393	298	95	76%	178	168	14	92%
	FY 2009																
	Tim Westwood (5)	46	39	8	83%	10	9	1	90%	126	38	88	30%	24	22	1	96%
	DWR – WRI (10)	42	35	8	81%	8	7	1	88%	118	30	88	25%	19	18	1	95%
	Subtotal	**321**	**271**	**50**	**84%**	**88**	**79**	**9**	**90%**	**714**	**380**	**335**	**53%**	**249**	**234**	**18**	**93%**
	FY 2005																
Irrigation	Ralf Perkins (8)	1,152	94	1,058		285	15	270	5%	1,751	197	1,554	11%	2	0	2	0%
	Jeff Owens (2)	577	131	445	23%	93	15	78	16%	1,010	274	736	27%	1	0	1	0%
	Jan Frandsen (6)	1,136	83	1,053	7%	281	13	268	5%	1,725	174	1,552	10%	1	0	1	0%
	Allen Henrie (3)	322	72	249	23%	64	11	53	17%	591	152	439	26%	1	0	1	0%
	Delin Roundy (7)	155	14	141	9%	73	5	68	7%	542	22	520	4%	16	15	1	94%
	Steve Garrett (FY 2005/2007) (9)	743	110	632	15%	163	15	148	9%	1,236	232	1,004	19%	1	0	1	0%
	FY 2007																
	Vince Salvado (11)	678	99	579	15%	153	15	137	10%	1,129	210	919	19%	2	0	2	0%
	Kinston Irrigation (12)	NA	NA	NA	NA	1,406	323	323	77%	NA	NA	NA	NA	NA	NA	NA	NA
	Subtotal	4,763	603	4,157	13%	2,518	412	1,345	47%	7,984	1,261	6,724	16%	24	15	9	63%
	Total	**5,083**	**874**	**4,208**	**17%**	**2,605**	**491**	**1,355**	**48%**	**8,699**	**1,641**	**7,074**	**19%**	**272**	**249**	**24**	**91%**

		Nitrogen				Phosphorus				BOD				Sediment			
	Cooperator (Location)	Pre-Implementation (kg/yr)	Load Reduction (kg/yr)	Post-Implementation (kg/yr)	% Reduction	Pre-Implementation (kg/yr)	Load Reduction (kg/yr)	Post-Implementation (kg/yr)	% Reduction	Pre-Implementation (kg/yr)	Load Reduction (kg/yr)	Post-Implementation (kg/yr)	% Reduction	Pre-Implementation (ton/yr)	Load Reduction (ton/yr)	Post-Implementation (ton/yr)	% Reduction
Total																	
	East Fork Sevier River Watershed	84	64	20	76%	1,418	332	326	77%	181	39	157	13%	43	40	2	95%
	Upper Sevier River Watershed	4,999	810	4,188	16%	1,187	158	1,029	13%	8,518	1,602	6,917	19%	229	209	24	90%

*The cooperator number shows the approximate project locations on Figure 6-1 and Figure 6-5.

Table 5-2. Load Reduction Estimates for TMDL Segments in the Upper Sevier and East Fork Sevier River Watersheds

	Phosphorus		Nitrogen	BOD	Sediment
	TMDL Load Reduction (kg/yr)	Estimated BMP Reduction (kg/yr)	Load Reduction (kg/yr)	Load Reduction (kg/yr)	Load Reduction (ton/yr)
Upper Sevier River					
Circleville to Horse Valley Diversion	3,263	59	164	298	168
Horse Valley Diversion to Long Canal	1,921	100	646	1,304	41
Long Canal to Mammoth Creek	343	0	0	0	0
Mammoth Creek	291	0	0	0	0
Subtotal	5,818	158	**646**	**1,304**	**41**
East Fork Sevier River					
Kingston to Black Canyon	2,920	340	84	68	40
Total	**8,738**	**498**	**894**	**1,670**	**250**

6.0 Monitoring Results and Load Reduction Estimates

6.1 Upper Sevier River – Assay Creek and Mainstem Sevier River

Figure 6-1displays the location of the Sevier River STORET monitoring locations implemented to monitor project effectiveness. The monitoring stations displayed are a combination of DWQ long-term ambient monitoring stations (4949650, 4949640, 4949660 and 4949670) and DWQ intensive basin stations (4949710 and 4949720). Cross reference the project number presented in Figure 6-1with Table 5-1 for project name, funding year, and respective load reductions.

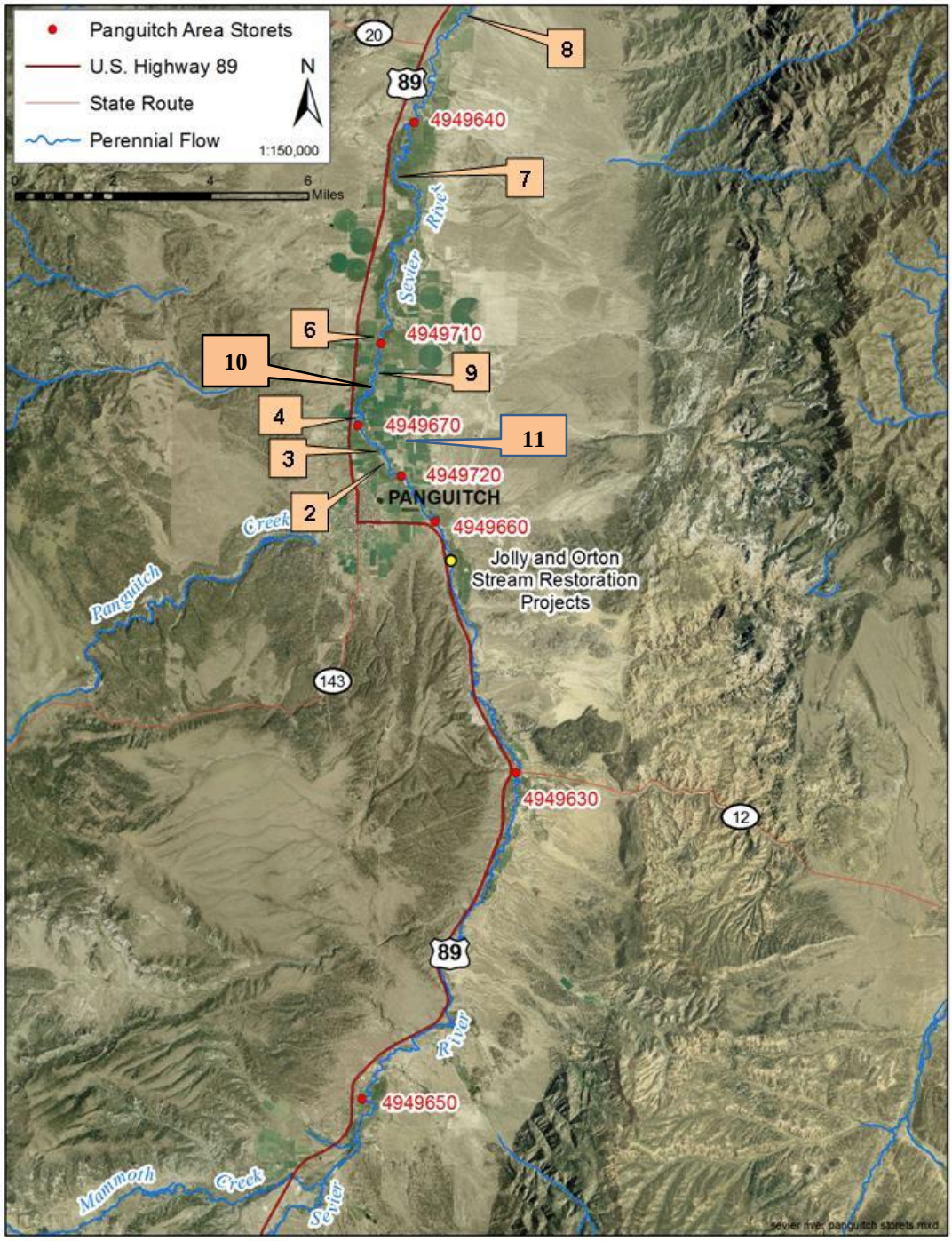


Figure 6-1. Locations of Upper Sevier Water Quality Monitoring Stations.

Table 6-1 shows the number of monitoring visits for each location pre- and post- implementation and demonstrates that there is a good frequency of site visits pre-implementation and twelve post-implementation site visits. The DWQ Intensive Basin Monitoring effort collected monthly samples beginning during the 2014water year. Table 6-1 shows the sampling distribution for this event. However, most of this data is not yet uploaded to the Utah Ambient Water Quality Monitoring System database and is not available for analysis of project effectiveness. The Upper Sever River Watershed Group is currently developing a Sampling Analysis plan in order to continue monthly monitoring of water chemistry sites as well physical project monitoring protocols. The Utah Water Watch is also coordinating with the watershed group to implement a volunteer monitoring program.

Table 6-1. Monitoring Frequency in Relationship to Project Implementation (Ordered Upstream to Downstream).

STORET	Location	Pre-Implementation	During Implementation	Post - Implementation
4949650	SEVIER R NEAR HATCH	1/10/1990 to 6/26/2007 (n = 14)	7/26/2006 to 6/26/2007 (n = 13)	10/23/2013 to 9/18/2014 (n=12)
4949630	SEVIER R AT U12 XING	4/4/1996 to 6/12/2002 (n=22)	7/26/2006 to 7/26/2006 (n=1)	10/23/2013 to 9/18/2014 (n=12)
4949660	Sevier R. East of Panguitch	5/09/96 to 6/12/2002 (n=26)		10/23/2013 to 9/18/2014 (n=12)
4949720	Sevier R. East of Panguitch Fairgrounds	3/28/2002 to 4/28/2004 (n=7)		
Project #2, #3, &#11				
4949670	Sevier R. @ Panguitch Airport Road Crossing	5/08/1996 to 5/21/1997 (n=13)		10/23/2013 to 9/18/2014 (n=12)
Project #4, #9, and #10				
4949710	Sevier R. blw USU Farm @ Sandwash Rd. Xing	3/28/2002 to 3/28/2002 (n=1)		
Project #6 and #7				
4949640	Sevier R. @ Sanford Rd. Crossing	4/04/1996 to 6/26/2007 (n=19)	7/26/2006 to 6/26/2007 (n= 15)	10/23/2013 to 9/18/2014 (n=12))
Project #8				

Table 6-2 and Figure 6-2 demonstrate the summary statistics for total phosphorus, the parameter of concern defined by the TMDL. Figure 6-2 shows the relative project locations in relation to the Sevier River monitoring stations. The table and figure shows that min, mean, and max total concentrations are very similar from station to station throughout the monitoring. Additionally, mean TP concentrations are greater than TMDL endpoint of 0.05 mg/L at most stations and all but one station has maximum concentrations greater than the indicator value. Total phosphorus loading statistics for the Upper Sevier River monitoring stations demonstrate a similar trend as compared to TP concentrations.

Figure 6-3 and Figure 6-4 show total phosphorus concentration and load, respectively, for all monitored sites in the Upper Sevier River Watershed. Ttest and Anova statistical analyses of pre- and post- conditions at each site and between sites showed no significant change is total phosphorus concentrations and load ($p>0.05$). While there is not statistical significance between pre- and post- implementation, there is a visual decrease in loading at 4949660 and 4949670 that could indicate reductions associated with BMP implementation.

Table 6-2. Total Phosphorus Summary Statistics for Monitoring Locations in Proximity to the Project Locations.

STORET	Location	Start	End	Count	Min (mg/L)	Avg (mg/L)	Max (mg/L)
4949650	SEVIER R NEAR HATCH	1/10/1990	9/23/2014	39	0.01	0.06	0.39
4949630	SEVIER R AT U12 XING	4/4/1996	9/23/2014	35	0.01	0.09	0.96
4949660	SEVIER R EAST OF PANGUITCH	5/9/1996	9/23/2014	35	0.01	0.15	2.12
4949720	Sevier R East of Panguitch fairgrounds	3/28/2002	4/28/2004	7	0.01	0.04	0.06
Project #2, #3, &#11							
4949670	SEVIER R @ PANGUITCH AIRPORT RD XING	5/8/1996	9/23/2014	25	0.01	0.0.03	2.07
Project #4, #9, and #10							
4949710	Sevier R bl USU Farm @ Sandwash Rd Xing	3/28/2002	3/28/2002	1	0.03	0.03	0.03
Project #6 and #7							
4949640	SEVIER R @ SANFORD ROAD XING	4/4/1996	9/23/2014	46	0.01	0.06	3.83
Project #8							

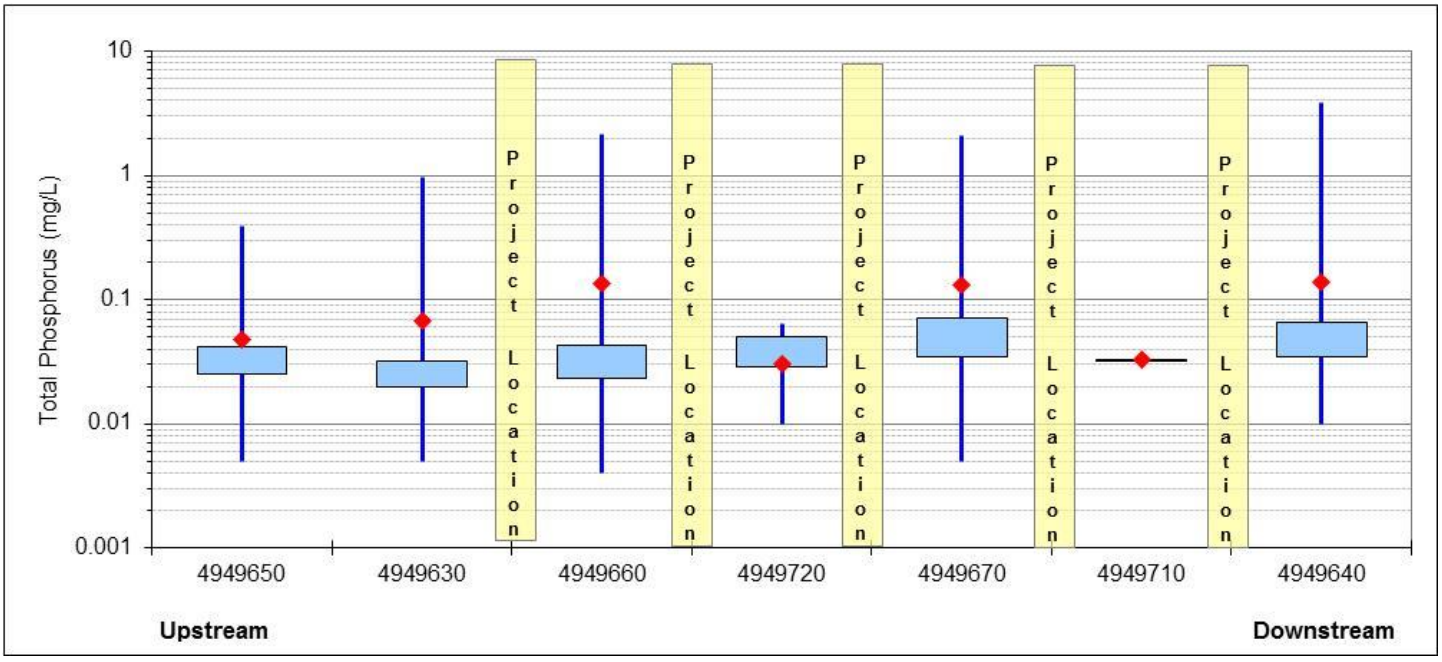


Figure 6-2. Total Phosphorus Summary Statistics for Monitoring Locations in Proximity to the Project Locations (1990 to Present).

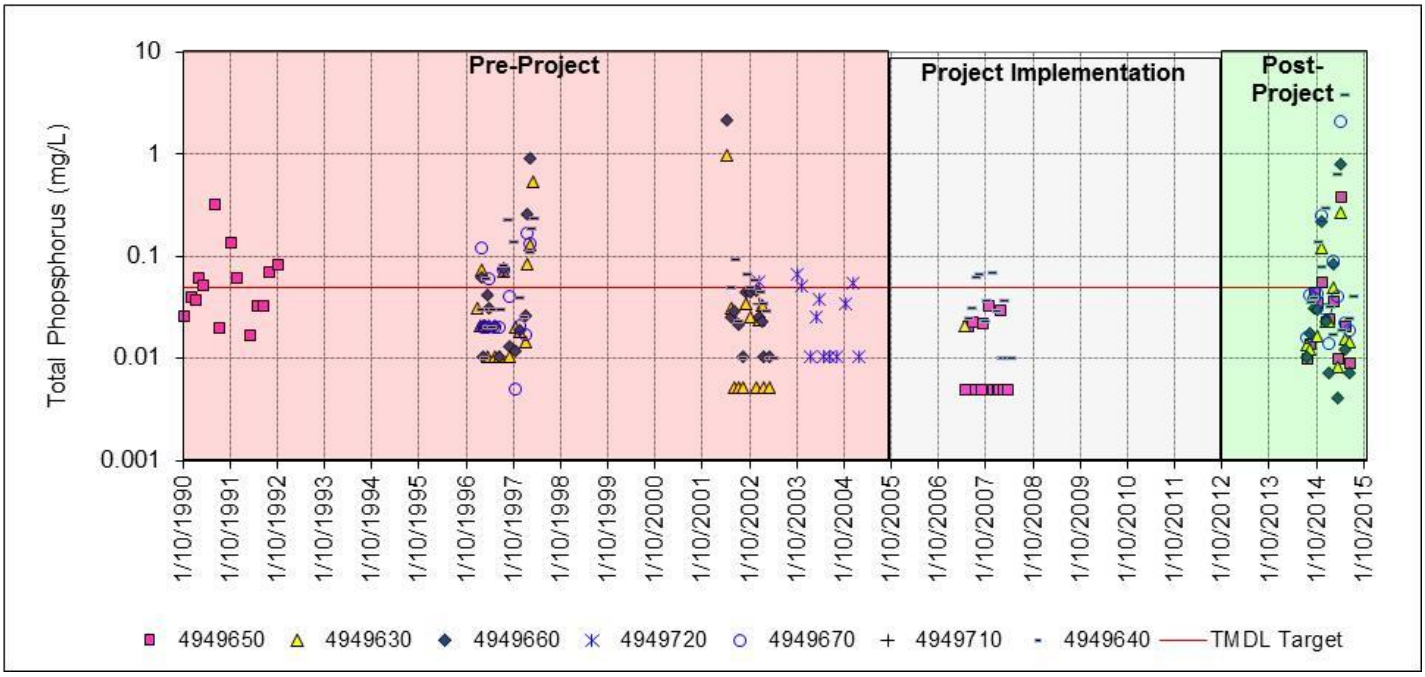


Figure 6-3. Sevier River Total Phosphorus Concentrations for Monitoring Locations in Proximity to Project Locations (1996-Present).

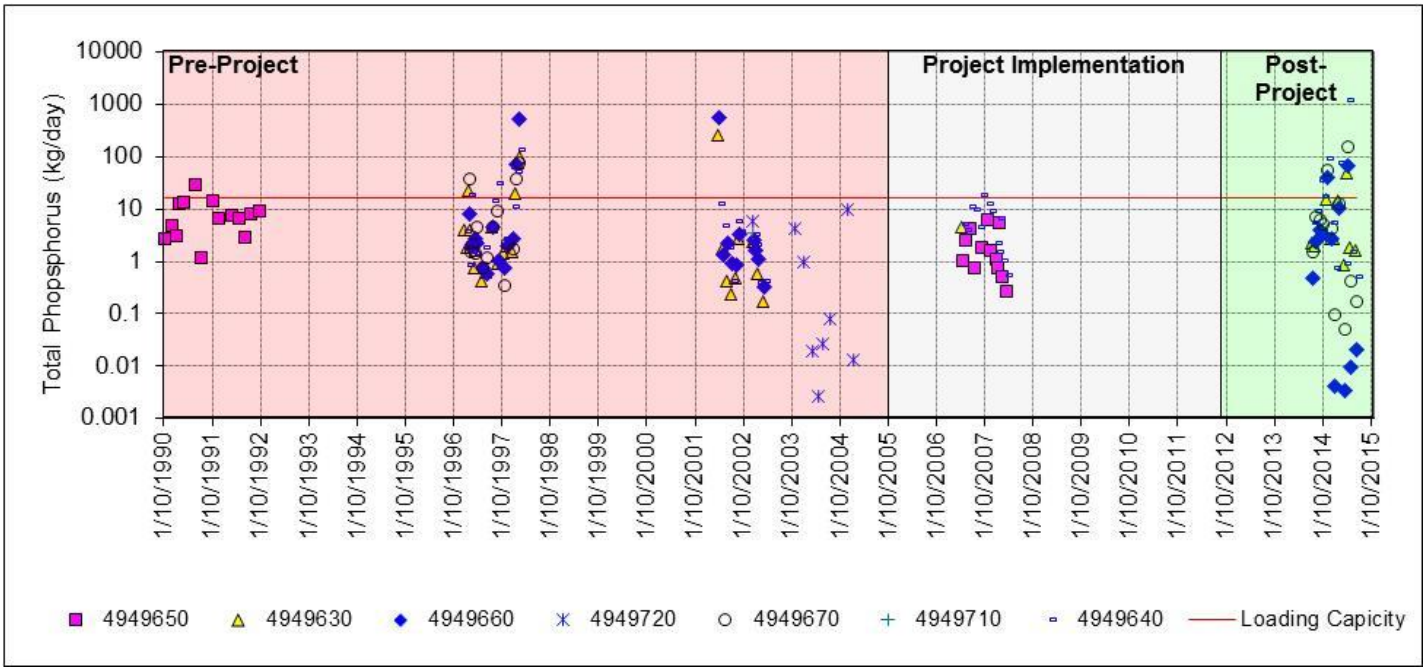


Figure 6-4. Sevier River Total Phosphorus Loads for Monitoring Locations in Proximity to Project Locations (1996-Present).

6.2 East Fork Sevier River – Black Canyon Stream Restoration Projects.

Figure 6-5 displays the location of the East Fork Sevier River monitoring locations and implementation project locations. The monitoring stations displayed are a combination of DWQ long-term ambient monitoring stations (4949970, 4949260, and 4949100) and DWQ Intensive basin stations (4949270, 4949910, 4949108, 4949105, and 4949120).

Table 6-3 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, but

limited post-implementation site visits. Monitoring location 494260, the station used to evaluate the Black Canyon area stream restoration projects, has good pre-project data but only six TP observations after implementation was completed. Twelve additional sampling events were completed during the 2014 water year as part of the Sevier River Intensive Basin monitoring effort. These results are not yet available for review.

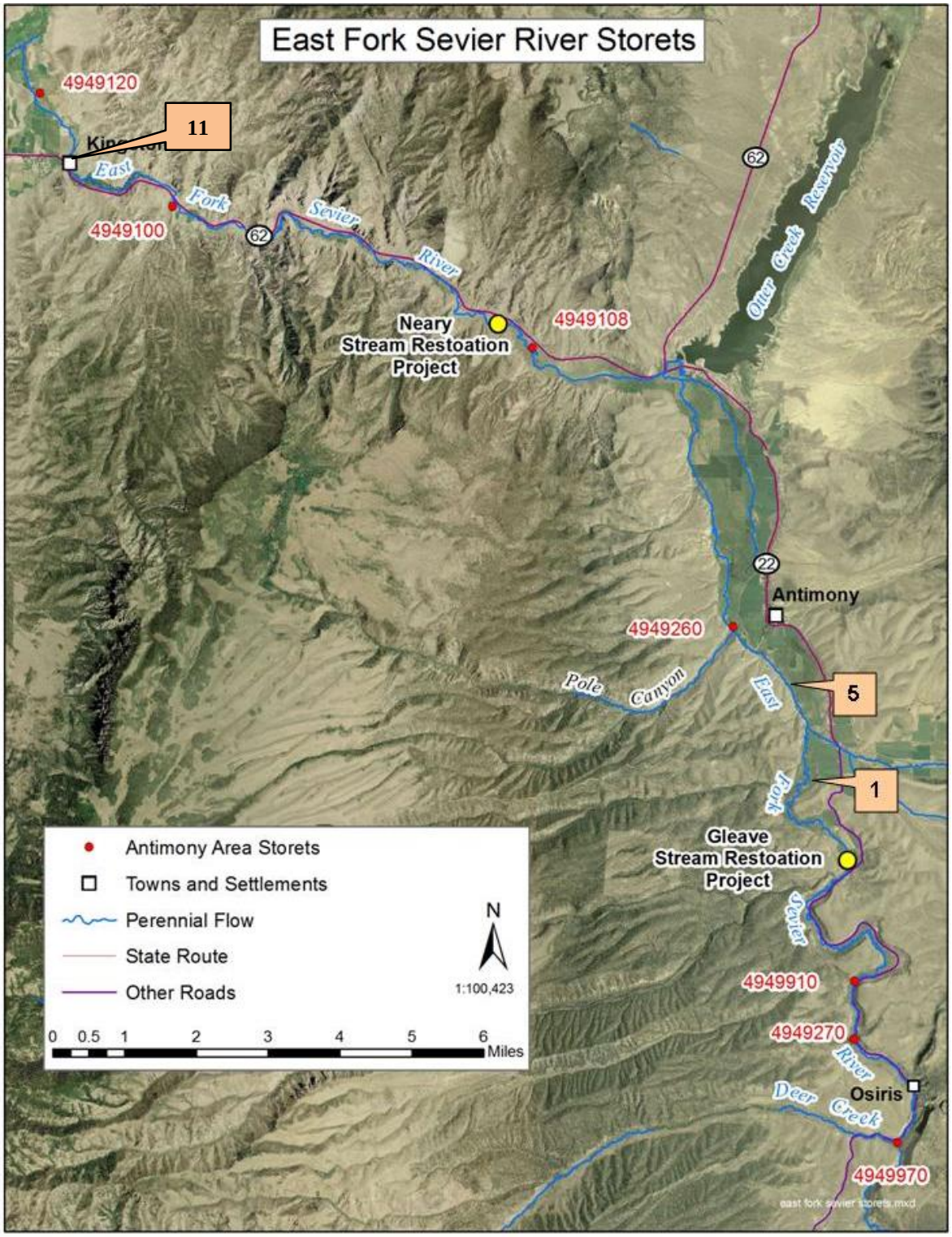


Figure 6-5. Location of East Fork Sevier River Water Quality Stations and Implementation Projects.

Table 6-3. Monitoring Frequency in Relation to Project Locations (Ordered Upstream to Downstream).

STORET	Location	Pre-Implementation	During Implementation	Post - Implementation	2013/2014 Monitoring
4949970	E FK SEVIER R AB CNFL/ DEER CK	04/26/1993 to 04/11/2000 (n=26)			
4949270	E FK SEVIER R ON MARTINEZ PROP. NR HOME (DWR)	10/17/1990 to 06/16/1994 (n=18)			
4949910	E Fk Sevier R bl Martinez Property		07/27/2006 to 02/27/2008 (n=19)	10/24/2013 to 11/20/2013 (n=2)	10/24/2013 to 9/18/2014 (n=12)
4949260	EAST FK SEVIER R AB DIV @ ANTIMONY	05/15/1993 to 06/13/2002 (n=42)	07/27/2006 to 08/22/2007 (n=13)	10/24/2013 to 11/20/2013 (n=2)	10/24/2013 to 9/18/2014 (n=12)
4949108	E FK SEVIER R 2.5 MI BL OTTER CK RES		10/25/2006 to 10/25/2006 (n=1)		
4949100	E FK SEVIER R AT U62 XING E OF KINGSTON	01/09/1990 to 08/10/2005 (n=119)	09/06/2005 to 01/13/2009 (n=29)	10/24/2013 to 11/20/2013 (n=2)	10/24/2013 to 9/18/2014 (n=12)
4949120	E FK SEVIER R .8MI N OF KINGSTON		09/28/2005 to 06/14/2006 (n=6)		

Table 6-4 and Figure 6-6 summarize total phosphorus observations, the parameter of concern defined by the East Fork 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. Figure 6-8 shows that TP loading increases in the downstream direction.

A statistical comparison of pre- and post-implementation TP concentrations and TP load at each monitoring location did not detect changes in water quality associated with project implementation ($p>0.05$). The same result was observed for each site and between sites. There also does not appear to be a visual trend in TP throughout the implementation period (Figure 6-8).

Table 6-4. Total Phosphorus Summary Statistics for Monitoring Locations in Proximity to the Project Location (1990-Present).

STORET	Location	Start	End	Count	Min (mg/L)	Avg (mg/L)	Max (mg/L)
4949970	E FK SEVIER R AB CNFL/ DEER CK	4/26/1993	4/11/2000	26	0.01	0.10	0.60
4949270	E FK SEVIER R ON MARTINEZ PROP. NR HOME (DWR)	10/17/1990	6/16/1994	18	0.02	0.09	0.45
4949910	E Fk Sevier R bl Martinez Property	7/27/2006	9/18/2014	31	0.02	0.07	0.23
4949260	EAST FK SEVIER R AB DIV @ ANTIMONY	5/15/1993	9/18/2014	67	0.02	0.08	0.59
Otter Creek Reservoir							
4949210	OTTER CK BL OTTER CK RES	4/26/1993	9/18/2014	32	0.02	0.10	0.34
4949108	E FK SEVIER R 2.5 MI BL OTTER CK RES	10/25/2006	10/25/2006	1	0.03	0.03	0.03
4949120	E FK SEVIER R .8MI N OF KINGSTON	9/28/2005	6/14/2006	6	0.03	0.05	0.08
4949100	E FK SEVIER R AT U62 XING E OF KINGSTON	1/9/1990	9/18/2014	162	0.01	0.08	0.26

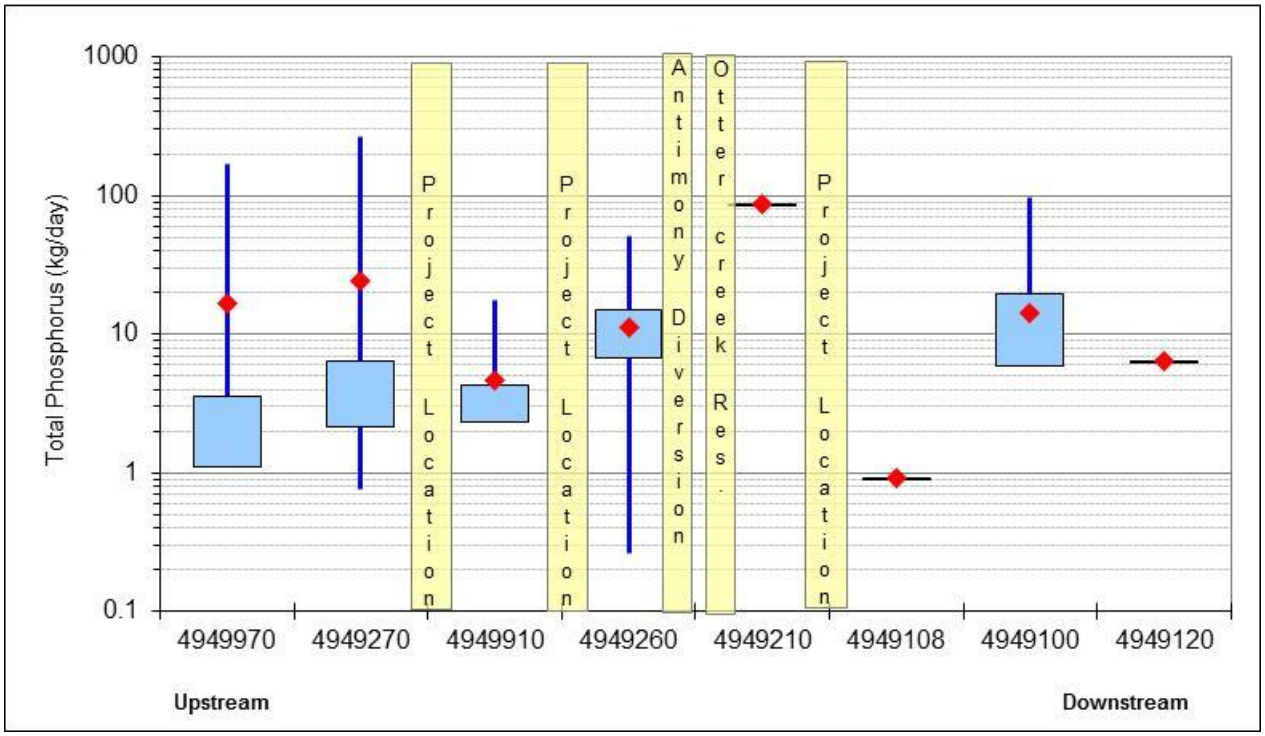


Figure 6-6. Total Phosphorus Summary Statistics for STORET Stations in Proximity to the Project Locations (1990 to Present).

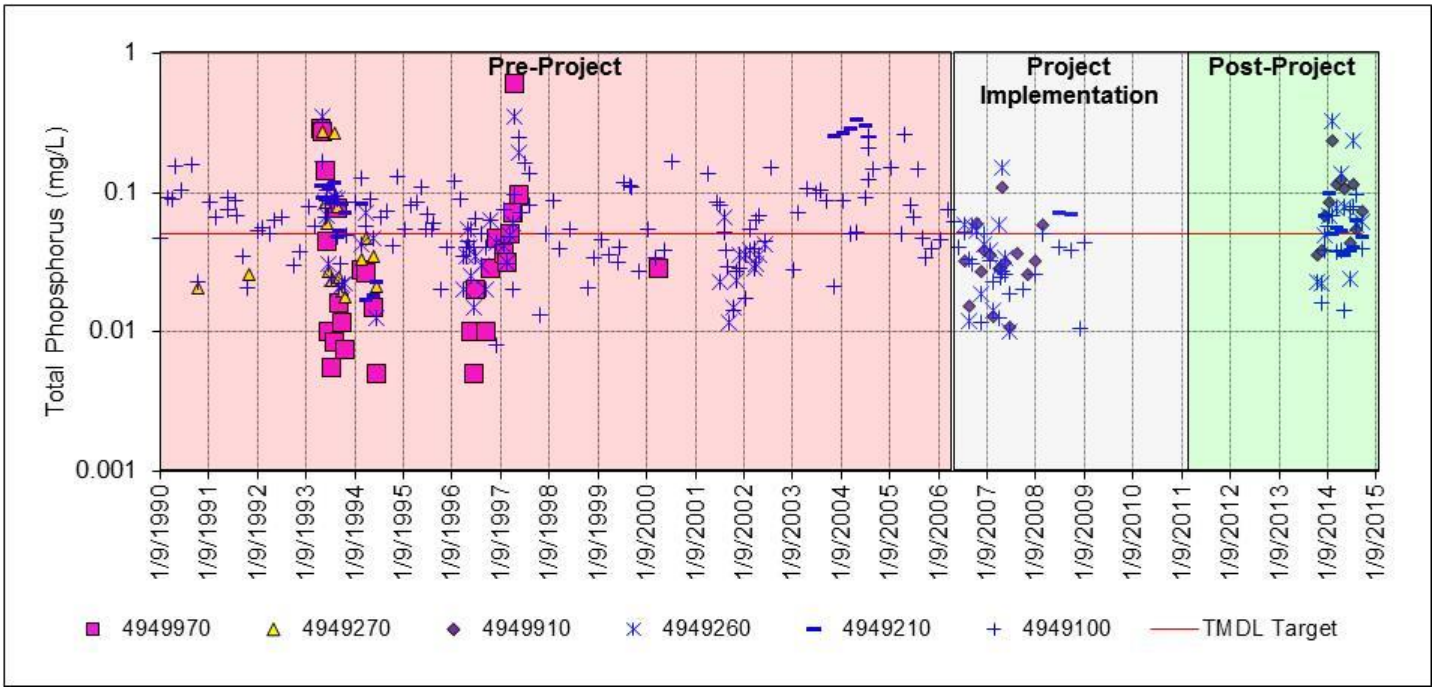


Figure 6-7. East Fork Sevier River Total Phosphorus Concentrations for Stations in Proximity to the Project Locations (1996-Present).

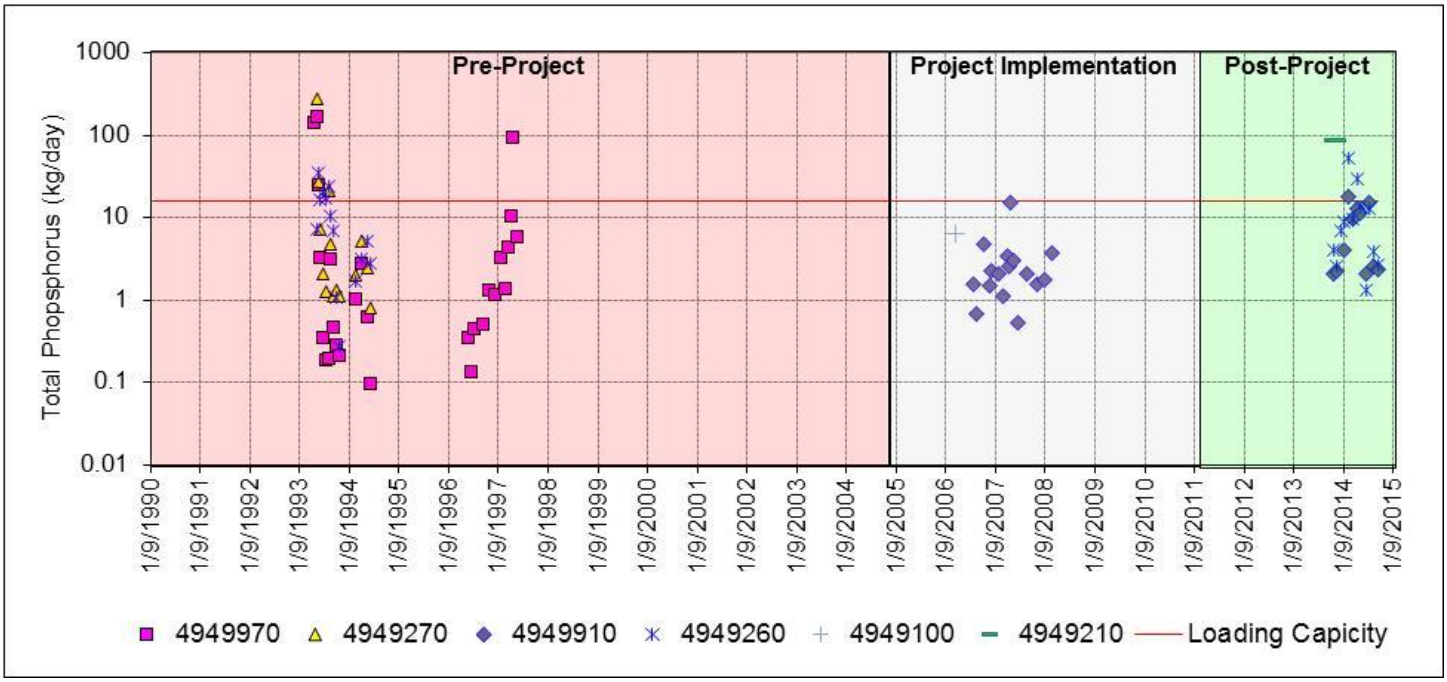


Figure 6-8. East Fork Sevier River Total Phosphorus Loads for Stations in Proximity to the Project Locations (1996-Present).

7.0 Benthic Macro Invertebrate Monitoring

Table 7-1 and Table 7-2 present the results from UDWQ Utah's Comprehensive Assessment of Stream Ecosystems (UCASE) monitoring for all events in the Upper Sevier River and East Fork Sevier River Watersheds, respectively. The biologic conditions of good, fair, and poor are based on statistical models of biologic integrity that compare the organisms expected to be present to those actually present within a given stream system. This approach of observed vs. expected, or O/E, allows for the comparison of benthic macroinvertebrates to determine if taxa composition and density are within the thresholds of a healthy stream ecosystem. The categories of good, fair, and poor represent a range of O/E values and are presented in broad categories due to changes in statistical models between sample years.

In general, benthic conditions do not demonstrate a significant trend in the Upper Sevier and East Fork Sevier River Watersheds over time (

Table 7-1 and Table 7-2). This is true for samples collected at individual monitoring locations and for multiple locations within an individual assessment unit. This is likely due to the effects of upstream sediment loading at monitoring at BMP implementation locations. Fine sediment and the lack of course gravel are the primary factor determining benthic communities in these watersheds.

Table 7-1. UCASE Benthic Macroinvertebrate Condition for Upper Sevier River

AU	Site Name	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
UT16030001-012	SEVIER R NEAR HATCH					Good					
UT16030001-005	SEVIER R 6MI SW OF CIRCLEVILLE				Fair			Fair			
UT16030001-005	Sevier R SW of Circleville										
UT16030001-007	SEVIER R EAST OF PANGUITCH FAIRGROUNDS				Fair						
UT16030001-011	Asay CK .5 mi bl US-89 Xing				Fair			Fair			
UT16030001-011	Asay Creek at U89		Fair	Poor							
UT16030001-009	MAMMOTH CREEK @ US 89 XING	Poor	Poor	Fair							
UT16030001-007	Sevier River-Dettamonte Prop										Poor
UT16030001-007	Sevier River-Roundy Prop										Poor
UT16030001-007	Sevier River-Partridge Prop										Fair

Table 7-2. UCASE Benthic Macroinvertebrate Condition for the East Fork Sevier River.

AU	Monitoring Location	2006	2007	2008	2009	2010	2011
UT16030002-005	E FK SEVIER R @ DWR PROPERTY 2.5 MI AB USGS GAGE	Poor	Poor				
UT16030002-005	E FK SEVIER R 2.5 MI BL OTTER CK RES	Good	Good				
UT16030002-006	E FK SEVIER R AB PINE CK	Poor	Poor				
UT16030002-006	E FK SEVIER R 1 MI AB 4949907 SITE IN BLACK CANYON	Fair	Good				
UT16030002-006	E Fk Sevier River-Martinez Prop						Poor
UT16030002-006	E Fk Sevier River-Gleave Prop						Good

8.0 Photo Point Monitoring

8.1 Creston Black

8.2 Steve Garrett Gated Pipe Project

Gated Pipe installed on Steve Garret to reduce Irrigation Return to the Sevier River.

8.3 DWR Wildlife Restoration Initiative Project

DWR WRI Bank 1 Before Project Implementation.

DWR WRI Bank 1 After One Year Needing Minor Repair.

DWR WRI Project Bank 2 After Two Years With Repair Work Completed.

DWR WRI Project Bank 2 before Implementation.

DWR WRI Project Bank 2 After Implementation.

DWR WRI Project Bank 3 Before Implementation

DWR WRI Project Bank 3 After Implementation

DWR WRI Project Bank 4 Before Implementation.

DWR WRI Project Bank 4 After Implementation

DWR WRI Project After Implementation with Barb Installation and Willow Growth.

8.4 Greg Excell

Gregg Excell Bank Erosion Before Project Implementation

Gregg Excell Bank 1 Before

Gregg Excell Bank 1 After

Gregg Excell Bank 2 Before

Gregg Excell Bank 2 After Showing Barb Installation

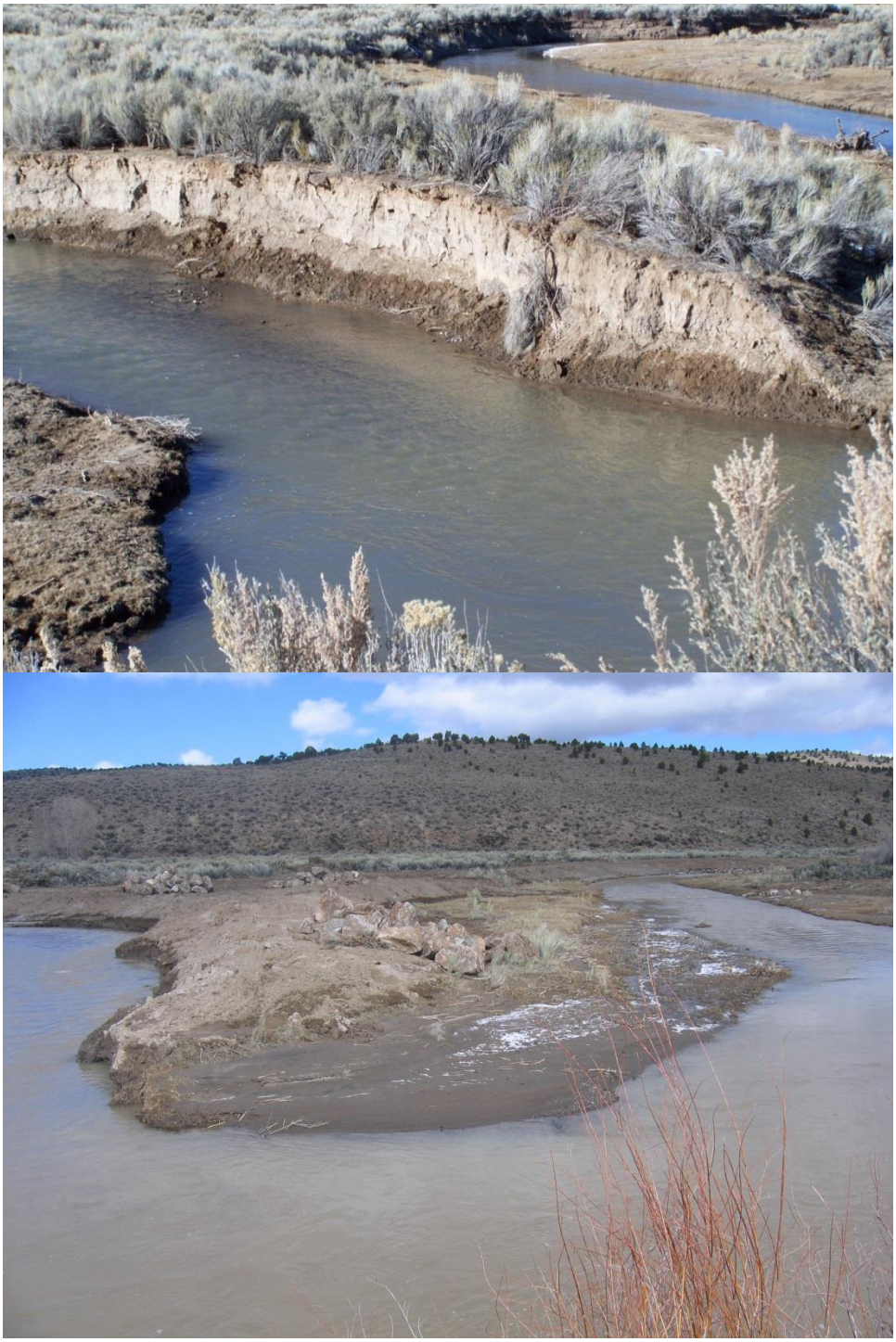
Greg Excell After Implementation showing Rock Installation and Bank Sloping.

Gregg Excell After Showing Gank Sloping.




Gregg Excell Project with Bank Stabilization Completed and during Flood Conditions.

8.5 Tim Westwood



Tim Westwood Project Before and After Implementation.


Tim Westwood Project with Willow Growth and minor Bank Erosion After Implementation.

8.6 Future Monitoring

The 2014 Intensive Basin Monitoring effort began October 1st 2013 and will continue through September 2014. This data is not yet available, but will be used to assess current trends, conditions, and to assess realized project load reductions. The intensive basin monitoring effort focused on water chemistry collection at DWQ long-term stations throughout the Upper Sevier Watershed, including the stations presented in Sections 6.1 and 6.2. DWQ is also planning to revisit previously monitored UCASE sites to assess the effects of BMP implementation on physical stream habitat and biological communities.

The Upper Sevier Watershed Group has initiated the process of revising the Upper Sevier River Watershed Plan in preparation of the Intensive Basin Funding Cycle scheduled for 2016. This process, in conjunction with the Intensive Basin Monitoring, includes revising the Upper Sevier River Sampling Analysis Plan to assure that data collection meets needs of watershed planning, assessment, BMP implementation, and TMDL implementation efforts. Results from these efforts will guide implementation of the FY 16 Sevier River Intensive Basin Funding program.

8.7 Coordination from other State Agencies

The Utah DWR was by far the biggest contributor to this project. Stan Beckstrom UDWR Fisheries Biologist did four major restoration projects and helped stretch the 319 funds that were committed by leveraging state Blue Ribbon Fisheries, UDWR Habitat Council, EQUIP, and Targeted Watershed funds. These funds helped secure additional projects that would not have been funded otherwise. Stan also helped on the design work of practically all of the projects that were implemented, without his expertise it would have been nearly impossible to get this money on the ground.

9.0 Federal Coordination

The NRCS committed funds to this project as well in the form of technical assistance, and monetarily. The technical assistance is an invaluable asset to completing these projects. At times coordinators don't have field expertise, or the equipment to design sprinkler, or pipe projects. These projects have ranked very high on the priority scale in the Upper Sevier Management Plan and in most other plans in the state of Utah. Without some kind of technical assistance it is very difficult to accomplish goals that are identified in the plans.

10.0 USDA Programs

EQIP funds were used as cost share to stretch other available funds. This is a very successful way to make 319 and other funds go further. We also received technical assistance on projects that were partially funded through EQIP.

11.0 Accomplishments of Agency Coordination Meetings

The Upper Sevier Steering Committee met bi-annually throughout the duration of this grant cycle. The Steering Committee is made up of top officials from different State, and Federal agencies. It also has leaders from local committees and private landowners as members. The Upper Sevier Conservation District Board is also used to approve projects for planning and funding. They meet each month so projects that come up between Steering Committee meetings are taken to them, and projects planned in the spring and fall are taken to the Steering Committee. During the Committee meetings the Watershed Coordinator gives a presentation on all of the projects that were accomplished throughout the year and gets financial approval for any projects planned for the following year. At the end of the meeting we have a round table so that members have an opportunity to listen to what other agencies are doing in their watersheds and give a report on what is happening in their particular watershed.

12.0 Summary of Public Participation

Each fall the Upper Sevier Information and Education committee host the Upper Sevier Watershed days. Thirty High School students at Panguitch High take a morning and plant willows, riparian grass, woody vegetation, and trees along the Sevier River where a project has been previously completed. In the afternoon they learn about water quality and water sampling, taught by someone at USU or Division of Water Quality. This is a great activity and a great opportunity to teach kids about water quality and what they can do to help keep the watershed in pristine condition. The I&E committee also puts on a fall tour so local producers and State and Federal Agencies can see what types of projects have been accomplished throughout the year. This is also a very effective way to involve outside agencies and generate interest in projects.

13.0 Aspects of the Project that Did Not Work Well

Everything in this project was a good success. I would make sure in the future to set up a better monitoring system to monitor projects pre work, and post work, this would help us analyze data more effectively and understand better which projects are working and which ones aren't. It is important that we have a well-

established grazing practice in place with fencing where applicable and a rotational grazing system set up so these projects have time to establish.

14.0 Future Activity Recommendations

The Upper Sevier River Project is one of the best successes in this part of the state. We have gotten several large-scale grants and done literally millions of dollars in restoration work. We have several projects that are in the planning stages for the future. It is imperative that we have funding to continue this work. The only way that this money will continue to get on the ground is through local Coordinators and agencies dedicated to continuing these projects and returning this river to its pristine condition and Class A fishery for Southern Utah. We need continual support from State and Federal agencies for funding and especially technical support. The NRCS could be a great source of technical support if the local on the ground people had the support and funding to work with local Coordinators and Conservation Districts. The work that has been accomplished here is due to the fact that we have great state, federal, and local coordination.