Salmon Falls Creek Subbasin
Agriculture TMDL Implementation Plan
HUC 17040213

Developed for
Idaho Department of Environmental Quality

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INTRODUCTION

The Salmon Falls Creek Total Maximum Daily Load (TMDL) Implementation Plan is a plan designed to assist and/or complement other watershed efforts to aid in restoration and protection of beneficial uses for water quality impaired streams in the Salmon Falls Creek subbasin. It will also provide the necessary guidance to the Twin Falls Soil & Water Conservation District, the Balanced Rock Soil Conservation District, and agricultural producers in the Salmon Falls Creek subbasin to meet the requirements of the TMDLs on 303(d) listed streams.

PURPOSE

The Salmon Falls Creek TMDL Implementation Plan for Agriculture outlines an adaptive management approach for implementation of best management practices (BMPs) and resource management systems (RMS) on agricultural lands to meet the requirements of the Salmon Falls Creek TMDL.

GOALS AND OBJECTIVES

The goal of this plan is to improve water quality by implementing BMPs to control agricultural non-point source pollution for approximately 24 miles of 303(d) listed streams and for approximately 94,637 critical acres of private cropland and rangeland. Table 2, under the subwatersheds section, identifies the pollutants of concern.

The objective of this plan is to reduce the amount of pollutants entering these water bodies from agricultural-related practices. Agricultural pollutant reductions will be achieved by on-farm conservation planning with individual operators and by application of BMPs in agricultural critical areas. This plan recommends BMPs needed to meet TMDL targets in the Salmon Falls Creek subbasin, and suggests alternatives for reducing surface and groundwater quality problems from agricultural related activities.

BACKGROUND

PROJECT SETTING

Subbasin:

The Salmon Falls Creek subbasin, located in southern Idaho and northern Nevada encompasses portions of Twin Falls and Owyhee counties in Idaho; and Elko County in Nevada (Figure 1 and Table 1). Approximately 513,280 acres of the Salmon Falls Creek subbasin lie within Twin Falls County and 44,160 acres lie within Owyhee County (Table 1). It is part of the Upper Snake Basin, Hydrologic Unit Code (HUC) # 17040213. The remainder of this implementation plan will focus only on the Idaho portion of the subbasin.

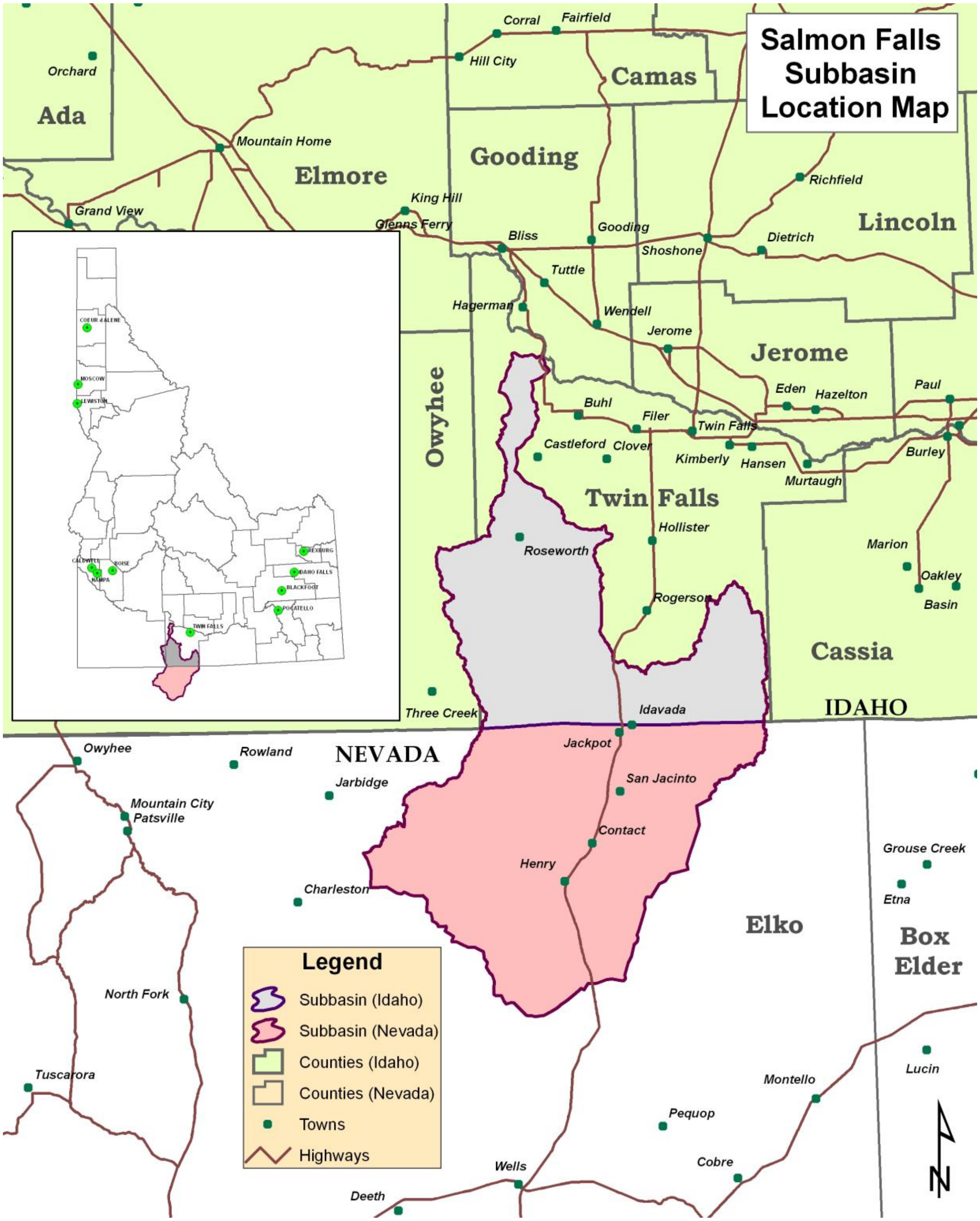

Figure 1. Location of Salmon Falls Creek Subbasin in Idaho

Table 1. Subbasin acreages in Idaho and Nevada counties

County	Area (Acres)	Percent of Total Area
Elko County, Nevada	788,480	59
Twin Falls County, Idaho	513,280	38
Owyhee County, Idaho	44,160	3
TOTAL	1,345,920	100

The two major drainages are Shoshone Creek and Salmon Falls Creek. Shoshone Creek starts in the Cassia Mountains (known locally as the South Hills of south central Idaho). The eastern boundary of the basin is known as Deadline Ridge and occurs within the Sawtooth National Forest. Upon entering Nevada, Shoshone Creek veers towards the west crossing US Highway 93 approximately two miles south of Jackpot, Nevada. This is where Shoshone Creek joins the main branch of Salmon Falls Creek. Shoshone Creek and its tributaries account for approximately 40 percent of the subbasin above the Salmon Falls Creek Reservoir.

The headwaters of Salmon Falls Creek originate in the Nevada mountain range within the Jarbidge Forest southwest of Contact, Nevada. Most of Salmon Falls Creek subbasin lies in Nevada with its headwaters occurring in several different drainages. The southeast drainages begin in the Trout Creek subbasin. The creeks in this area form the South Fork of Salmon Falls Creek The North Fork and South Forks of Salmon Falls Creek join together approximately 10 miles west of Contact, Nevada and run southeasterly toward Highway 93.

The northern or lower subwatershed of Salmon Falls Creek occurs in Idaho in the area west of the reservoir known as Browns Bench and China Mountain. These areas drain south towards O'Neil basin through the North Fork of Salmon Falls Creek and through smaller tributaries that drain directly into the west side of Salmon Falls Creek Reservoir.

The water which seeps through Salmon Falls Creek dam makes its way down to the Snake River. This lower section of Salmon Falls Creek runs through a deep basalt canyon. The majority of the cropland in the subwatershed is situated 22 miles below the dam. The hydrology in this section is manipulated by pumping water out to irrigate crops on the west side in the Magic Waters area. On the east side there are irrigation return flow drains which flow into Salmon Falls Creek.

Climate, Vegetation, and Soils:

The climate in the Salmon Falls Creek subbasin consists of generally mild winters and hot summers. The recorded temperatures in the subbasin range from 20 degrees below zero to 110 degrees F. Annual precipitation in the Salmon Falls subbasin is highly variable from year to year, ranging from 40 inches in the Jarbidge Mountains to 10 inches on the valley floor.

The Salmon Falls Creek subbasin is characterized as a "sagebrush-steppe" community. Sagebrush-steppe is a type of dry habitat characterized by sagebrush and other shrubs and short, perennial grasses. Along the Snake River Plain, shrub-steppe winters are cold and wet with strong winds and blowing snow.

The majority of the soils in the Salmon Falls Creek subbasin are deep, fertile loam soils. These soils are best suited for sprinkler irrigation, although, surface irrigation can be used if the water is regulated to control erosion. Soils underlying stream channels and surrounding canyon areas are the biggest concern in the subbasin. Stream channels are made up primarily of gravelly loam/sandy loam soils which have a moderate water erosion rate. With the fluctuating hydrology of a majority of these waters coupled with the lack of vegetation in some areas, these areas are at high risk for bank erosion. A large amount of the streams are surrounded by canyons which are primarily rock outcrop complexes subject to severe water erosion. Another concern in the Salmon Falls Creek subbasin is the semi wet meadows which are present along the streams.

For more information about the Salmon Falls Creek subbasin, please consult the Salmon Falls Creek Subbasin Assessment and TMDL (IDEQ 2007).

SUBWATERSHEDS

In order to simplify the flow of the Salmon Falls Creek Implementation Plan, the plan will be separated into 4 distinct sections based on area and land use.

Based on the conclusions from the Salmon Falls Subbasin Assessment and TMDL, waterbodies, assessment unit(s), subwatersheds, and their pollutants are provided in Tables 2-5. The Salmon Falls Subbasin Assessment and TMDL uses assessment units, a new system for grouping streams based on stream order, land ownership, and land use. Assessment units are a subset of waterbody identification numbers for streams. Subwatershed numbers have been provided for cross reference with assessment units. Subwatershed names and numbers are shown in Figure 2.

Figure 3 illustrates the impaired streams in the Salmon Falls Creek subbasin.

1. Cedar Creek Reservoir and the waters which drain into it (Table 2).

2. Salmon Falls Creek Reservoir along with the streams which drain into it (Table 3).

3. Lower Salmon Falls Creek which includes the sixth order segment of Salmon Falls Creek that begins at the confluence with Devil Creek and terminates at the confluence of the Snake River (Table 4).

4. The Shoshone Creek subwatersheds which are located in the eastern portion of the subbasin (Table 5).

Table 2. Cedar Creek Reservoir and drainage

Waterbody	Assessment Unit(s)	Subwatershed	Pollutants
Cedar Creek Reservoir	ID17040213SK004_L ID17040213SK004	1704021305	Sediment, Temperature, TP
Cedar Creek (Lower)	ID17040213SK000_04	1704021305	Flow Alteration, Sediment, Temperature
Cedar Creek (Upper)	ID17040213SK000_06	1704021303	Sediment, Temperature, TP
House Creek	ID17040213SK000_05	1704021305	Sediment, Temperature, TP

Table 3. Salmon Falls Creek Reservoir and drainage

Waterbody	Assessment Unit(s)	Subwatershed	Pollutants
Salmon Falls Creek Reservoir	ID17040213SK007__L	1704021306	Mercury
Salmon Falls Creek (state line to Salmon Falls Creek Reservoir)	ID17040213SK009_06	1704021307	Temperature, Sediment, TP
N. Fork Salmon Falls Creek	ID17040213SK010	1704021326	Temperature
China Creek, Browns Creek, Corral Creek, Whiskey Slough, and Player Creek	ID17040213SK008_02	1704021306	Temperature, Sediment, TP
China Creek	ID17040213SK008_03	1704021306	Temperature, Sediment, TP

Table 4. Lower Salmon Falls Creek

Waterbody	Assessment Unit(s)	Subwatershed	Pollutants
Lower Salmon Falls Creek (Devil Creek to mouth of Snake River)	ID17040213SK001_06 ID17040213SK003_06	1704021301	Temperature, TP, TN, Sediment

Table 5. Shoshone Creek and tributaries

Waterbody	Assessment Unit(s)	Subwatershed	Pollutants
Shoshone Creek (Hot Creek to the Idaho/Nevada state line)	ID17040213SK011_04	1704021309 1704021310	Sediment, Temperature
Shoshone Creek (Cottonwood Creek to Hot Creek)	ID17040213SK013_04	1704021309 1704021310	Sediment, Temperature
Shoshone Creek (source to Cottonwood Creek)	ID17040213SK016_02, ID17040213SK016_03, ID17040213SK016_04	1704021311	Sediment, Temperature
Cottonwood Creek	ID17040213SK015_02 ID17040213SK015_03	1704021311	TP, Sediment, Bacteria, Temperature
Big Creek	ID17040213SK014	1704021311	Sediment, TP, Temperature
Hot Creek	ID17040213SK012_03 ID17040213SK012_04	1704021311	Temperature

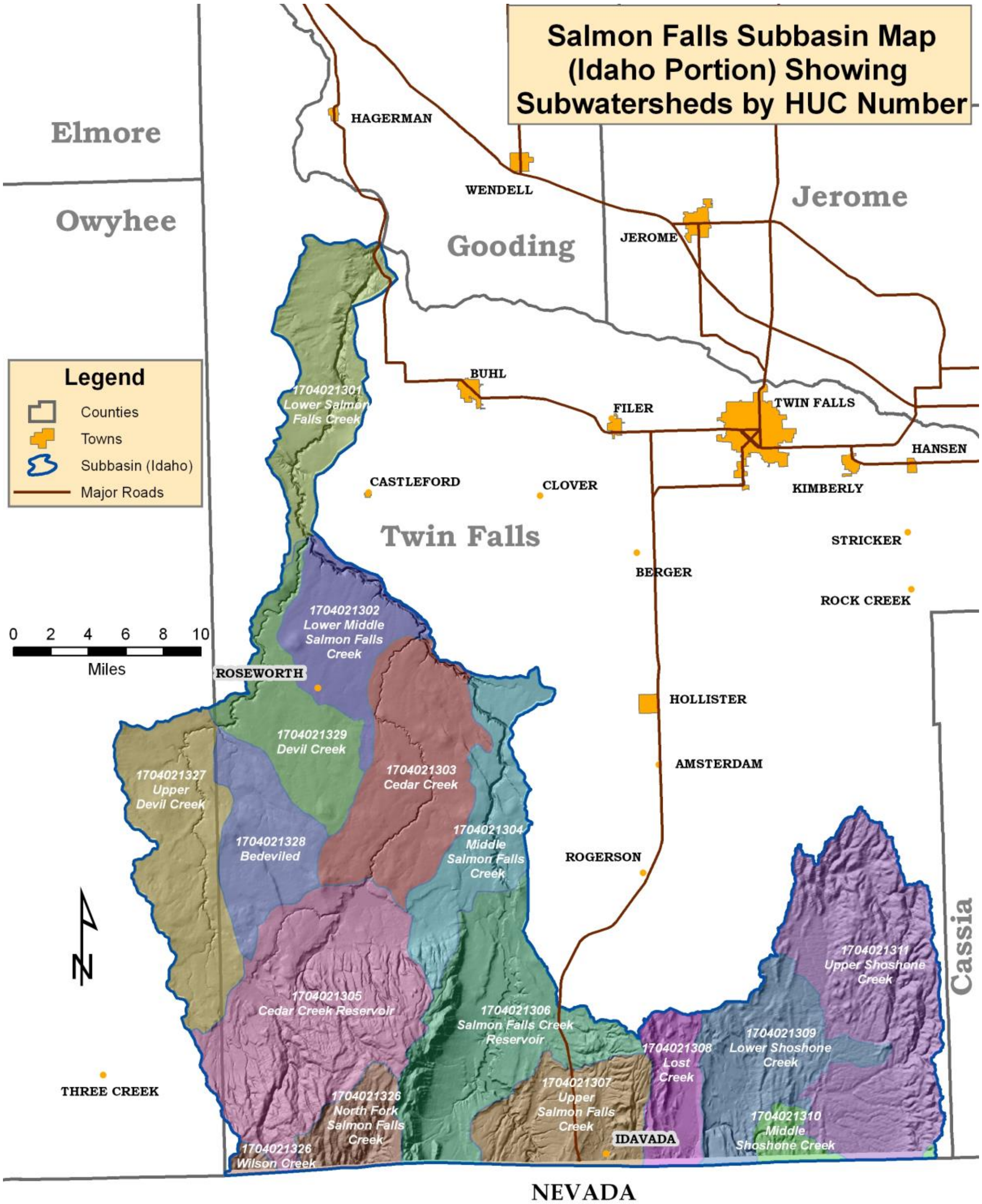

Figure 2. Subwatersheds in the Salmon Falls Creek Subbasin

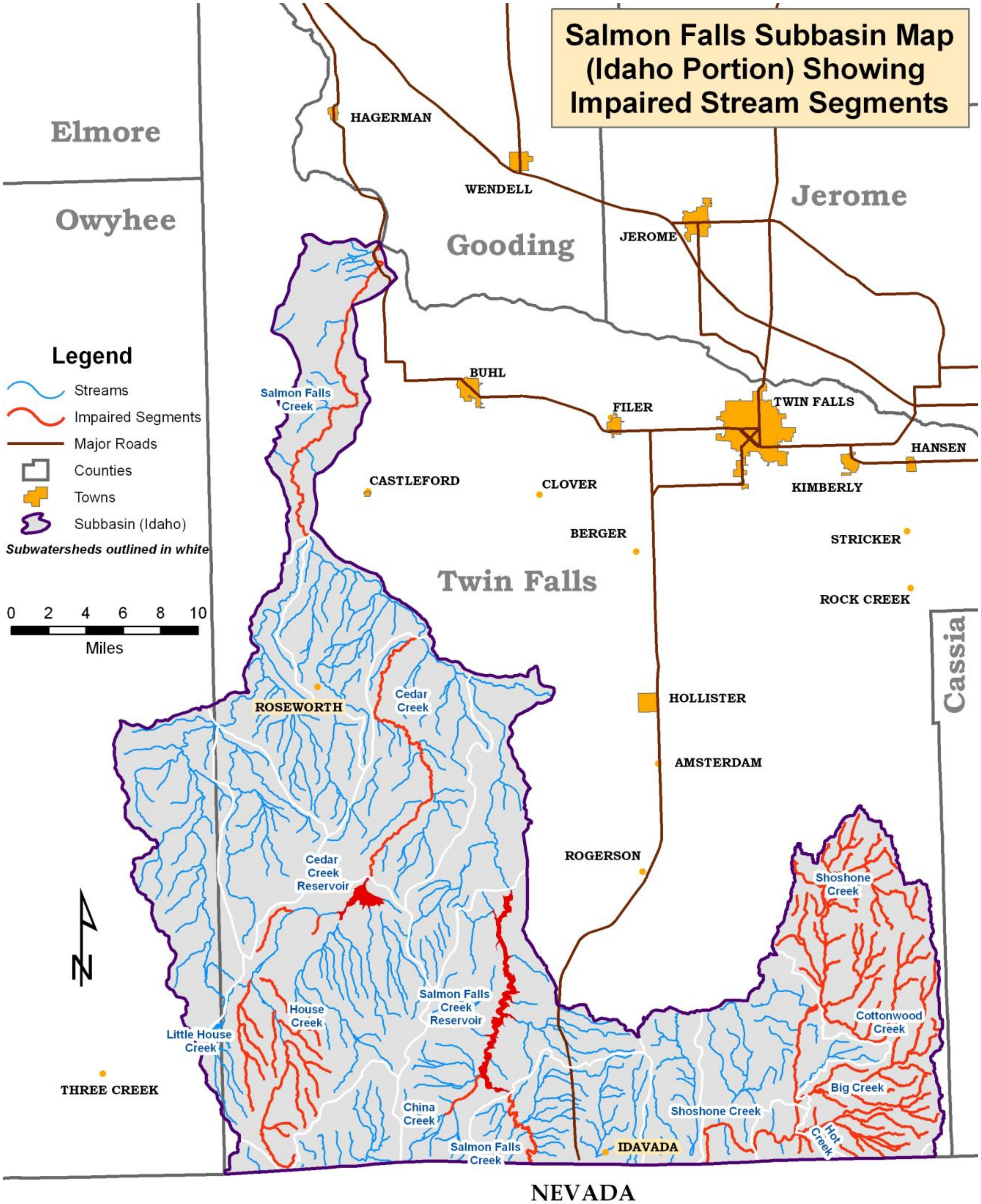

Figure 3. 2002 303(d) listed Waterbodies in the Salmon Falls Creek Subbasin

LAND USE

There are four major land uses in the Salmon Falls Creek subbasin: 1) irrigated agriculture, which includes cropland and pasture/hayland, 2) forest, 3) rangeland, and 4) water/wetlands/urban (Figure 4 and Table 6). Grazed rangeland is the largest land use and encompasses approximately 424,544 acres or 77% of the subbasin (Table 6). Irrigated agriculture is the third largest land use and occurs mainly below Salmon Falls Creek Reservoir. Major crops grown in this area include pasture, alfalfa, small grains, corn, sweet corn, dry beans, sugar beets, and potatoes. Approximately 75% of the irrigated agricultural land is irrigated by sprinkler with the remaining 25% irrigated by furrow irrigation.

Animal feeding operations within the Salmon Falls Creek subbasin are not a significant resource concern. Only one dairy farm exists within the Salmon Falls Creek subbasin. There are a total of two confined animal feeding operations. These operations are within the confines of state and federal laws. The owners of these operations are aware of the Salmon Falls Creek TMDL and have adequate best management practices in place to minimize negative impacts to water quality.

Table 6. Land use in the Salmon Falls Creek Subbasin.

Land Use Category	Acres	% of Subbasin
Cropland	22,140	4
Grass/Pasture/Hayland	99,570	18.02
Forest	650	0.12
Rangeland/Shrubland	424,544	76.86
Water/Wetlands/Urban	5,480	1
	552,384	100

LAND OWNERSHIP

The subbasin contains portions of Twin Falls and Owyhee Counties. Only 24 percent of the entire subbasin is privately owned. Seventy one percent of the subbasin is managed by the federal government. Sixty three percent is managed by the United States Bureau of Land Management (BLM) and 8 percent is managed by the United States Forest Service. State lands account for 4.5 percent of the subbasin (Figure 5, Table 7).

Table 7. Land Ownership in the Salmon Falls Creek Subbasin.

Land Owners/Managers	Acres	% of Subbasin
Private	133,248	24.12
BLM	349,564	63.28
USFS	44,338	8.03
US Military	143	0.03
State	25,091	4.54
TOTAL	552,384	100

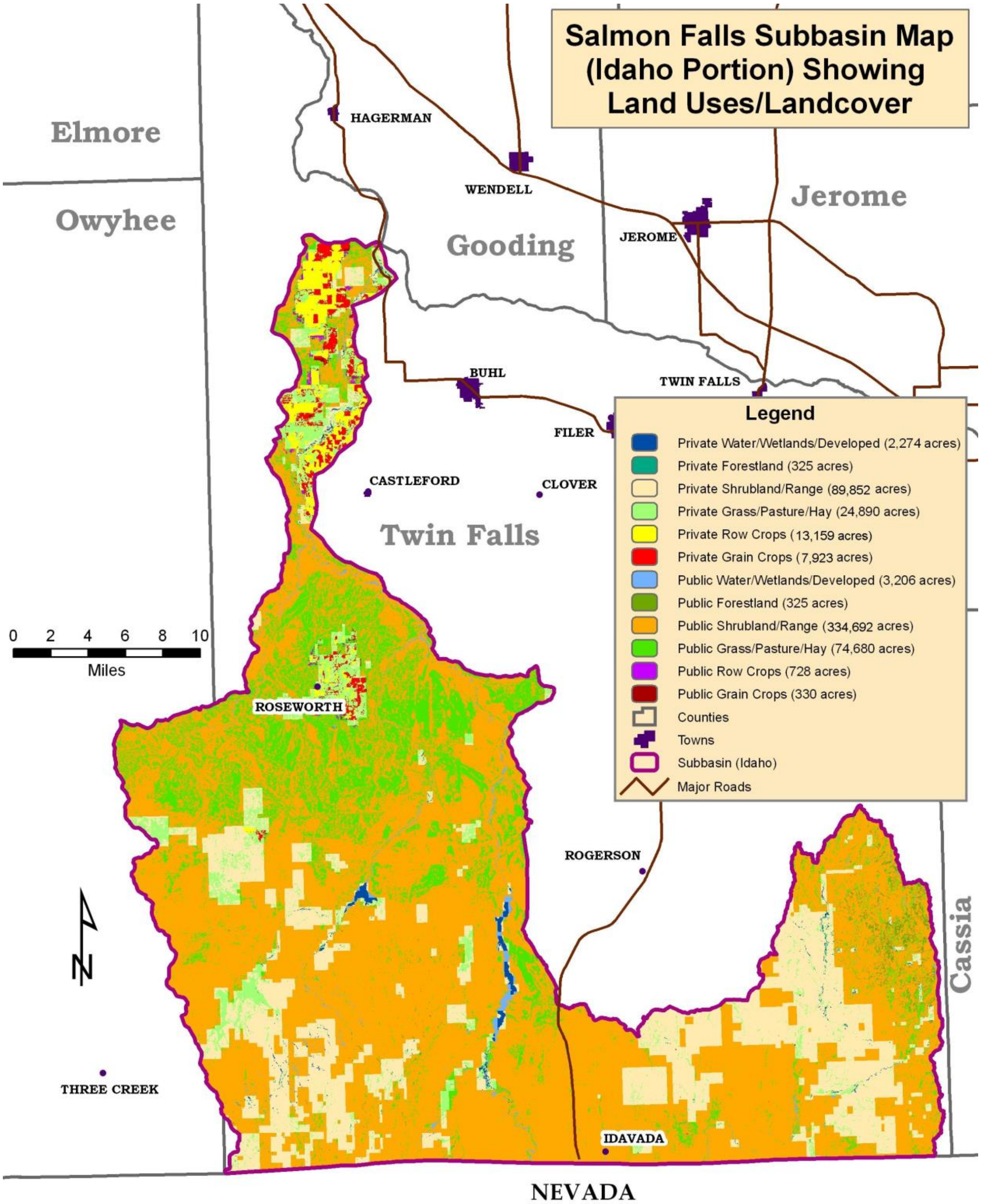

Figure 4. Land Uses in the Salmon Falls Subbasin

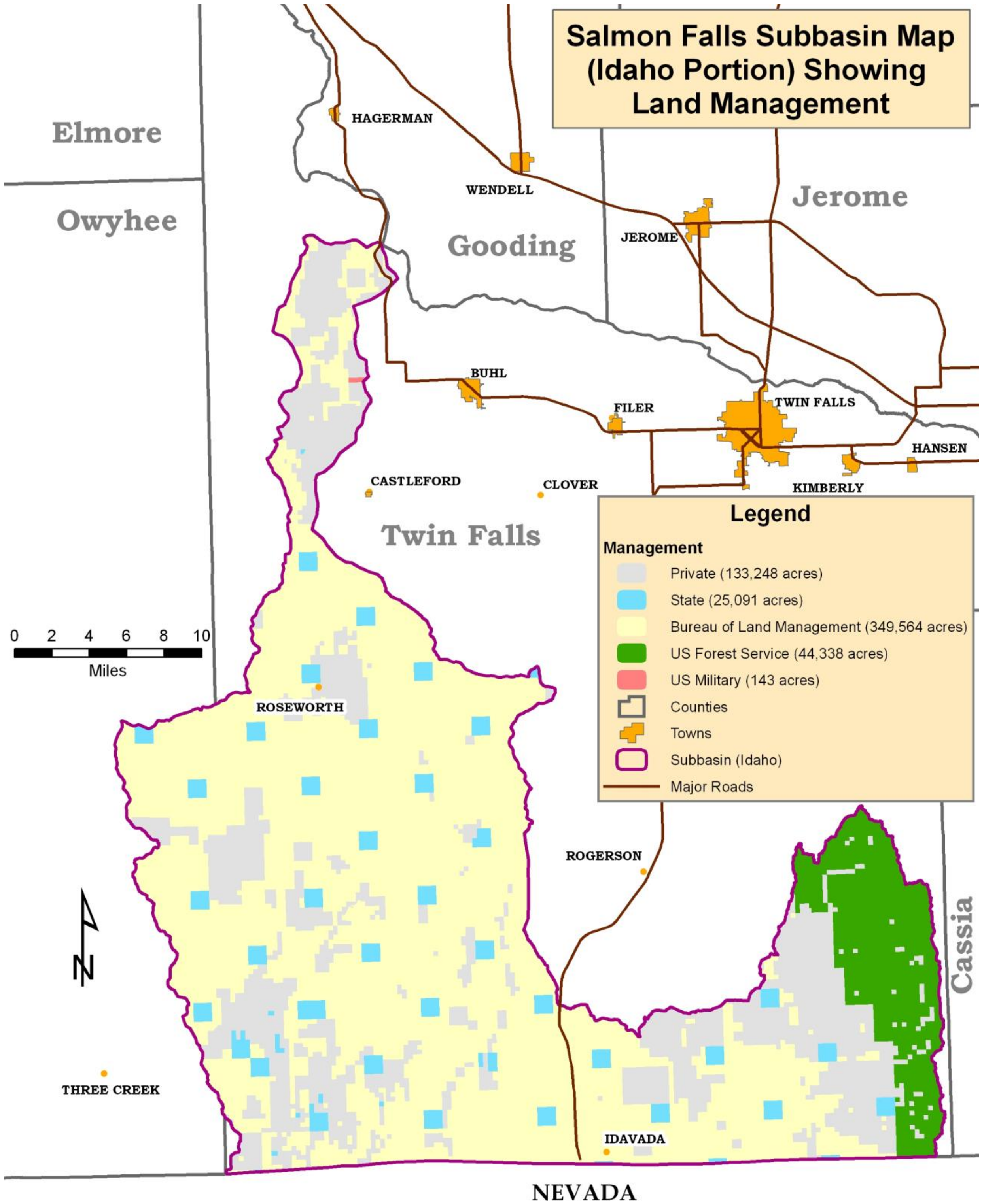

Figure 5. Land Ownership in the Salmon Falls Subbasin

CONSERVATION ACCOMPLISHMENTS

The Balanced Rock Soil Conservation District, the Twin Falls Soil and Water Conservation District, the Natural Resources Conservation Service (NRCS), and the Idaho Soil Conservation Commission (ISCC) have assisted landowners and producers with implementation of water quality projects in the Salmon Falls Creek subbasin over the past several years. Many acres of cropland have been converted from flood to sprinkler irrigation with cost share being provided by the NRCS through the Environmental Quality Incentives Program (EQIP) and by the ISCC through the Water Quality Program for Agriculture (WQPA), the Conservation Improvement Grant (CIG) program, and the Resource Conservation and Rangeland Development Loan Program (RCRDP). Approximately 15,400 acres of agricultural lands are now watered with sprinkler irrigation, while 4,600 acres are surface (flood) irrigated. Many conservation practices have been implemented along Shoshone Creek. Numerous projects which focus on sage grouse habitat restoration have been undertaken on the private and public rangeland in the Shoshone Basin. Table 8 lists the Best Management Practices (BMPs) which have been installed on private lands in the Salmon Falls Creek subbasin over the last 10 years (http://ias.sc.egov.usda.gov/PRSHOME/, ISCC 2008).

Table 8. Conservation practices installed in the Salmon Falls Creek Subbasin

Conservation Practice	Practice No.	Unit	Amount Installed
Brush Management	314	ac	607
Comprehensive Nutrient Management	100	no	2
Conservation Crop Rotation	327	ac	3,258
Diversion	362	ft	825
Fence	382	ft	28,622
Filter Strip	393	ac	3
Forage Harvest Management	511	ac	875
Irrigation Regulating Reservoir	552	no	9
Irrigation System Sprinkler	442	ac	2,176
Irrigation System, Surface & Subsurface	443	ac	206
Irrigation Water Conveyance, pipeline	430dd	ft	24,318
Irrigation Water Conveyance, pipeline	430ee	ft	8,192
Irrigation Water Management	449	ac	3,028
Nutrient Management	590	ac	998
Pest Management	595	ac	5,042
Pipeline	516	ft	29,720
Pond	378	no	4
Prescribed Grazing	528	ac	23,635
Pumping Plant	533	no	10
Range Planting	550	ac	320
Residue Management, Seasonal	344	ac	4,764
Residue Management, Mulch till	345	ac	3,921
Riparian Forest Buffer	391	ac	2
Sediment Basin	350	no	1
Stream Crossing	578	no	4
Structure for Water Control	587	no	5
Surface Roughening	609	ac	4,856
Tree and Shrub Establishment	612	ac	2
Upland Wildlife Habitat Management	645	ac	7,337
Use Exclusion	472	ac	37
Waste Storage Facility	313	no	5
Watering Facility	614	no	18
Water Well	642	no	1
Wetland Enhancement	659	ac	40
Wetland Wildlife Habitat Management	644	ac	34
Windbreak/Shelterbelt Establishment	380	ft	16,237

WATER QUALITY PROBLEMS

BENEFICIAL USE STATUS

Idaho water quality standards require that beneficial uses of all water bodies be protected. Beneficial uses can include existing uses, designated uses, and presumed existing uses. Designated uses are uses officially recognized by the state. In cases where designated uses have not been established by the state for a given water body, DEQ has established the presumed existing uses of supporting cold water aquatic life and either primary or secondary contact recreation. Beneficial uses for water bodies on the 2002 303(d) list in the Salmon Falls Creek subbasin are listed in Tables 9-12 (IDEQ 2007, http://global.deq.idaho.gov/Website/deqwaters/viewer.htm).

Table 9. Beneficial uses for 2002 303(d) listed stream segments Cedar Creek Reservoir and drainage (IDEQ 2007)

Subwatershed	Assessment Units	Beneficial Use(s)	Support Status
Cedar Creek Reservoir	ID17040213SK004_L	CWAL, PCR, AWS	CWAL-Not Fully Supported, PCR-Fully Supported
Cedar Creek (Lower)	ID17040213SK000_04	CWAL, SCR, AWS	CWAL-Not Fully Supported

Table 10. Beneficial uses for 2002 303(d) listed stream segments Salmon Falls Creek Reservoir and drainage (IDEQ 2007)

Subwatershed	Assessment Units	Beneficial Use(s)	Support Status
Salmon Falls Creek Reservoir	ID17040213SK007_06	CWAL, PCR, AWS, SS	CWAL-Not Fully Supported, PCR-Fully Supported
Upper Salmon Falls Creek (Idaho/Nevada state line to Salmon Falls Creek Reservoir)	ID17040213SK009_06 ID17040213SK001_06	CWAL, PCR, AWS, SS	CWAL, PCR, & SS-Not Fully Supported
China Creek	ID17040213SK008_03	CWAL, SCR, AWS, SS	CWAL & SS-Not Fully Supported SCR-Fully Supported
China Creek, Browns Creek, Corral Creek, Whiskey Slough, and Player Creek	ID17040213SK008_02	CWAL, SCR, AWS	CWAL-Not Fully Supported SCR-Fully Supported

Table 11. Beneficial uses for 2002 303(d) listed stream segments Lower Salmon Falls Creek (IDEQ 2007)

Subwatershed	Assessment Units	Beneficial Use(s)	Support Status
Lower Salmon Falls Creek (Devil Creek to mouth of Snake R.)	ID17040213SK001_06	CWAL, PCR, AWS, SS	CWAL & SS-Not Fully Supported PCR-Fully Supported

Table 12. Beneficial uses for 2002 303(d) listed stream segments Shoshone Creek and tributaries (IDEQ 2007)

Subwatershed	Assessment Units	Beneficial Use(s)	Support Status
Upper Shoshone Creek (Hot Creek to the Idaho/Nevada state line)	ID17040213SK011_04	CWAL, SCR, AWS	CWAL-Not Fully Supported SCR-Fully Supported
Middle Shoshone Creek (Cottonwood Creek to Hot Creek)	ID17040213SK013_04	CWAL, SCR, AWS	CWAL-Not Fully Supported SCR-Fully Supported
Big Creek	ID17040213SK014_02 ID17040213SK014_03	CWAL, SCR, AWS	CWAL-Not Fully Supported SCR-Fully Supported
Subwatershed	Assessment Units	Beneficial Use(s)	Support Status
Hot Creek	ID17040213SK012_02 ID17040213SK012_03A ID17040213SK012_04	CWAL, SCR, AWS	CWAL-Not Fully Supported SCR-Fully Supported

AWS = Agricultural Water Supply; DWS = Domestic Water Supply; CWAL = cold water aquatic life; PCR = primary contact recreation; SCR = secondary contact recreation; SS = salmonid spawning, WWAL=warm water aquatic life.

POLLUTANTS

Introduction

The Idaho Association of Soil Conservation Districts (IASCD) has been conducting water quality monitoring on Salmon Falls Creek since 2002. This data were incorporated into the Salmon Falls Creek Subbasin Assessment and TMDL. Water quality data were collected at three sites along Salmon Falls Creek: Miracle Hot Springs, just below Balanced Rock State Park, and Lilly Grade (Clawson 2006). Monitoring was later conducted on three additional sites for Shoshone Creek and one site for each of Big, Cottonwood, and Hot Creeks. Monek (2007) reported, "to date, very little water quality data other than that performed by the IDEQ exists in the Brown's Bench area west of the dam in the Salmon Falls Creek subbasin."

Methods

Monek stated that, "samples were collected for suspended sediment concentration, total phosphorous, orthophosphorous, and *Escherichia coli* (*E. coli*) at each location. Stream discharge, temperature, pH, conductivity, total dissolved solids (TDS), and dissolved oxygen (DO) were also measured at all monitoring locations. Additionally, total Kjeldahl nitrogen (TKN), ammonia, and nitrates were collected for the first four monitoring events at all sites. These samples were discontinued because it was determined that nitrogen was not a major factor contributing to nutrient impairment within the subbasin."

Results

A summary of the monitoring data used to justify impairment of 303 (d) listed streams is found below. These results are categorized by pollutant.

Bacteria

Bacteria levels are a concern in upper Shoshone Creek and Cottonwood Creek. The instantaneous bacteria criteria for primary contact recreation (406 cfu/100 mL) was exceeded for 18% of all monitoring events at the upper Shoshone Creek site and 23% of all events at the Cottonwood Creek site (Monek 2007). Monek stated that, "this may be due to cattle in the stream within close proximity to the monitoring locations." However, bacteria was delisted as a pollutant for Shoshone Creek because the IDEQ determined the exceedances to be seasonal, site specific, and likely to be addressed with BMPs (IDEQ 2007). A TMDL for bacteria was deemed necessary for Cottonwood Creek.

Mercury

Although not currently listed on the integrated report, Salmon Falls Creek Reservoir was examined due to a fish consumption advisory placed on the waterbody in 2001. Fish tissues were collected in October of 2006. Mercury concentrations found in fish at that time averaged 0.779 mg/kg, well above IDEQ's health and safety standards for fish tissue of 0.30 mg/kg. In order to meet the water quality standard, mercury levels would need to be reduced by 69 percent. Mercury is entering Salmon Falls Creek Reservoir from several possible sources: Salmon Falls Creek and/or other tributaries, dry deposition and/or wet deposition, soil materials and/or geothermal springs, and/or gold mining. Mercury is also a problem in Cedar Creek. The IDEQ is in the process of developing a TMDL for mercury for Salmon Falls Creek Reservoir (Monek 2008, IDEQ 2007).

Nutrients

IDEQ determined that total phosphorus (TP) was a limiting nutrient in the subbasin. However, Big Creek, China Creek, Cottonwood Creek, and Shoshone Creek have excess TP that may be impacting the beneficial uses of Shoshone Creek. In addition, Salmon Falls Creek Reservoir and Cedar Creek Reservoir have excess levels of phosphorus that are contributing to nuisance aquatic blooms and consequently eutrophication of these reservoirs. All monitoring sites, except one on Shoshone Creek, exceeded the TMDL instantaneous target for at least 8% of monitoring events. However, average TP only ranged between 0.06 – 0.08 mg/L for all sites. All tributary streams that flow into these two reservoirs have been listed for nutrients, in particular phosphorus. In the Salmon Falls Creek Reservoir, annual TP concentrations averaged 0.114 mg/L while in the Cedar Creek Reservoir annual TP concentrations averaged 0.100 mg/L. TP concentrations for China Creek have averaged 0.185 mg/L annually. Natural background levels in the subbasin were determined to be between 0.02-0.035 mg/L TP. TP concentrations are set at 0.05 mg/L for Salmon Falls Creek, China Creek, Cedar Creek, and House Creek because these streams flow into a reservoir. Salmon Falls and Cedar Creek Reservoir TP concentration targets are set at 0.025 mg/L (Monek 2008., IDEQ 2007). Water samples taken from Salmon Falls Creek near the confluence with the Snake River exceeded the TMDL target for instantaneous total phosphorus for more than twenty percent of the samples (Clawson, 2006). In addition to phosphorus loading, Salmon Falls Creek has an excess nitrogen problem (IDEQ, 2007).

Sediment

Lower and Upper Salmon Falls Creek have excess total suspended sediment loading from bank instability. The remaining streams listed for sediment also have poor bank stability. Cottonwood and Big Creeks have exceptionally high streambank erosion rates (DEQ 2007). Average suspended sediment concentrations (SSC) ranged from 7.4 mg/L – 20.4 mg/L (Monek 2007).

Temperature

Salmon Falls Creek (NV/ID border to Salmon Falls), Shoshone Creek (NV/ID border to Magic, Cottonwood Creek to Big Creek), and Hot Creek are listed as impaired by temperature because of lack of shading along these streams. Additionally, major tributaries to Salmon Falls Creek and Shoshone Creek were added to the analysis as potential sources of heat loading. These tributaries included the South Fork Shoshone Creek, Pole Camp Creek, Cottonwood Creek, Langford Flat Creek, Big Creek, Hannah's Fork, and Horse Creek in the Shoshone Creek drainage. In the Salmon Falls Creek drainage, Devil Creek, Cedar Creek, House Creek, Little House Creek, Whiskey Slough, Browns Creek, China Creek, Player Creek, and the North Fork Salmon Falls Creek were examined (Monek 2008).

IASCD monitoring data showed that four of the six monitoring locations exceeded the state criteria for temperature for at least 30% of the sampling events. Due to the time of day that temperature measurements were taken, this figure was likely conservative. Most exceedances coincided with spring and fall salmonid spawning, causing additional concern regarding the cold water aquatic life and salmonid spawning temperature criteria. High water temperature measurements may be an expression of riparian conditions and beaver activity in the region. Areas of sparse streamside vegetation and numerous beaver ponds often resulted in reduced shading and increased solar isolation (Monek 2007).

Although water temperature exceeded the salmonid spawning and cold water aquatic life targets for most of the samples, there are many natural factors that potentially cause these exceedances. Water temperature of Salmon Falls Creek is influenced by geothermal springs, groundwater, irrigation return flows, and Salmon Falls Dam (Clawson 2006).

Discussion and Recommendations

Clawson (2006) reported that "below the dam, water quality is minimally impacted by land use practices within the canyon. Below Balanced Rock State Park land ownership in the canyon is private. There are five agricultural return drains that empty into Salmon Falls Creek. The drains are Drain 3, Drain 4C, Drain 5A, Lateral 10P and Lateral 10S. Current water quality data exists on L10P, L10S and 5A from the Agricultural Research Service (ARS). During the irrigation season water is diverted from the High Line Canal and Deep Creek. During the non-irrigation season water is diverted from Deep Creek into L10P to run a small hydroelectric plant that drains into Salmon Falls Creek. There are three major pumping stations in the canyon that supply irrigation water to Magic Waters Irrigation Company. The first pump is located just below Balanced Rock State Park and pumps geothermal groundwater to the surface. The next two pumps withdraw directly from the creek. The amount of water diverted by these pumps is unknown." The natural hydrograph of Salmon Falls Creek has been dramatically altered by the Salmon Falls Dam and irrigation diversion structures.

Clawson (2006) suggested that, "[in order] to reduce sediment and phosphorus levels on Salmon Falls Creek best management practices (BMPs) should be installed on agricultural return drains that discharge into the lower section of the creek. Other BMPs, such as developing large wetlands and settling ponds on the tail drains, planting buffer strips along the canals and developing small settling ponds at the ends of fields will improve water quality. One such wetland has been developed on Drain 3. Unfortunately, water quality data does not exist for this drain. Another potential BMP for the Salmon Falls Creek subbasin is to convert surface irrigation to gravity fed sprinkler irrigation. This will reduce the amount of potential erosion from cropland and reduce the amount of water needed to irrigate."

Monek (2007) concluded that the major contributors of sedimentation and TP [in the Shoshone Creek drainage] were: natural erosion, animal induced erosion, improper road maintenance, and recreation activities (i.e. ATV traffic). IASCD recommended that the following BMPs be implemented to improve water quality.

- Develop grazing management plans
- Avoid extensive grazing of animals in or near streams especially when land is wet or saturated or when streams are at low flow
- Fence off creeks and streams
- Develop off site watering
- Restore riparian corridor (new plantings)
- Change timing and limit duration of cattle grazing (especially during dry periods)
- Rework/ replace culverts at main road crossing to stop head cut erosion within the subbasin

- Modify stream channels above road crossings to better direct high flows through the culvert (not over the road) where appropriate
- Perform water mitigation where backflow from beaver dams inundates access roads (i.e. bypass pipes to control water levels)
- Use of beaver deceivers to help manage pond construction
- Conduct comprehensive stream surveys to better identify potential BMPs for the area

Tables 2-5 list the pollutants of concern for streams/reservoirs located in the Salmon Falls Creek subbasin. Because these waterbodies are impaired, total maximum daily loads (TMDLs) were developed by IDEQ. A TMDL for bacteria was developed for Cottonwood Creek based on excess *E.coli* concentrations. A TMDL for mercury was required for Salmon Falls Creek Reservoir. Waterbodies with a nutrient TMDL include: Cedar Creek Reservoir, House Creek, Upper Cedar Creek, China Creek, Corral Creek, Whiskey Slough, Lower China Creek, Salmon Falls Creek, Big Creek, and Cottonwood Creek. The above mentioned waterbodies also have sediment TMDLs, with the addition of Shoshone Creek. Poor bank stability is the source of excess sediment for waterbodies with a TMDL for sediment. All of the impaired streams require a temperature TMDL based on existing shade values.

Load reduction requirements for private agricultural land were generated by multiplying the excess load times the percent private land in the subwatershed (Table 13). This calculation is an estimate of the load reductions necessary for waterbodies to meet their beneficial uses on private lands. Required load reductions for Cedar Creek Reservoir are based on input from House Creek only as outlined in the Salmon Falls Creek Subbasin Assessment and TMDL (IDEQ 2007).

Table 13. Identified pollutants and required reductions for streams with TMDLs in the Salmon Falls Creek Subbasin.

Stream	303(d) Listed	Calculated Load	Agricultural Concerns

Segment	Pollutants	Reductions for Private Lands	
Cedar Creek Reservoir	Sediment Temperature TP	1 ton/yr (House Cr.) 1,828 kWh/day 0.50 lbs/day (House Cr.)	Nutrient and sediment delivery from Cedar Creek and House Creek, water losses from canal diversions during irrigation season, excess TP
Cedar Creek (Lower)	Sediment Temperature	6 tons/yr 5,178 kWh/day	Lower section dewatered due to irrigation demands during the irrigation season, poor bank stability
House Creek	Sediment Temperature TP	20 tons/yr 75,550 kWh/day 7 lbs/day	Poor bank stability, excess TP
Salmon Falls Creek Reservoir	Mercury	29 grams	Potential sediment and phosphorus delivery from Upper Salmon Falls Creek subwatershed (suspended sediment from poor bank stability), mercury in fish tissue
China Creek	Sediment Temperature TP	0.50 tons/yr 5,916 kWh/day 1.50 lbs/day	Poor bank stability in lower reach, excess TP, mercury problem
China Creek, Corral Creek, Whiskey Slough	Sediment Temperature TP	0.36 tons/yr 2,073 kWh/day 1.50 lbs/day	Poor bank stability, TP levels exceed allocated amount for discharge into a reservoir
Salmon Falls Creek (Upper)	Sediment Temperature TP	9 tons/yr 2,402 kWh/day 6 lbs/day	Excess sediment and phosphorus from erosion during spring runoff, no excess aquatic plant growth
N.F. Salmon Falls Creek	Temperature	6,677 kWh/day	Low existing shade values
Salmon Falls Creek (Lower)	Sediment Temperature TP TN	5,397 tons/yr 164,749 kWh/day 24 lbs/day 621 lbs/day	Nuisance aquatic plant growth from excess nutrients (both TP and TN), sediment from irrigation return flows
Shoshone Creek	Sediment Temperature	95 tons/yr 544,335 kWh/day	Nutrient input from Big and Cottonwood Creeks, fine sediment from Shoshone Creek impacting salmonid spawning and rearing
Cottonwood Creek	Bacteria Sediment Temperature TP	5.39×10^{10} org/day 164 tons/yr 336,167 kWh/day 1 lb/day	Increased temperature from decreased flow and poor riparian shading, depth fines exceed SS target, high streambed erosion from cattle access
Big Creek	Sediment Temperature TP	69 tons/yr 57,470 kWh/day 16 lbs/day	High percentage depth fines from poor bank stability along Big Creek, nutrient input from Hannah's Fork, increased bacteria levels in summer
Hot Creek	Temperature	11,008 kWh/day	Sediment and bacteria problems in Nevada reach, low existing shade values
Devil Creek	Temperature	10,827 kWh/day	Low existing shade values

AGRICULTURAL WATER QUALITY INVENTORY AND EVALUATION

Cropland

Prior to 1900 the desert of Twin Falls County, Idaho was covered by sagebrush and native grasses. Early settlers cleared sagebrush in the lowlands and burned and plowed grasses to plant crops. In addition, miles of fence were built to contain livestock and to act as property boundary markers. Over the years, a combination of land use practices and drought conditions has negatively impacted riparian vegetation, resulting in channelization of the streams and rivers. The absence of woody vegetation contributes to higher water temperatures and bank instability. Moreover, there is no buffer between tilled ground and streams in some areas. Weed control practices designed to improve stream channel drainage and reduce flooding also impair riparian habitat. The cumulative impacts of these practices have severely reduced or eliminated the riparian habitat. Most drainage coulees within the Twin Falls irrigation tract are now managed as drainage ditches. Irrigated cropland encompasses approximately 15,000 acres. The principle irrigated crops are alfalfa hay, barley, dry beans and peas, wheat, corn, and corn silage.

Salmon Falls Creek Reservoir was constructed in 1911 by the Twin Falls Salmon River Land and Water Company. Salmon Falls Creek Reservoir holds 230,650 ac-ft. Of this, 48,000 ac-ft is considered dead storage and is not usable for irrigation. Maximum reservoir storage usually occurs in May. A constant amount of water is released from the dam but there is also some seepage which occurs. The total amount of water which flows back into Salmon Falls Creek below the dam is approximately 17 acre feet during the irrigation season. This return flow runs 23 miles through irrigated cropland. Below the dam, water quality is minimally impacted by land use practices within the canyon. Most of the impairment of water quality is caused by the dam itself and land use practices that exist above the canyon rim and surrounding areas.

In most watersheds stream discharge is regulated by precipitation and snowmelt. Because Salmon Falls Creek is highly regulated by the dam, stream discharge is controlled by other factors. Stream discharge in Salmon Falls Creek at Lilly Grade is regulated by the amount of water stored behind Salmon Falls Dam that seeps out of the canyon walls. Midway down below this point and the mouth of Salmon Falls Creek stream discharge is controlled by groundwater influences and springs. Stream discharge in Salmon Falls Creek at Miracle Hot Springs is controlled by irrigation return flows and diversions during the irrigation season and groundwater and springs during the non-irrigation season. Stream discharge at Miracle Hot Springs averaged 116.5 cubic feet per second (cfs) from 2002 to 2005. During the irrigation season mean discharge was 94.4 cfs. During the non-irrigation season mean discharge was 134 cfs. Stream discharge at the mid-point of lower Salmon Falls Creek and Lilly Grade does not fluctuate between the irrigation season and non-irrigation seasons. Means discharge at the midpoint was 34.3 cfs and 12.1 cfs at Lilly Grade. There are five agricultural return drains that empty into Salmon Falls Creek between SF2 and SF1. Discharge is only known for three of these drains-- L10P, L10S and 5A. During the irrigation season, discharge at 5A averaged 5.79 cfs. Stream discharge at L10P averaged 51.2 cfs and 5.02 cfs at L10S during the irrigation season.

There are water rights to run a small hydroelectric plant during the non-irrigation season on L10P. During the non-irrigation season, discharge on this drain averaged 32.2 cfs. All of this non-irrigation season water is diverted from Deep Creek.

Cedar Creek Reservoir, also known as Roseworth Reservoir, is located about 17 miles west of Rogerson, Idaho. The reservoir was created in 1910 by the construction of a dam across Cedar Creek by the Idaho Farm Development Company. During the irrigation season water flows approximately 2 miles downstream to the Cedar Mesa Siphon where all water is diverted into the Cedar Canal which delivers irrigation water to Roseworth. Hydrology has been manipulated since the reservoir construction. Once Cedar Creek Reservoir fills, water is taken down stream to the Cedar Mesa Siphon and diverted into the Cedar Mesa Reservoir. Water is stored in the Cedar Mesa Reservoir and canal water is used according to irrigation demand. Because of the alteration of flow brought on by the construction of the Cedar Mesa Canal no water is present from the canal outlet approximately 5.5 miles below Cedar Reservoir to Salmon Falls Creek. No water returns from the Roseworth tract to Salmon Falls Creek. Roseworth area was developed as agricultural land after the reservoirs were built in 1910. There are 5,460 acres of irrigated cropland in the Roseworth tract, 1,750 of which is surface irrigated.

Very little or no dry cropland can be found in the Salmon Falls subbasin at the present time. As shown in Figures 7-9, a small amount of formerly dry cropland (377 acres) is enrolled in the Conservation Reserve Program.

Rangeland Inventory and Evaluation

Introduction

Settlers first came to the Shoshone Creek area in the 1860's bringing both cattle and sheep. In 1909, a 5,200 acre gravity irrigation project was constructed at the north end of the area. The project consisted of a dam directly on Shoshone Creek and a canal system which ran to the south. The total cost of the project was $165,000. However, the 5,700 foot elevation and short growing season, soon led to the abandonment of these homesteads. Part of these homesteads reverted back to public ownership, however; many remained in private ownership.

The Utah Construction Company continued to raise cattle in the area. The UCC raised native hay for the thousands of cattle to feed on from Rogerson, Idaho to Wells, Nevada until the UCC sold their water interests to Wilson and Wunderlich, who in 1947 sold them to the Salmon River Canal Company.

With livestock being raised, it was very important to grow plenty of feed. It was common for the landowners to cut ditches all along the creeks to direct the water out into the meadows to irrigate the grass hay. When high water years would occur this practice would totally alter the stream channel. An estimated 12% of Shoshone Creek and its tributaries are no longer present in the original stream channel.

Historic beaver activity has forever altered the streams in the Shoshone Creek subwatersheds. Beaver dam construction and blow out has eroded a high percent of the streambanks.

The removal of riparian areas has dramatically reduced the upland water storage capacity of these subwatersheds. Forest grounds have been historically clear-cut reducing water storage potential. These factors have contributed to a 'spiky' hydrologic curve, causing Shoshone Creek and several tributary streams to become intermittent in the summer months. The average stream flow for Shoshone Creek near Nevada (drainage area 34,699 acres) is 34,319 acre feet. Peak flows occur in May and low flows around 900 acre feet occur from August through October.

The primary activities in the Shoshone Creek subwatersheds are grazing and recreation. Rangeland is the largest land use and encompasses approximately 43,967 acres or 58% of the subbasin. Grazing occurs in meadow and riparian habitats and has decreased bank stability, impacted native vegetation, and allowed for the invasion of noxious weeds. Removal of woody, overhanging vegetation along stream corridors has increased stream temperatures to the point that there is a decrease in cold water biota. Low flows in late summer, coupled with high temperatures, sediments and nutrients, affect streams ability to support most beneficial uses.

Owhyee Plateau Semiarid Uplands, Hills, and Low Mountains Common Resource Areas (CRA 25.2 & 25.7) (ftp:\\ftfpc.egov.usda.gov/ID/technical/pdffiles/IdahoCRAReport.pdf)
Resource Setting – Rangeland vegetation consists of sagebrush, perennial grasses, and forbs. Precipitation ranges from 12-16 inches, most of which falls in winter and early spring outside the growing season. Average frost free period ranges from 80 to 140 days. Elevations range from 3,500 to 7,500 feet. Most lower elevation sites occur on nearly level flats up to benches and rolling foothills. Higher elevation sites have steep slopes and high mountain valleys. Soils are loamy to gravelly, usually shallow with some rock outcrops. Average frost free period ranges extensively from 50-140 days depending on topography. Fencing is generally an existing practice. Wildlife habitat for shrub-steppe wildlife species (e.g., sage grouse, sharp-tailed grouse, brewer's and sage sparrows) has been in decline due to wildfires, invasion of noxious and invasive plants, overgrazing, and habitat fragmentation.

Snake River Plains Magic Valley and High Lava Plateau Common Resource Areas (CRA 11.6 & 11.8)
Resource Setting – Native vegetation was sagebrush and perennial grasses. Frequent fires have eliminated vast areas of sagebrush. Cheatgrass and other invaders are dominant. Regeneration of native perennial vegetation is limited. Precipitation is 6 to 12 inches, most of which falls in winter and early spring, outside the growing season. Lower elevations range from 2,000 to 3,500 feet while high elevations reach 5,500 feet. Frost free periods vary greatly from 100-150 days. Topography varies from nearly level flats up to benches and rolling hills. Soils are loamy to gravelly. Fencing is generally an existing practice. Wildlife habitat for shrub-steppe wildlife species (e.g., sage grouse, sharp-tailed grouse, brewer's and sage sparrows) has been in decline due to wildfires, invasion of noxious and invasive plants, overgrazing, and habitat fragmentation.

Rangeland Assessment – NRCS Rangeland Conservationists utilized NRCS' Similarity Index, Rangeland Health, and Rangeland Trend worksheets on about 81,000 acres of the total private rangeland in the Salmon Falls Creek subbasin. The Similarity Index is expressed as the percentage of an existing plant community compared to a reference plant community for a given range site. NRCS' Rangeland Health provides us with a preliminary evaluation of three rangeland health attributes: soil stability, hydrologic function, and biotic integrity. This evaluation enables us to rate 17 indicators based on that indicator's degree of departure from the appropriate rangeland ecological site description. Rangeland Trend helps us determine the direction of change that may be occurring on a rangeland site. The vegetation may be either moving toward or away from the historic climax plant community or some other desired plant community or vegetation state.

Resource Concerns – Existing grazing management may not meet NRCS resource quality criteria or landowner objectives. Best management practices (BMPs) may be needed for range improvement and livestock distribution. Resource concerns for private rangeland include plant productivity; plant health and vigor; noxious and invasive plants; wildfire hazard; forage quality and palatability; plants not adapted or suited; plant establishment and growth; inadequate quantity/quality of feed/forage for domestic animals; inadequate domestic stock water; habitat fragmentation; declining wildlife species; and inadequate wildlife cover/shelter/water. All resource concerns are evaluated on a site-specific basis according to NRCS' Conservation Planning Process.

Current Condition of Rangeland in the Salmon Falls Creek Subbasin

– From Scott Engle, Rangeland Management Specialist, NRCS Pocatello, April 2008

The majority of the rangeland (337,000 acres) in this subbasin is federally owned and managed by the BLM. However, there is approximately 90,000 private rangeland acres. This is divided into upland range areas and meadows located along streams (these may be flood irrigated in some areas and natural in other areas). Some of the meadows are cut for meadow hay and grazed in the fall. Other meadows are used for summer grazing. These meadows and the associated upland range have the most effect on water quality because of their close proximity to riparian areas and because of irrigation water return flows. These meadows are usually quite stable with little erosion, but flood water and irrigation return flows can carry manure and nutrients into the stream. Riparian vegetation has often been severely modified by haying and grazing. Management efforts should be concentrated on these areas of the subbasin.

Potential problems may also occur where the livestock water out of the creeks. These areas are generally located in the bottom of draws or even canyons. They are more common in the higher elevations along the Nevada border and become rare at the northern end of the subbasin where the canyons are deep and inaccessible.

Most of the upland range is located on a high plateau that slopes to the Snake River on the north. This area has very few natural water sources and stock water is provided by an elaborate set of pipelines. The private, state, and BLM range are generally mixed and are managed together. In a few cases there are blocks of private range that are currently fenced separately.

The following plant community data is based on NRCS Ecological Site Descriptions for the Owyhee High Plateau Major Land Resource Area, which includes the Salmon Falls subbasin.

At the lower elevations, rangeland is a mixture of crested wheatgrass and native range. Sagebrush has become reestablished on the older crested wheatgrass seedings. The predominant ecological site is a basin big sagebrush- bluebunch wheatgrass site, but there are Wyoming big sagebrush and low sagebrush sites. Cheatgrass is a problem in the northwestern part of the subbasin. High fire frequency has reduced and may eliminate sagebrush if it continues. Much of this area has been severely affected by wildfires. In 2007, the Murphy Complex Wildfire burned 652,000 acres. The ecological condition of the range varies considerably, but the similarity index is usually low when compared to the historic native plant community. The reason for this is the large amount of seeded range, the large amount of fire impacted acreage, and other areas with old stands of big sagebrush.

At higher elevations and to the south, the predominant range site is mountain big sagebrush- Idaho fescue- bluebunch wheatgrass. Antelope bitterbrush becomes a component on some sites and mountain big sagebrush, buckbrush, quaking aspen, and mountain mahogany break up the landscape. Fires are not as common in the higher elevation areas but are still a threat. Ecological condition is generally low, good, or high seral compared to the historic plant community. More of the higher elevation sites are privately owned but many areas are still a part of Jarbidge BLM Field Office allotments. Livestock operations are mostly beef cattle. Some ranches feed hay to cows, but many winter on the range. A few sheep operations also use this range area.

Recommendations

Cattle grazing needs to be adapted to the conditions and local issues of the area. Firstly, public grazing allotments in the Jarbidge area have been in litigation. This has led to additional grazing pressure on private lands, subsequently districts and landowners have requested NRCS assistance. NRCS has assessed most, if not all of the private acres and are developing grazing plans for ranchers. In addition, "Idaho BLM is currently conducting assessments of all grazing allotments to determine if Idaho's Standards for Rangeland Health are being achieved." (www.blm.gov/id). Secondly, sage grouse are a major wildlife species of concern which have lost a considerable amount of habitat due to wildfire, so suitable habitat for sage grouse needs to be preserved. And lastly fire management which includes fire suppression, fuels treatment, and fire rehabilitation strategies need to be in place to improve rangeland health (www.blm.gov/id/st/en/prog/fire.1.html). All of these local issues need to be addressed in the planning process before rangeland BMPs, such as prescribed grazing are installed.

NRCS practices which are needed on the rangeland in this subbasin are: prescribed grazing (528A); firebreak (394); watering facility (614); water well (642); pumping plant (533); spring development (574); pipeline (516); range planting (550); prescribed burning (338); brush management (314); fence (382); and pest management (595).

Riparian Inventory and Evaluation

Introduction

From 2004 to 2007, IASCD, ISCC, NRCS, and SWCD personnel assessed forty-seven (47) reaches covering over 59 miles of Salmon Falls Creek and its tributaries on private lands. These evaluations were used to determine direct and indirect agricultural impacts to 303(d)-listed creeks and to develop realistic goals for water quality improvement.

IDEQ (2007) states that most surface streams are intermittent or ephemeral in nature due to low annual precipitation and high seasonal evaporation therefore limited riparian habitat exists in the subbasin. They also say that water quality in the subbasin, in general, is of good to moderate quality while sediment, nutrients, and temperature are the most common listed pollutants (IDEQ, 2007). It can also be clearly demonstrated that salmonid spawning is not fully supported and is impacted a great deal by sediment which is from poor bank stability and that the sediment is generated during high flow events (IDEQ, 2007).

IDEQ (2007) found that all streams examined had excess sediment loads due to poor bank stability while Salmon Falls Creek and Cottonwood Creek had the largest excess loads. Most of this sediment impacting beneficial uses is from streambank erosion (IDEQ, 2007). Along with poor bank stability, both sections of Salmon Falls Creek had excess loads of suspended sediment. In the Upper Salmon Falls Creek subwatershed this is likely tied to poor bank stability. However, in the Lower and Middle Salmon Falls Creek subwatersheds, the likely sources of the elevated suspended sediment are agricultural runoff (IDEQ, 2007). They recommend an 86% percent sediment load reduction. Upper Salmon Falls Creek would require an 86% reduction in sediment to meet existing criteria and targets and this reduction would need to occur in Idaho’s portion of the subbasin (IDEQ, 2007).

Additionally, IDEQ’s TMDL (2007) says that all streams examined had excess heat loads due to a lack of shade. Shoshone and Salmon Falls Creeks had the largest excess loads due to their size, although percent reductions to achieve loading capacities were only 40% and 20%, respectively.

IDEQ (2007) calls for nutrient load reductions ranging from 50% to 80% on creeks and reservoirs in the subbasin. Furthermore, nutrients, although not impacting the Salmon Falls reach, are likely impacting the receiving water and should be addressed in a TMDL (IDEQ, 2007).

In general, grazing management in the subbasin appears to be managing the contribution of bacteria successfully while the only egregious exceedances of recreation water quality standards were found in Cottonwood Creek (IDEQ, 2007).

Past Efforts

Aquatic Habitat

In 1994, IDFG investigated Salmon Falls Creek fisheries and instream habitat between Lilly Grade and Salmon Falls Creek Dam. This reach is in a remote, narrow, steep walled canyon with limited access. Therefore, they were only able to sample four sites where they measured stream width, depth, habitat type, stream discharge, water temperature, and substrate class. Their summarized findings are shown below (IDFG, 1995).

> *IDFG stated, "Water quality is good but the lack of annual flushing flows has resulted in a narrow riparian zone with dense vegetation encroaching on the stream channel and a deep build up of fine sediments in most pools. Habitat features are nearly identical at all sites investigated with numerous pools created by the presence of large boulders which have fallen into the stream from the surrounding steep canyon walls."(IDFG, 1995)*

Riparian Health

Since 1994, BLM has been classifying and assessing riparian health in the subbasin. Specifically, they have inventoried and monitored riparian health on almost 146 miles in 1994, 1997, and 2000. Their specific reach data can be found at the Ecological Solutions Group LLC's BLM Riparian and Wetland Database http://www.ecologicalsolutionsgroup.com/Lasso/default.html.

In 2000, they found that of the total 146 miles inventoried throughout their field office area; there were 29 miles or 20% at Proper Functioning Condition (PFC), another 68 miles or 47% at Functional At-Risk (FAR), and lastly, 49 miles or 33% determined Nonfunctional (ESG, 2008).

Fishery Management

Currently, IDFG manages Salmon Falls Creek above and below the reservoir as a mixed species fishery which includes rainbow trout, brook trout, brown trout, smallmouth bass, mountain whitefish, and walleye (IDFG, 2007). From the Nevada border to Balanced Rock Park, they are trying to maintain Salmon Falls Creek as a wild trout fishery. Below that park, they manage the creek as a stocked, catchable Rainbow trout fishery.

IDFG is managing all other streams in the subbasin, including Shoshone and Big Creeks, as coldwater wild trout fisheries. They are working with SNF and BLM to improve habitat through grazing and beaver management (IDFG, 2007). IDFG states that the streams in the Raft, Goose, Rock, and Salmon Falls drainages support good wild trout populations (IDFG, 2007). Conversely, they also state "that large portions of these streams have been degraded by overgrazing and poor land use practices" (IDFG, 2007).

Bank Stability

IDEQ's BURP crew measured bank stability at two locations in the subbasin. The first of these was near the state line and the second was upstream of the reservoir. In the upper 4.6

miles, measured bank stability averaged 74%. In comparison, bank stability measures collected following BURP protocols in 2002 ranged from 95% to 97% stable (IDEQ, 2007). Bank stability measures collected in the lower 5 miles averaged 25% and indicated that excessive sediment is being delivered to the reservoir. For comparison, BURP data collected in this reach in 1994 indicated poor bank stability with only 42% of the banks being stable (IDEQ, 2007).

Assessment Methods

The tools IASCD/ISCC used to assess these reaches included: BLM Proper Functioning Condition (PFC); NRCS Streambank Erosion Condition Inventory (SECI); NRCS Stream Visual Assessment Protocol (SVAP); Solar Pathfinder; and Rosgen's Stream Classification. The reaches were delineated using soils, geology, slope, sinuosity, vegetation, hydrology, roads, valley type, land ownership, and land use using GIS layers, NAIP aerial imagery, and USGS topographic maps.

Streambank Erosion Condition Inventory (SECI)

Streambank Erosion Condition Inventory (SECI) is used to estimate streambank erosion rates. This method produces an index by ranking six factors; bank stability, bank condition, bank cover, channel shape, channel bottom, and deposition. SECI is based on the direct volume method outlined in the Channel Evaluation Workshop (NRCS, 2000). The teams used SECI to estimate erosion on habitat units and the entire reach. Erosion is estimated by applying lateral recession rates (LRRs) to bank heights and lengths. SECI is used for comparison rather than for a sediment budget (NRCS, 2000).

BLM Proper Functioning Condition (PFC)

The USDI-BLM's Creeks & Communities strategy uses their Assessing Proper Functioning Condition (BLM, 1995) consists of 17 factors to qualitatively assess stream function. Three categories include; proper functioning, functional at risk, or nonfunctional. PFC is used to assess riparian/wetland areas. PFC evaluates features that dissipate energy, reduce erosion, improve water quality, capture bed load, develop floodplains, improve flood-water retention, recharge groundwater, stabilize streambanks, provide habitat, and support greater biodiversity (BLM, 1998).

Stream Visual Assessment Protocol (SVAP)

SVAP provides a simple procedure to evaluate stream conditions based on visual characteristics. The protocol includes 15 qualitative factors and corresponding values, which are used to rate the reach's condition. The protocol assesses riparian ecosystems condition; identifies opportunities to enhance biological value; conveys information on stream function; and stresses the need to protect or to restore riparian areas (NWCC, 1998).

Rosgen Stream Classification

Rosgen's stream classification offers a consistent method to describe and to measure stream characteristics (Rosgen, 1996). The classification consists of four levels. This assessment used the first two levels. Level 1 is a geomorphic characterization that categorizes streams based on pattern, slope, and shape. Level 2 is the morphological description and requires measuring bankfull width and depth, floodplain width, channel materials, slope, and sinuosity. These factors are used to distinguish individual sub-categories for each stream type.

Assessment Results

Stream Visual Assessment Protocol (SVAP)

Our assessments showed that approximately 61% or 36 miles of the assessed reaches scored good, while 11% or 6.3 miles of the reaches scored fair, and 28% or 16.4 miles of reaches scored poor. Those results are shown in Table 14 and Figure 6. The largest amount of eroding banks was seen in the lower reaches of Cottonwood Creek and the upper reaches of Shoshone Creek.

Streambank Erosion Condition Inventory (SECI)

SECI results showed that 54% or 24 miles of assessed reaches had slight erosion, while 26% or 11 miles had moderate erosion, and 20% or 9 miles had severe erosion. SECI reach conditions and total scores are shown in Table 14.

Rosgen Stream Classification

All of the streams measured in the subbasin were classified as C type channels. Cobble accounted for about one (1) mile of channel material on upper Big Creek. Silt and clay accounted for almost two (2) miles of channel material on Shoshone Creek. While, cobble or sand were the dominant channel material on the remaining reaches. Rosgen stream classifications are shown in Table 14.

Solar Pathfinder (SP) Canopy Cover

We measured and rated canopy cover on over a third (23 miles or 39%) of the total stream miles assessed (59 miles). Our results show that over 17 miles or 77% of the 23 miles evaluated had 20% to 50% canopy cover. While another 3 miles or 14% had 50% to 75% canopy cover with only 2 miles or 9% having 0% to 20% canopy cover.

Recommendations

Our assessment results show that over a third of the assessed reaches had poor to fair aquatic habitat with almost half of the reaches with moderate to severe erosion. About a quarter of the assessed reaches had percent canopy cover less than 25%.

IDEQ (2007) suggests that livestock grazing seems to be the predominant reason for streambank degradation in the subbasin; because cattle are put into many riparian areas early in the spring when the soil is very wet and banks are unstable. They suggest that better grazing management would improve water quality in a majority of the streams in the subbasin (IDEQ, 2007).

IASCD (2007) reports the major contributors of sedimentation and TP levels in the Shoshone Creek subwatersheds appear to be: natural erosion, animal induced erosion, improper road maintenance, recreation activities, and off-highway vehicle (OHV) traffic. IASCD (2007) also recommended that to reduce sediment and phosphorous levels on Salmon Falls Creek below the dam, BMPs should be installed on the agricultural return drains that discharge into the lower section of the creek. They also found temperature to be the most critical parameter with respect to water quality and maybe due to riparian conditions and beaver activity in the subbasin (IASCD, 2007).

Recommendations for BMPs to be installed include: prescribed grazing, access roads, fencing, stream habitat improvement, riparian buffer, tree/shrub planting, structures for water control, use exclusion, livestock watering facilities, streambank protection, structures for water control, fish passage, and range planting. Several of these recommendations are in progress or have been completed which include fencing, prescribed grazing, livestock watering facilities, culvert replacement, and use exclusion for both livestock and off-highway vehicles (OHVs).

Table 14. Summary of Assessed Reaches in the Salmon Falls Creek Subbasin

Stream	Reach	Length (miles)	Percent of Eroded Bank	SVAP Rating	SECI Condition	Rosgen Type	Percent Canopy Cover
Salmon Falls Creek	SF-1	0.6	25%	Fair	Moderate	C5	
Unnamed Drainage	D-1	0.32	5%	Fair	Moderate	----	
Shoshone Creek	SC-1	0.7	10%	Fair	Moderate	C4	0-20%
Shoshone Creek	SC-2	0.4	46%	Fair	Severe	C4	20-50%
Shoshone Creek	SC-3	0.5	28%	Fair	Moderate	C4	50-75%
Shoshone Creek	SC-4	0.5	35%	Fair	Severe	C4	0-20%
Shoshone Creek	SC-5	0.4	17%	Fair	Moderate	C4	0-20%
Shoshone Creek	SC-6	0.4	12%	Fair	Moderate	C5	0-20%
Shoshone Creek	SC-7	0.3	4%	Good	Slight	C4	
Shoshone Creek	SC-8	0.5	31%	Poor	Moderate	C4	50-75%
Shoshone Creek	SC-9	0.2	2%	Poor	Moderate	C4	
Shoshone Creek	SC-10	0.3	4%	Poor	Slight	C4	50-75%
Shoshone Creek	SC-11	1.2	35%	Good	Slight	C4	50-75%
Shoshone Creek	SC-12	0.4	7%	Good	Moderate	C4	
Shoshone Creek	SC-13	0.5	21%	Fair	Moderate	C5	
Shoshone Creek	SC-14	0.5	23%	Fair	Moderate	C5	
Shoshone Creek	SC-15	1.5	8%	Good	Slight	C4	20-50%
Shoshone Creek	SC-16	0.5	31%	Poor	Moderate	C6	
Shoshone Creek	SC-17	0.5	37%	Poor	Moderate	C6	
Shoshone Creek	SC-18	0.7	21%	Poor	Moderate	C6	50-75%
Langford	LC	1.2	7%	Good	Slight	C4	
Cottonwood Creek	CC-1	0.4	50%	Poor	Moderate	C4	
Cottonwood Creek	CC-2	0.4	65%	Poor	Moderate	C4	
Cottonwood Creek	CC-3	1.3	45%	Poor	Moderate	C4	
Cottonwood Creek	CC-4	0.9	34%	Poor	Moderate	C4	
Cottonwood Creek	CC-5	0.3	8%	Poor	Moderate	C4	
Cottonwood Creek	CC-6	0.3	11%	Poor	Moderate	C4	
Cottonwood Creek	CC-7	0.4	7%	Poor	Moderate	C4	
Cottonwood Creek	Upper	1.0	0%	Good	Slight	C3	20-50%
Big Creek	BC-1	0.7	9%	Good	Slight	C3	
Big Creek	BC-2	1.7	12%	Good	Slight	C4	
Big Creek	BC-3	2.3	30%	Good	Slight	C4	
Big Creek	BC-4	0.8	.8%	Good	Slight	C4	
Big Creek	BC-5	1.6	23%	Good	Slight	C4	
Hannah's Fork	----	1.5	27%	Fair	Moderate	C4	
Hot Creek	----	1.8	44%	Poor	Moderate	C4	
Cedar Creek	CC-1	1.1	28%	Poor	Moderate	C6	
Cedar Creek	CC-2	2.0	33%	Poor	Moderate	C5	
Taylor Canyon Creek	----	2.2	33%	Poor	Moderate	C6	
House Creek	Upper	9.7	7%	Good	Slight	C4	20-50%
House Creek	Lower	5.2	6%	Good	Slight	C4	20-50%
Little House Creek	----	3.71	2%	Good	Slight	C4	
Devil Creek	----	2.7	11%	Good	Slight	C4	
Antelope Spring canal	----	1.5	31%	Poor	Moderate	C6	
Whiskey Slough	----	1.5	3%	Good	Slight	C4	
Player Creek	----	1.1	17%	Poor	Moderate	C4	
China Creek	----	0.8	15%	Good	Slight	C4	

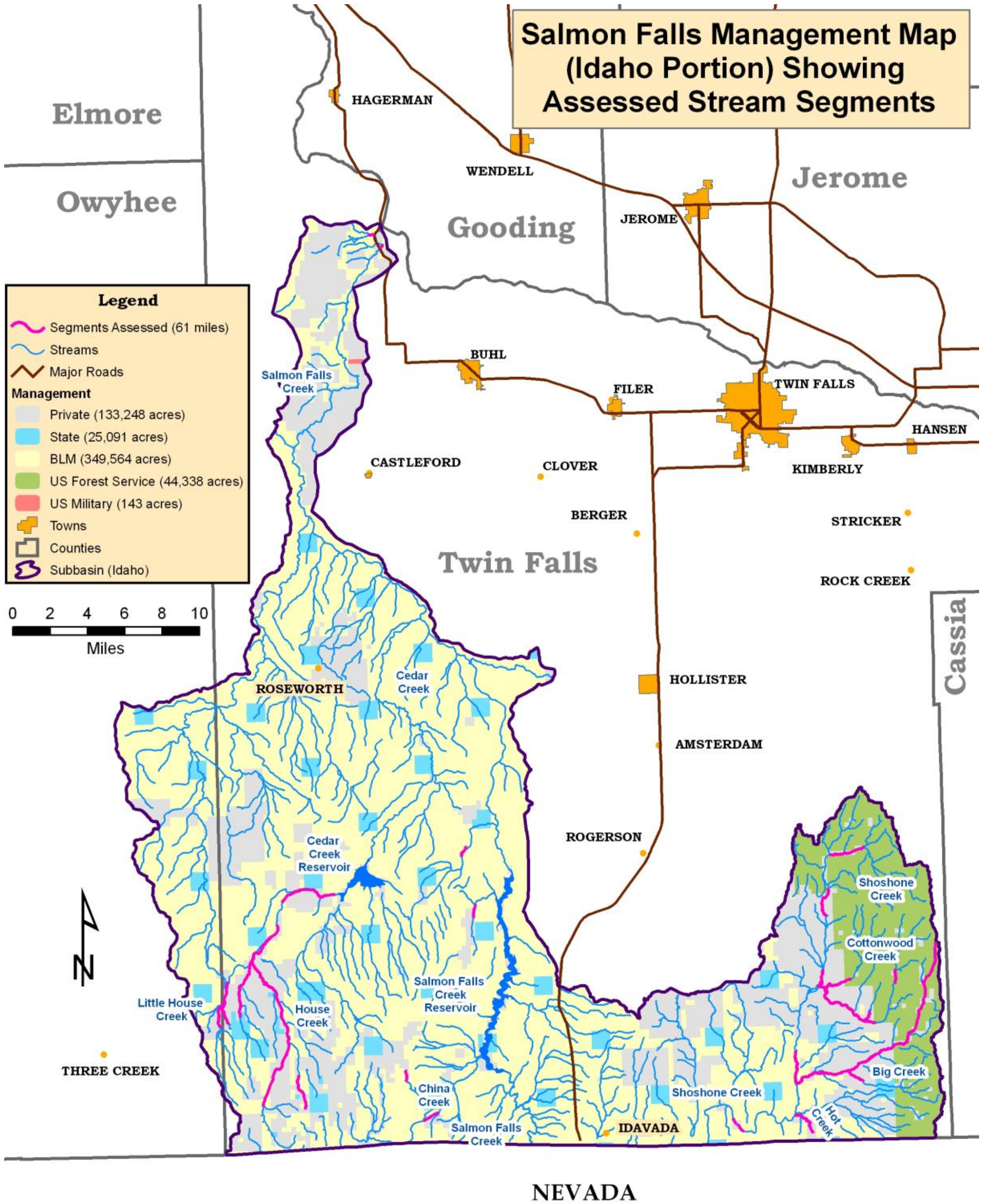

Figure 6. Salmon Falls Creek Subbasin Assessed Stream Reaches

THREATENED AND ENDANGERED SPECIES

There are seven endangered or threatened species (Table 15) within the Salmon Falls Creek subbasin. Of these species, five are aquatic and one, the bald eagle, frequents aquatic habitats. Aquatic species include: the spotted frog (*Rana luteiventris*), slickspot peppergrass (*Spiranthes diluvalis*), the Bliss Rapids snail (*Taylorconcha serpenticola*), the Banbury Spring limpet (*Lanx* sp.), and the Snake River snail (*Physa natricina*). The Snake River snails are found only in the mainstem of the Snake River. Decreases in the sediment and nutrient delivery from the Salmon Falls Creek subbasin should have a positive impact on the snails of the Snake River system. In addition to the downstream effects of improving water quality on the listed snails, other federally listed or candidate plants and animals that may be influenced by implementation of agricultural best management practices are slickspot peppergrass (*Spiranthes diluvalis*) and the spotted frog (*Rana luteiventris*). Slickspot peppergrass has the potential to be found in bare slickspot soils within Wyoming sagebrush habitat and has been found in nearby Owyhee County. The spotted frog is an aquatic animal found in and near streams, lakes, marshes, and ponds. The spotted frog frequents these aquatic habitats in mixed coniferous forests, subalpine forests, grasslands, and sagebrush and rabbitbrush shrublands (Stebbins 1985, IDEQ 2007).

Implementation of agricultural best management practices that improve riparian habitat can have positive impacts on the above species. All of these species will be considered when making decisions on private agricultural land and when working with private landowners.

Species Common name (Scientific name)	Status/Comments	Habitat affected by water quality
Bald Eagle (*Haliaeetus leucocephalus*)	First Protected in 1966 by the Endangered Species Preservation Act. Listed as endangered in 1973. Down listed from endangered to threatened in 1995.	Yes
Banbury Spring Limpet (Lanx n sp.)	Listed as endangered in 1992.	Yes
Bliss Rapids Snail (*Taylorconcha serpenticola*)	Listed as threatened in 1992	Yes
Canada Lynx (*Lynx canadensis*)	Proposed for listing as threatened	Yes
Snake River Physa Snail (*Physa natricina*)	Endangered	Yes
Spotted Frog (*Rana lateiventris*)	Candidate Species	Yes
Gray Wolf (*Canus lupus*)	Endangered	Yes

Slickspot peppergrass (*Lepidium papilliferum*)	Proposed Endangered	No

Table 15. Threatened, endangered, and other species of federal concern in the Salmon Falls Creek Subbasin.

ANIMAL FEEDING OPERATIONS AND DAIRIES

As mentioned earlier under the land use section, animal feeding operations are not a significant resource concern in the Salmon Falls Creek subbasin. These operations are not in close proximity to any surface waters in the Salmon Falls Creek subbasin.

GROUNDWATER CONCERNS

A portion of the Lower Salmon Falls subwatershed falls within the Twin Falls nitrate priority area. The Twin Falls nitrate priority area is ranked as the number 1 most degraded area in Idaho (IDEQ 2008), according to the drinking water standard for nitrate. Water samples from domestic wells show that nitrate levels exceed the 5 mg/L target for approximately fifty percent of samples. A Ground Water Quality Management Plan for Twin Falls had been completed (IDEQ 2001) to address agricultural non-point source pollution, in the form of over-fertilization from commercial fertilizers, wastewater land application, and animal feeding operations.

Twin Falls has also been designated as a Groundwater Concern Management Area because of concerns regarding insufficient geothermal groundwater supplies (http://www.idwr.idaho.gov/hydrologic/projects/gwma/tf_gwma.htm).

IMPLEMENTATION

The TMDL implementation planning process assesses impacts to water quality for 303(d) listed streams on agricultural lands and recommends priorities for installing best management practices (BMP's) to meet water quality objectives stated in the Salmon Falls Creek TMDL. Data from water quality monitoring as well as field inventory and evaluations were used to identify critical agricultural areas affecting water quality and set priorities for treatment.

The Twin Falls Soil and Water Conservation District, Balanced Rock Soil Conservation District, and state and federal agency partners will work with landowners to implement best management practices established in this implementation plan. Best management practices are effective and practical ways to prevent or reduce pollutant transfer from non-point sources.

CRITICAL AREAS

Critical areas are those areas in which treatment is considered necessary to address resource concerns affecting water quality. Critical areas in the Salmon Falls Creek subbasin were prioritized for treatment based on their location to a water body of concern and their potential for direct pollutant transport and delivery to the receiving water body. For this reason, critical areas adjacent to Salmon Falls Creek and its tributaries are considered highest priority. The highest priority critical areas are treated first to speed up the restoration process. This can save time and money by achieving the same pollutant reduction while treating fewer sources.

Agricultural critical areas within the Salmon Falls Creek subbasin include:

- Unstable and erosive streambanks/riparian areas. Areas where livestock have access to streams and riparian areas.
- Upland areas which are overgrazed and show signs of erosion.
- Areas generating irrigation induced erosion, including erosion caused by irrigation return flows into streams.

TREATMENT UNITS (TU)

Treatment units for the Salmon Falls Creek Subbasin Agriculture TMDL Implementation Plan are based on soil type, physical characteristics, stream assessments, existing irrigation practices, and water quality monitoring conducted by IDEQ, IASCD, and ISDA. The Salmon Falls Creek subbasin can be broken into three treatment units: 1) Unstable and Erosive Streambanks/Riparian Areas, 2) Rangeland, and 3) Irrigated Cropland.

Treatment Unit #1 – Unstable and Erosive Streambanks/Riparian Areas

Miles	Soils	Resource Concerns
24	Silt-Clay Loam Soils Gravelly Loam Soils	1) Overgrazing- streamside vegetation removal, 2) Stream channel-straightening and evolution, 3) Soil erosion-hoof shear, 4) Water quality-excessive nutrients and sediment in surface water, 5) Forage production-loss of hay/pasture, 6) Livestock-loss of shelter, 7) Habitat-loss of shelter, forage, etc. for wildlife habitat, 8) Fisheries-reduced 9) Ecological condition-reduced quality

Treatment Unit #2 –Rangeland

Acres	Soils	Resource Concerns
90,000	Cobbly/Gravelly/Clay/Silt Loams 2-12% Areas of rock outcrop 2-30% Areas of rock outcrop 30-75%	1) Soil erosion-hoof shear, 2) Water quality - excessive nutrients, organics, suspended sediment, and turbidity in surface water, harmful temperatures of surface water, 3) Plant condition - noxious and invasive plants, loss of productivity, loss of health and vigor, 4) Fish and wildlife-inadequate cover/shelter, 5) T&E species- impacts to declining species and species of concern, 6) Livestock-inadequate quantities and quality of feed and forage, inadequate stock water

Treatment Unit #3 Irrigated Cropland

Acres	Soils	Resource Concerns
4,637	Silt Loam, Very Cobbly Sandy loam, and Gravelly Loam	1) Soil Condition- organic matter depletion, 2) Water Quality- excessive nutrients & organics in ground water, 3) Water Quality- harmful levels of pesticides in groundwater, 4) Water Quality- excessive suspended sediment and turbidity in surface water, 5) Soil Erosion- irrigation induced, 6) Water Quantity- inefficient water use on irrigated land, 7) Water Quantity- aquifer overdraft.

Treatment Unit #3– Surface Irrigated Cropland

The critical areas of irrigated cropland are shown in Figures 7, 8, and 9. Critical areas were considered to be those areas that are currently flood (surface) irrigated. Part of the northern portion of the subbasin, the Lower Salmon Falls Creek subwatershed, (Figure 7) is within the Twin Falls Nitrate Priority Area. This includes irrigated cropland on the east side of Salmon Falls Canyon. In most cases, conversion to sprinkler irrigation is the recommended conservation alternative, along with facilitating practices such as nutrient management, irrigation water management, residue management, and other practices as shown in Table18. Figure 8 shows irrigated cropland located in the Lower Middle Salmon Falls Creek subwatershed. For long, narrow fields located along Devils Creek and House Creek (Southern Portion, Figure 9) wheelines were not considered practical. Installation of gated pipe is the recommended treatment. For small pivot corners that are flood irrigated, the recommended treatment is the use of anionic polyacrylamide (PAM) for erosion control. The resource concerns (shown above under Treatment Unit # 3) and recommended treatments were based on field observations, soil maps, and interviews with area farmers, soil conservation district supervisors, and local NRCS field office personnel. Supporting documentation was obtained from the NRCS Field Office Technical Guide for Common Resource Areas ID 11.5 and ID 25.2.

RECOMMENDED BMPS AND ESTIMATED COSTS

BMPs recommended for reducing agricultural impacts to surface waters in the Salmon Falls subbasin and their estimated installation costs are listed in Tables 16-18. The NRCS practice code is also included. The 2008 NRCS Environmental Quality Incentives Program (EQIP) payment schedule was used to determine the unit cost for each practice. In addition to the practices listed in the table, non cost shared practices such as Conservation Crop Rotation (328), Residue Management-Seasonal (344), Surface Roughening (609), and Upland Wildlife Habitat Management (645) are strongly encouraged. Individual conservation planning for willing landowners will determine the most appropriate BMPs to install on a case by case basis. The rationale column describes how unit amounts are established for critical areas in each of the treatment units.

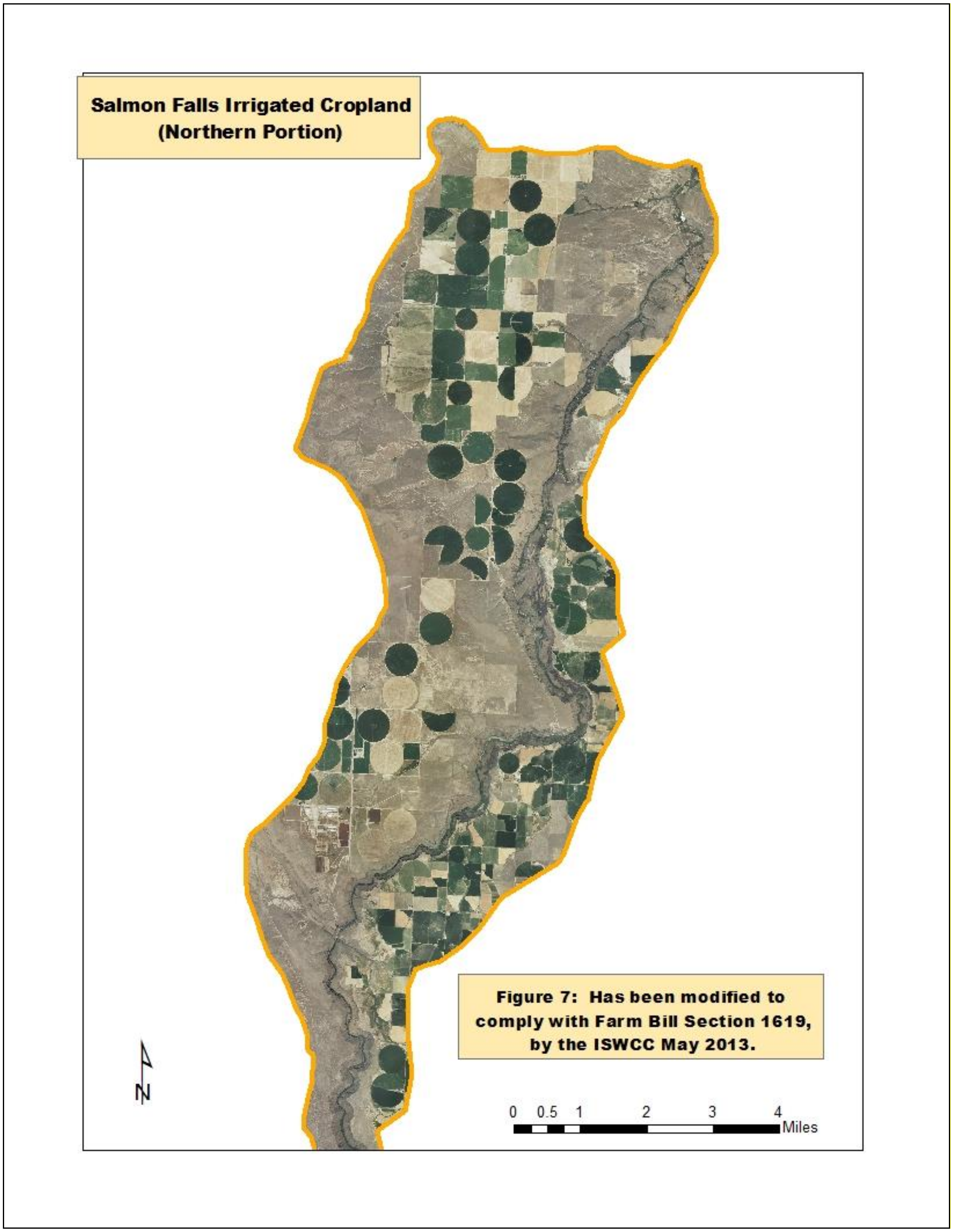

Figure 7. Irrigated Cropland in the Salmon Falls Subbasin (Northern Portion).

Figure 8. Irrigated Cropland in the Salmon Falls Subbasin (Central Portion).

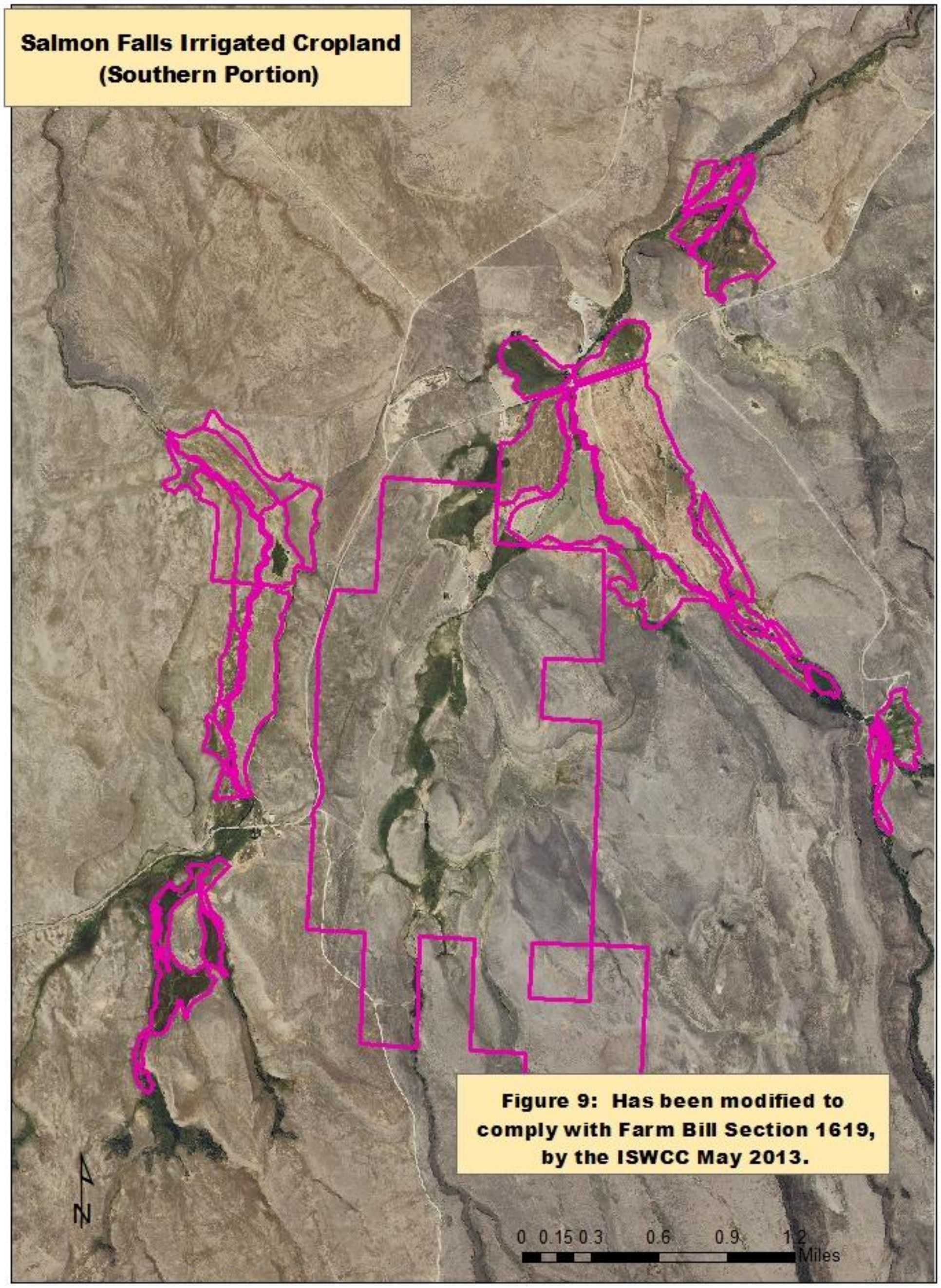

Figure 9. Irrigated Cropland in the Salmon Falls Subbasin (Southern Portion)

Table 16. Recommended BMPs and estimated costs for Treatment Unit 1.

Treatment Unit 1	Best Management Practice	Unit Type	Unit Cost	Unit Amount	C/S Funds	Participant Funds	Total Funds	Rationale
Unstable and erosive streambank and riparian areas 24 miles	Fence, 4-wire	feet	$3.50	132,000	$346,500	$115,500	$462,000	treat 50%
	Fence, Jack	foot	$5.00	26,000	$97,500	$32,500	$130,000	treat 10%
	Riparian Buffer	acre	$1,500.00	30	$33,750	$11,250	$45,000	treat 10%
	Pumping Plant	each	$2,500.00	10	$18,750	$6,250	$25,000	1 per well
	Water Well	feet	$40.00	5,000	$150,000	$50,000	$200,000	1 per 2 miles @ 400'
	Riparian Cover	acre	$500.00	30	$11,250	$3,750	$15,000	treat 10%
	Pipeline, PE 100 psi, 2.0"	feet	$3.00	30,000	$67,500	$22,500	$90,000	1,200 ft/mile
	Prescribed Grazing	acre	$100.00	225	$16,875	$5,625	$22,500	treat 75%
	Watering Facility, Trough	each	$1,500.00	50	$56,250	$18,750	$75,000	2 per mile
	Channel Vegetation	acre	$3,000.00	3	$6,750	$2,250	$9,000	treat 1%
	Heavy Use Area Protection	acre	$1,500.00	25	$28,125	$9,375	$37,500	1 per mile
	Stream Bank Protection	foot	$30.00	6,600	$148,500	$49,500	$198,000	treat 5%
	Stream Channel Stabilization	foot	$60.00	1,300	$58,500	$19,500	$78,000	treat 1%
	Tree/Shrub Establishment	acre	$300.00	30	$6,750	$2,250	$9,000	treat 10%
	Use Exclusion (2 yrs)	acre	$200.00	225	$33,750	$11,250	$45,000	treat 75%
				Subtotal	**$1,080,750**	**$360,250**	**$1,441,000**	

Table 17. Recommended BMPs and estimated costs for Treatment Unit 2.

Treatment Unit 2	Best Management Practice	Unit Type	Unit Cost	Unit Amount	C/S Funds	Participant Funds	Total Funds	Rationale
Rangeland 90,000 acres	Fence, 4-wire	foot	$3.50	210,000	$551,250	$183,750	$735,000	1,500 ft/sec
	Pipeline, PE 100 psi, 2.0"	foot	$3.00	168,000	$378,000	$126,000	$504,000	1,200 ft/sec
	Prescribed Grazing	acre	$2.50	68,000	$127,500	$42,500	$170,000	treat 75%
	Spring Development	each	$2,500.00	28	$52,500	$17,500	$70,000	1 per 5 sec
	Watering Facility, Trough	each	$1,500.00	140	$157,500	$52,500	$210,000	1 per sec
	Range Planting	acre	$50.00	1,800	$67,500	$22,500	$90,000	treat 2%
	Brush Management	acre	$30.00	1,800	$40,500	$13,500	$54,000	treat 2%
	Upland Wildlife Habitat Mgmt	acre	$10.00	18,000	$135,000	$45,000	$180,000	treat 20%
	Pumping Plant	each	$2,500.00	20	$37,500	$12,500	$50,000	2 per sec
	Water Well	feet	$40.00	5,600	$168,000	$56,000	$224,000	1 per 10 sec @ 400'
	Firebreak	mile	$500.00	56	$21,000	$7,000	$28,000	0.4 mile/sec
	Pest Management	acre	$30.00	4,500	$101,250	$33,750	$135,000	treat 5%
				Subtotal	**$1,837,500**	**$612,500**	**$2,450,000**	

Table 18. Recommended BMPs and estimated costs for Treatment Unit 3.

Treatment Unit 3	Best Management Practice	Unit Type	Unit Cost	Unit Amount	Cost Share Funds	Participant Funds	Total Funds	Rationale
Surface Irrigated Cropland 4,637 acres	Irrigation System, Sprinkler, pivot	acre	$630	2,732	$860,580	$860,580	$1,721,160	
	Irrigation System, Sprinkler, wheelines	acre	$460	1,764	$405,720	$405,720	$811,440	
	Irrigation water conveyance	foot	$5.71	64,437	$183,967	$183,968	$367,935	Assume 8 inch average
	Irrigation water conveyance with risers	foot	$7.75	44,778	$173,515	$173,515	$347,030	Assume 8 inch average
	Pumping Plant	hp	$240	2,900	$348,000	$348,000	$696,000	1 -25 hp pump per 40 acres
	Structure for Water Control	cuyd	$500	240	$60,000	$60,000	$120,000	4 yd^3 per structure
	Irrigation Regulating Reservoir	cuyd	$8.84	9,000	$39,780	$39,780	$79,560	300 yd^3 per reservoir
	Irrigation water conveyance, gated pipe	foot	$5.35	12,495	$33,424	$33,424	$66,848	Assume 8 inch average
	PAM erosion control	acre	$26.67	140	$1,867	$1,867	$3,734	
	Nutrient Management	acre	$5.00	4,637	$11,593	$11,592	$23,185	
	Pest Management	acre	$15.00	4,637	$34,777	$34,778	$69,555	
	Irrigation Water Management	acre	$5.00	4,637	$11,593	$11,592	$23,185	
	Residue Management (mulch tillage	acre	$15.00	4,637	$34,777	$34,778	$69,555	
	Subtotals				**$2,199,593**	**$2,199,593**	**$4,399,187**	

IMPLEMENTATION PRIORITY

The TMDL implementation planning process includes assessing agricultural impacts to water quality for 303(d) listed streams in the Salmon Falls Creek subbasin and recommending priorities for installing BMPs to meet water quality objectives stated in the Salmon Falls Creek TMDL. Data from water quality monitoring and field inventory and evaluations were used to identify critical agricultural areas affecting water quality and to recommend subwatersheds for treatment (Table 19).

RECOMMENDED SUBWATERSHEDS FOR BMP IMPLEMENTATION

Table 19 lists the subwatersheds prioritized for treatment and the rationale for their prioritization. Subwatersheds in the Salmon Falls Creek subbasin were ranked using TMDLs and calculated load reductions, field inventory, streambank stability, and water quality data. According to this ranking, Lower Salmon Falls Creek and Shoshone Creek are the highest priority subwatersheds for implementation of BMPs.

Table 19. Subwatershed Priority for BMP Implementation.

Priority Ranking	Subwatershed	Rationale
1	Lower Salmon Falls Creek	Significant sediment inputs from irrigation return flows and farmland soil erosion; excessive nutrients (TN and TP) from irrigation return flows; predominant land uses include irrigated cropland and pasture/hay; thermal modification; Twin Falls Nitrate Priority Area
2	Shoshone Creek and its tributaries	Significant sediment inputs from unstable and erosive streambanks; predominant land use consists of rangeland (cattle impacts); nutrient loading from Big Creek; bacterial contamination in Cottonwood Creek; large solar load reductions required; impacts to T&E species; Groundwater Concern Area
3	Salmon Falls Creek Reservoir and its tributaries	Mercury contamination; Groundwater Concern Area; thermal modification
4	Cedar Creek Reservoir and its tributaries	Sediment from unstable banks in Lower Cedar Creek; thermal modification

TREATMENT ALTERNATIVES

The Balanced Rock and Twin Falls Soil and Water Conservation Districts, NRCS, and IASCD/ISCC will evaluate treatment alternatives and implement BMPs based on the priorities set forth in this plan, available funding, and landowner participation. Examples of treatment alternatives are listed below.

Proposed Treatment Alternatives:

1. Implement all BMPs per Tables 16, 17, and 18 for all subwatersheds.
2. Implement BMPs for subwatersheds with priority ranking 1 and 2.
3. Implement BMPs for the priority 1 subwatershed only.
4. Implement BMPs for a given treatment unit for a given subwatershed.
5. No action is taken to address identified water quality problems.

FUNDING

Financial and technical assistance for installation of BMPs is needed to ensure success of this implementation plan. The Balanced Rock and Twin Falls Soil and Water Conservation Districts will actively pursue multiple potential funding sources to implement water quality improvements on private agricultural and grazing lands. Many of these programs can be used in combination with each other to implement BMPs. These sources include (but are not limited to):

CWA 319 –These are Environmental Protection Agency funds allocated to the Nez Perce Tribe and the State of Idaho. The Idaho Department of Environmental Quality (IDEQ) administers the Clean Water Act §319 Non-point Source Management Program for areas outside the Nez Perce Reservation. Funds focus on projects to improve water quality and are usually related to the TMDL process. The Nez Perce tribe has CWA 319 funds available for projects on Tribal lands on a competitive basis http://www.deq.idaho.gov/water/prog_issues/surface_water/nonpoint.cfm#management

Water Quality Program for Agriculture (WQPA) –The WQPA is administered by the Idaho Soil Conservation Commission (ISCC). This program is also coordinated with the TMDL process. http://www.scc.state.id.us/programs.htm

Resource Conservation and Rangeland Development Program (RCRDP) –The RCRDP is a loan program administered by the ISCC for implementation of agricultural and rangeland best management practices or loans to purchase equipment to increase conservation. http://www.scc.state.id.us/programs.htm

Conservation Improvement Grants – These grants are administered by the ISCC. Source: http://www.scc.state.id.us/programs.htm

PL-566 –This is the small watershed program administered by the USDA Natural Resources Conservation Service (NRCS).

Agricultural Management Assistance (AMA) –The AMA provides cost-share assistance to agricultural producers for constructing or improving water management structures or irrigation structures; planting trees for windbreaks or to improve water quality; and mitigating risk through production diversification or resource conservation practices, including soil erosion control, integrated pest management, or transition to organic farming. http://www.nrcs.usda.gov/programs/ama/

Conservation Reserve Program (CRP) –The CRP is a land retirement program for blocks of land or strips of land that protect the soil and water resources, such as buffers and grassed waterways. http://www.nrcs.usda.gov/programs/crp/

Conservation Technical Assistance (CTA) –The CTA provides free technical assistance to help farmers and ranchers identify and solve natural resource problems on their farms and ranches. This might come as advice and counsel, through the design and implementation of a practice or treatment, or as part of an active conservation plan. http://www.nrcs.usda.gov/programs/cta/

Environmental Quality Incentives Program (EQIP): EQIP offers cost-share and incentive payments and technical help to assist eligible participants in installing or implementing structural and management practices on eligible agricultural land. http://www.nrcs.usda.gov/programs/eqip/

Wetlands Reserve Program (WRP) –The WRP is a voluntary program offering landowners the opportunity to protect, restore, and enhance wetlands on their property. Easements and restoration payments are offered as part of the program. http://www.nrcs.usda.gov/programs/wrp/

Wildlife Habitat Incentives Program (WHIP) –WHIP is a voluntary program for people who want to develop and improve wildlife habitat primarily on private land. Cost-share payments for construction or re-establishment of wetlands may be included. http://www.nrcs.usda.gov/programs/whip/

State Revolving Loan Funds (**SRF) –**These funds are administered through the ISCC. http://www.scc.state.id.us/programs.htm

Grassland Reserve Program (GRP) –The GRP is a voluntary program offering landowners the opportunity to protect, restore, and enhance grasslands on their property. http://www.nrcs.usda.gov/programs/GRP/

Conservation Security Program (**CSP) –**CSP is a voluntary program that rewards the Nation's premier farm and ranch land conservationists who meet the highest standards of conservation environmental management. http://www.nrcs.usda.gov

Grazing Land Conservation Initiative (GLCI) –The GLCI's mission is to provide high quality technical assistance on privately owned grazing lands on a voluntary basis and to increase the awareness of the importance of grazing land resources. http://www.glci.org/

HIP – This is an Idaho Department of Fish and Game program to provide technical and financial assistance to private landowners and public land managers who want to enhance upland game bird and waterfowl habitat. Funds are available for cost sharing on habitat projects in partnership with private landowners, non-profit organizations, and state and federal agencies. http://fishandgame.idaho.gov/cms/wildlife/hip/default.cfm

Partners for Fish and Wildlife Program in Idaho – This is a U.S. Fish and Wildlife program providing funds for the restoration of degraded riparian areas along streams, and shallow wetland restoration. http://www.fws.gov/partners/pdfs/ID-needs.pdf

OUTREACH

Conservation partners in the Salmon Falls Creek subbasin will use their combined resources to provide information about water quality to agricultural landowners and operators within subbasin. A local outreach plan may be developed. Newspaper articles, district newsletters, watershed and project tours, landowner meetings, and one-on-one personal contact may be used as outreach tools.

Outreach efforts will:

- Provide information about the TMDL process
- Supply water quality monitoring results
- Accelerate the development of conservation plans and program participation
- Distribute progress reports
- Enhance technology transfer related to BMP implementation
- Increase public understanding of agriculture's contribution to conserve and enhance natural resources
- Improve public appreciation of agriculture's commitment to meeting the TMDL challenge
- Organize an informational tour bringing together irrigation districts' Board of Directors and Soil Conservation Districts' Board of Supervisors.
- Identify and encourage the use of BMPs for recreation activities on the sub-basin

MONITORING AND EVALUATION

FIELD LEVEL

At the field level, annual status reviews will be conducted to insure that the contracts are on schedule and that BMPs are being installed according to standards and specifications. BMP effectiveness monitoring will be conducted on installed projects to determine installation adequacy, operation consistency and maintenance, and the relative effectiveness of implemented BMPs in reducing water quality impacts. This monitoring will also measure the effectiveness of BMPs in controlling agricultural nonpoint-source pollution. These BMP effectiveness evaluations will be conducted according to the protocols outlined in the Agriculture Pollution Abatement Plan and the ISCC Field Guide for Evaluating BMP Effectiveness.

The Revised Universal Soil Loss Equation (RUSLE) and Surface Irrigation Soil Loss (SISL) Equation are used to predict sheet and rill erosion on non-irrigated and irrigated lands. The Alutin Method, Imhoff Cones, and direct-volume measurements are used to determine sheet and rill irrigation-induced and gully erosion. Stream Visual Assessment Protocol (SVAP) and Streambank Erosion Condition Inventory (SECI) are used to assess aquatic habitat, stream bank erosion, and lateral recession rates. The Idaho OnePlan's CAFO/AFO Assessment Worksheet is used to evaluate livestock waste, feeding, storage, and application areas. The Water Quality Indicators Guide is utilized to assess nitrogen, phosphorus, sediment, and bacteria contamination from agricultural land.

WATERSHED LEVEL

At the watershed level, there are many governmental and private groups involved with water quality monitoring. The Idaho Department of Environmental Quality uses the Beneficial Use Reconnaissance Protocol (BURP) to collect and measure key water quality variables that aid in determining the beneficial use support status of Idaho's water bodies. The determination will tell if a water body is in compliance with water quality standards and criteria. In addition, IDEQ will be conducting five-year TMDL reviews.

Annual reviews for funded projects will be conducted to insure the project is kept on schedule. With many projects being implemented across the state, ISCC developed a software program to track the costs and other details of each BMP installed. This program can show what has been installed by project, by watershed level, by sub-basin level, and by state level. These project and program reviews will insure that TMDL implementation remains on schedule and on target. Monitoring BMPs and projects will be the key to a successful application of the adaptive watershed planning and implementation process.

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ABBREVIATIONS, ACRONYMS, AND SYMBOLS

§303(d) Refers to section 303 subsection (d) of the Clean Water Act, or a list of impaired water bodies required by this section **§** Section (usually a section of federal or state rules or statutes)

AFO Animal Feeding Operation

AU assessment unit

AWS agricultural water supply

BLM United States Bureau of Land Management

BMP best management practice

BOD biochemical oxygen demand

BU beneficial use(s)

BURP Beneficial Use Reconnaissance Program

C Celsius, Centigrade

CAFO Confined Animal Feeding Operation

CIG Conservation Improvement Grant

cfs cubic feet per second

CFU colony forming units

cm centimeters

CW cold water

CWA Clean Water Act

DEQ Department of Environmental Quality

DO dissolved oxygen

DWS domestic water supply

E. coli *Esherichia coli*

EPA United States Environmental Protection Agency

ESA Endangered Species Act

EQIP Environmental Quality Incentives Program

F Fahrenheit

FAR Fair-At Risk

FSA Farm Service Agency

GIS Geographical Information Systems

gpm/ft Gallons per minute per foot

HUC Hydrologic Unit Code

IASCD Idaho Association of Soil Conservation Districts

IDEQ Idaho Department of Environmental Quality

IDFG Idaho Department of Fish and Game

IDL Idaho Department of Lands

ISCC Idaho Soil Conservation Commission

ISDA Idaho State Department of Agriculture

km kilometer

km^2 square kilometer

kwh/m2/day Kilowatt per hour per square meter per day

LA load allocation

LC load capacity

LRR lateral recession rate(s)

m meter

m^3 cubic meter

NRCS Natural Resources Conservation Service

PFC Proper Functioning Condition

RCRDP Resource Conservation and Rangeland Development Loan Program

RMS Resource Management System

RUSLE Revised Universal Soil Loss Equation

SECI Streambank Erosion Condition Index

SP Solar Pathfinder

SVAP Stream Visual Assessment Protocol

SWCD Soil and Water Conservation District

TDS total dissolved solids

TKN total Kjeldahl nitrogen

TMDL Total Maximum Daily Load

TP total phosphorus

TU treatment unit(s)

WHIP Wildlife Habitat Incentives Program

WQPA Water Quality Program for Agriculture