Willow Creek Subbasin

Total Maximum Daily Load

Implementation Plan for Agriculture

Developed for the Idaho Department of Environmental Quality

Prepared by the Idaho State Soil and Water Conservation Commission In Cooperation with the East Side Soil and Water Conservation District, the North Bingham Soil Conservation District, and the Idaho Association of Soil Conservation Districts

January 2011

Table of Contents

List of Figures

List of Tables

List of Appendices

INTRODUCTION

Portions of the Introduction and Background sections of this document were taken from the Willow Creek Subbasin Assessment (SBA) and Total Maximum Daily Loads (TMDL) prepared by the Idaho Department of Environmental Quality (IDEQ 2004). The Willow Creek TMDL was submitted in May 2004 by IDEQ and approved by EPA in June 2004. The 1998 listed pollutants of concern for this subbasin included sediment, nutrients, temperature, and unknown. Since then the 2002 integrated and the 2008 integrated reports (303 (d)/305 (b) lists) have been published with more recent information. A detailed description of the listed stream segments and their pollutants can be found under the pollutants section in Table 7. The DEQ typically identifies water quality impaired streams in an integrated report compiled every two years. States must develop a total maximum daily load (TMDL) for waterbodies identified as impaired in the integrated report and set at a target to achieve water quality standards (IDEQ, 2004). The Idaho State Soil and Water Conservation Commission (SWC) is the designated state agency in Idaho for managing agricultural nonpoint source pollution (Idaho Code § 39-3601).

The Willow Creek Watershed Advisory Group (WAG) and supporting agencies will review the Willow Creek TMDL Implementation Plan for Agriculture submitted by the SWC. The plan will outline strategies to improve water quality and meet the load allocations presented in the SBA-TMDL document. Implementation of best management practices (BMPs) to reduce pollutant loading from nonpoint sources will be on a voluntary basis. This "Implementation Plan for Agriculture" will become a component of the Willow Creek Subbasin SBA-TMDL.

As additional information becomes available during the implementation of the TMDL, the targets, load capacity, and allocations may be revisited. In the event that new data or information shows that changes are warranted, TMDL revisions will be made with the assistance of the Willow Creek WAG. Although specific targets and allocations are identified in the TMDL, the ultimate success of the TMDL is not whether these targets and allocations are met, but whether beneficial uses and water quality standards are achieved.

The Idaho State Soil and Water Conservation Commission (SWC) works with the East Side Soil and Water Conservation District (ESSWCD), the North Bingham Soil Conservation District (NBSCD), the Caribou Soil Conservation District (CSCD), the Idaho Association of Soil Conservation Districts (IASCD), and the USDA Natural Resource Conservation Service (NRCS) in a partnership to reach common goals and successfully deliver conservation programs within the Willow Creek subbasin. Conservation assistance is provided by three Soil and Water Conservation Districts (East Side Soil and Water Conservation District, North Bingham Soil Conservation District, and the Caribou Soil Conservation District) and by three Resource Conservation and Development offices.

Purpose

The Willow Creek TMDL Implementation Plan outlines an adaptive management approach for implementation of Best Management Practices (BMPs) to meet the requirements of the TMDL. An adaptive management approach allows for modification of resource management decisions based on experimentation.
The purpose of this plan is to assist and/or complement other stakeholders in restoring and protecting beneficial uses for the §303 (d) listed stream segments (Table 1).

Goals and Objectives

This implementation plan is intended to assist and document ongoing efforts of the East Side Soil and Water Conservation District, the North Bingham Soil Conservation District, the Caribou Soil Conservation District, and agricultural producers in the Willow Creek subbasin to identify critical agricultural acres and suggest BMPs necessary to meet the requirements of the Willow Creek Subbasin SBA-TMDL. This work has already begun due to the efforts of the conservation districts and individual farm operators within the subbasin combined with funding assistance from the Natural Resource Conservation Service (NRCS), Idaho Department of Environmental Quality (IDEQ) and the Idaho State Soil and Water Conservation Commission. The main goal of this plan is to identify critical agricultural acres and to outline practices to reduce the amount of pollutants entering these water bodies from agricultural sources, where economically feasible.

Agricultural pollutant reductions will be achieved through the application of BMPs developed and implemented on-site with willing individual agricultural landowners and operators.

A long range objective of this plan will be to provide BMP effectiveness evaluation and monitoring to determine pollutant load reductions and the cumulative impact on the designated beneficial uses of the listed stream segments. Emphasis will also be placed on the continuance of an on-going water quality outreach program initiated by the conservation districts to encourage landowner participation in water quality remediation efforts within the subbasin

Background

Resource setting

The following excerpts were taken from the Willow Creek Subbasin SBA-TMDL.

> The Willow Creek Subbasin [Figure 1] is located in portions of Bingham, Bonneville, and Caribou counties of southeastern Idaho. The majority of the subbasin, over 50 percent, is in Bonneville County, about 39 percent in Bingham County and about 10 percent in Caribou County (Figure 1). The subbasin covers a geographical area of 647 square miles (mi^2) or 414,244 acres, with the widest section, the middle of the basin, being approximately 25 miles wide. The basin narrows at the northern and southern ends to a width of four miles at the Ririe Reservoir and nine and one-half miles in the Grays Lake area. Total basin length, from southernmost point to northernmost point, is 52 miles.

Three mountain ranges surround the subbasin: the Caribou Range is to the east, the Blackfoot Range is to the west, and the Grays Range is to the south. The highest peak is Caribou Mountain at 9,803 feet (ft), which is located on the southeastern portion of the subbasin above the headwaters of North Fork Eagle Creek, a tributary of Grays Lake. The highest peak to the west is Birch Creek Mountain at 7,487 ft, where the headwaters of Birch Creek originate. To the south, Henry Peak, above headwaters for Gravel Creek, has an elevation of 8,317 ft. The Grays Lake wetland complex and its source reaches reside on the southern tip of the subbasin where the elevation is approximately 7,000 ft. Drainage flows towards the Ririe Reservoir, the lower end of the subbasin at 5,200 ft.

There are 543 stream miles in the Willow Creek Subbasin. Willow Creek is the longest stream at 57 miles; Grays Lake Outlet, a tributary of Willow Creek is the second longest at 37 miles. Headwaters for Willow Creek are located in a high elevation, spring-fed, meadow-marsh complex at approximately 6,600 ft. Willow Creek proceeds through the subbasin where several tributaries merge with it and flow to the Hydrologic Unit Code (HUC) boundary, below the Ririe Reservoir at 5,250 ft. The approximate valley gradient for Willow Creek, from headwaters to HUC boundary, is 24 miles (Figure 2).

Climate

The climate of the subbasin is classified as semiarid high desert characterized by warm to hot dry summers and long, cool winters…

The average annual precipitation is about 20.38 inches (in) at Henry near the upper end of the subbasin and is 12.25 inches at the lower end of the subbasin near Idaho Falls. The precipitation in the area is relatively evenly distributed throughout the year with slight increases during the winter and again in May and June. Abramovich et al. (1998) indicate that southeastern Idaho is somewhat unique with these two precipitation peaks as compared to the rest of the state, which typically has one winter peak in precipitation.

The annual average snowfall for the subbasin varies from 28.5 inches at Idaho Falls to 84.9 inches at Henry with majority of the snowfall occurring between November and March. Snow-pack tends to be greatest at the upper end of the subbasin. Snowpack decreases towards the west consistent with elevation. Light snowfall begins in September in the higher elevations but the lower elevations generally do not receive snow until October.

Soils

The Willow Creek subbasin is in the Middle Rocky Mountain Province (USDA, 1984). In Idaho, this province extends from the Utah border to within a few miles of Montana, bordered on the east by Wyoming. Mean annual soil temperatures are between 0^{o} C and 8^{o} C (cryic soil temperature regime) for most soils in the province. Frigid soils with mean annual soil temperatures less than 8^{o} C but with warmer summer soil temperatures can occupy wider mountain valleys.

Major soil orders in this province, according to USDA (1984), are mostly Mollisols (soils with organic rich surface horizon) and Alfisols (marginal moisture forest soils), with smaller areas of Inceptisols (young soils) and Histosols (organic soils).

…there are three soil associations, described in the Bonneville County Soil Survey (USDA 1981), that occur in the Willow Creek subbasin. The following summarizes those association descriptions.

Soil Association # 4, Torriorthents - Cryoborolls - Rock Outcrop, describes those soils making up the drainage ways of Willow Creek, Meadow Creek and Tex Creek, extending northwest towards Ririe Dam. Torriorthents are on the south and west facing canyon and mountain slopes, while cryoborolls occupy north and east facing slopes. Both soils are shallow (less than 20 inches) to very deep (greater than 60 inches) with stony surface textures.

Rock outcrops consist of exposed rhyolite or basalt bedrock. Vegetation in this association includes Indian ricegrass, aspen, and big sagebrush. This soil association is used primarily for rangeland and wildlife habitat. There is a hazard of erosion noted for this association.

Soil Association # 5, Ririe – Potell, occurs in the northwest portion of the Willow subbasin in loess foothills. The association's southern boundary is just below the latitude where Tex Creek joins Bulls Fork. Both soils are very deep silt loams. This association is used primarily for dryland winter wheat and spring barley. Native vegetation can include bluebunch wheatgrass, slender wheatgrass, big sagebrush and mountain big sagebrush. Minor uses include rangeland and some sprinkle irrigated agriculture. There is a hazard of erosion noted for this association.

Soil Association # 6, Dranyon – Paulson – Rock Outcrop, an upper elevation mountainous unit, occurs in the upper middle of the Willow Creek subbasin, just north of the Bingham and Bonneville county line. As discussed previously, this association delineation joins, and is related to, Soil Association #s 4 and 8 of the Bingham Co. Soil Survey (USDA 1973), which associations are described below. Dranyon soils are deep (40 to 60 inches) and have extremely stony silt loam surface textures. Paulson soils are very deep with a silt loam surface and heavier textures in the subsurface. Rock outcropping is exposed sandstone and shale bedrock. Vegetation in this association includes aspen, bluebunch wheatgrass, snowberry, blue wildrye, and antelope bitterbrush. Uses of this association include grazeable woodland, rangeland, and wildlife.

Table 1. 303(d) listed streams and SBA-TMDL recommendations for the Willow Creek Subbasin

Stream	*Description*	*Assessment Units*	*TMDL completed*
Birch Creek	Headwaters to Willow Creek	SK006_02 SK006_03	Sediment-No
Brockman Creek	Corral Creek to mouth	SK024_02 SK024_03	Nutrients-No Sediment-Yes Temperature-Yes
Brockman Creek	Source to Corral Creek	SK025_02 SK025_03	Temperature-Yes
Buck Creek	Headwaters to Mill Creek	SK012_02	Sediment-Yes
Corral Creek	Headwaters to Brockman Creek/ Source to mouth	SK026_02	Sediment-Yes Temperature-Yes
Crane Creek	Headwaters to Willow Creek	SK014_02 SK014_03	Sediment-Yes
Gray's Lake Outlet	Grays Lake to Above Falls	SK020_02 SK020_04	Nutrients-No Sediment-No Temperature-Yes
Gray's Lake Outlet	Grays Lake to Willow Creek	SK016_04 SK017_04 Sk019_04	Temperature-Yes
Hell Creek	Headwaters to Grays Lake Outlet/Source to mouth	SK029_02 SK029_03	Nutrients-No Sediment-Yes Temperature-Yes
Homer Creek	Headwaters to Grays Lake Outlet	SK018_02 SK018_03	Sediment-Yes Temperature-Yes
Lava Creek	Headwaters to Grays Lake Outlet/Source to mouth	SK028_02 SK028_03	Sediment-Yes Temperature-Yes
Long Valley Creek	Headwaters to Willow Creek	SK015_02	Sediment-No Temperature-No
Meadow Creek	Headwaters to Ririe Reservoir	SK032_02 SK032_03	Sediment-Yes Temperature-Yes
Mill Creek	Headwaters to Willow Creek	SK012_02 SK012_03	Sediment-Yes Temperature-Yes
Rock Creek	Headwaters to Willow Creek	SK005_02	Temperature-Yes
Sawmill Creek	Headwaters to Brockman Creek	SK027_02	Sediment-Yes Temperature-Yes
Sellars Creek	S FK Sellars to Willow Creek	SK010_02 SK010_03	Sediment-Yes Temperature-Yes
Seventy Creek	Headwaters to Willow Creek	SK011_02	Sediment-Yes Temperature-No
Tex Creek	Headwaters to Indian Fork	SK031_02 SK031_03	Sediment-Yes Temperature-Yes
Willow Creek	Ririe Dam to HUC boundary	SK001_05	Sediment-No Temperature-No
Willow Creek	Grays Lake Outlet to Ririe Reservoir	SK004_05 SK005_05	Nutrients-Yes Sediment-Yes Temperature-Yes
Willow Creek	Sellars Creek to Grays Lake Outlet	SK008_04 SK005_04	Nutrients-Yes
Willow Creek	Headwaters to Sellars Creek	SK011_04 SK013_03	Nutrients-Yes Sediment-Yes Temperature-Yes

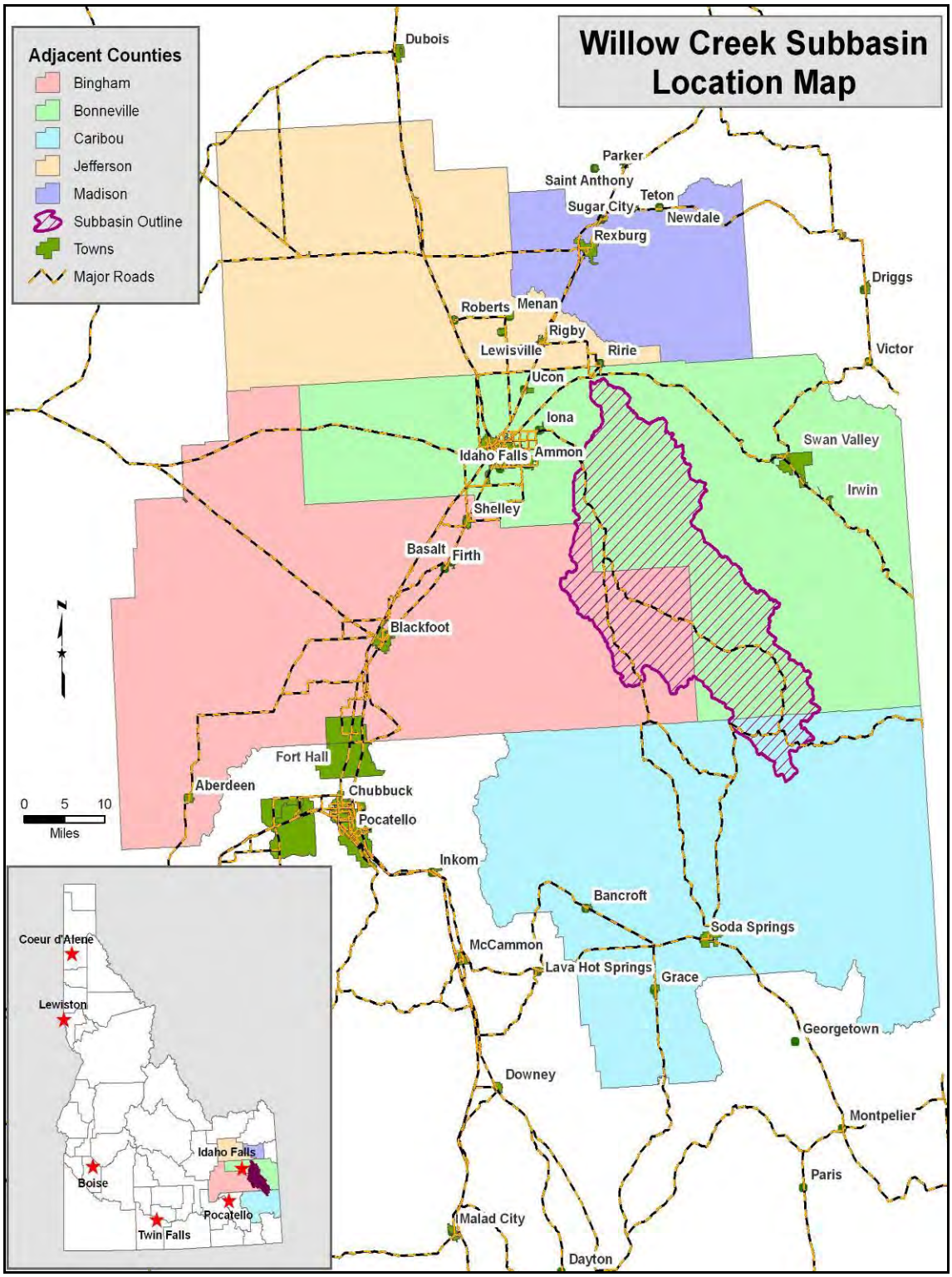


Figure 1. Location of the Willow Creek Subbasin in Idaho

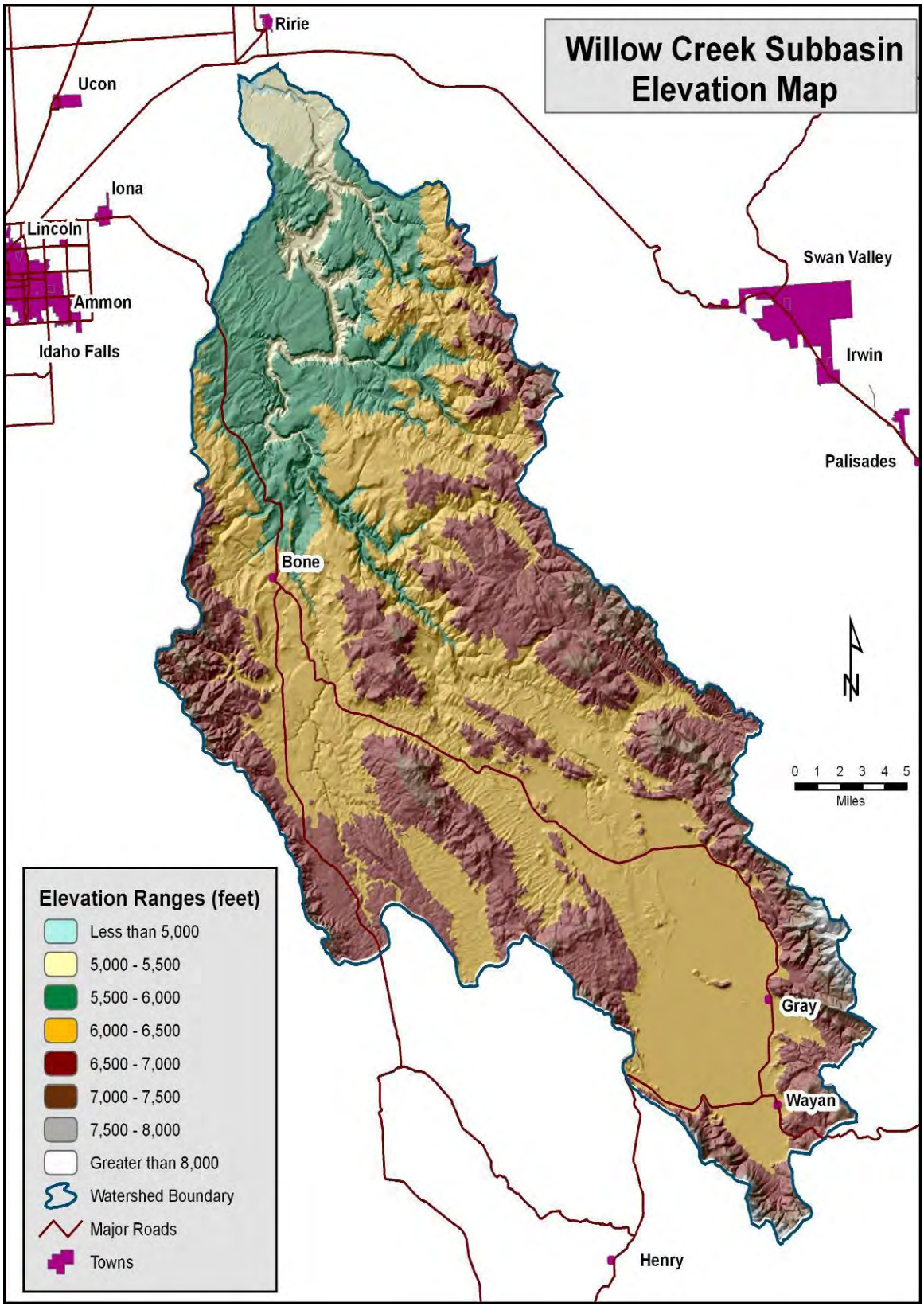


Figure 2. Elevation Ranges for the Willow Creek Subbasin

Common Resource Areas (CRAs)

There are two Major Land Resource Areas (MLRAs) in the subbasin: Eastern Idaho Plateaus (13) and Central Rocky Mountains (43B). Each of these MLRAs has subunits known as common resource areas (CRAs). There are six CRAs in the Willow Creek subbasin and they are listed below. A common resource area (CRA) is a region where resource concerns, problems, or treatment needs are similar. Landscape conditions, soil, climate, human considerations, and other natural resource information are used to determine the boundaries of a CRA (http://www.id.nrcs.usda.gov/technical/soils/common_res_areas.html).

13.1 Dissected Plateaus and Teton Basin
13.4 Sagebrush Steppe and Woodland Covered Hills and Low Mountains
13.5 High Elevation Forests and Shrublands
13.6 Sagebrush Steppe Valleys
43B.10 Cold Valleys
43B.11 Partly Forested Mountains

Watersheds

Willow Creek is a tributary to the Snake River. It originates from streams that drain the east side of the Blackfoot Mountains (RWA 2007). The Willow Creek subbasin is divided into nine watersheds (Figure 3). These are Grays Lake, Homer Creek, Lower Grays Lake Outlet, Lower Willow (Ozone), Middle Willow (Bone), Tex, Upper Grays Lake Outlet, Upper Willow, and Willow Reservoir. Maps of these watersheds can be found in Appendix B. For a more detailed description of each of these watersheds please refer to the Willow Creek SBA-TMDL (IDEQ 2004).

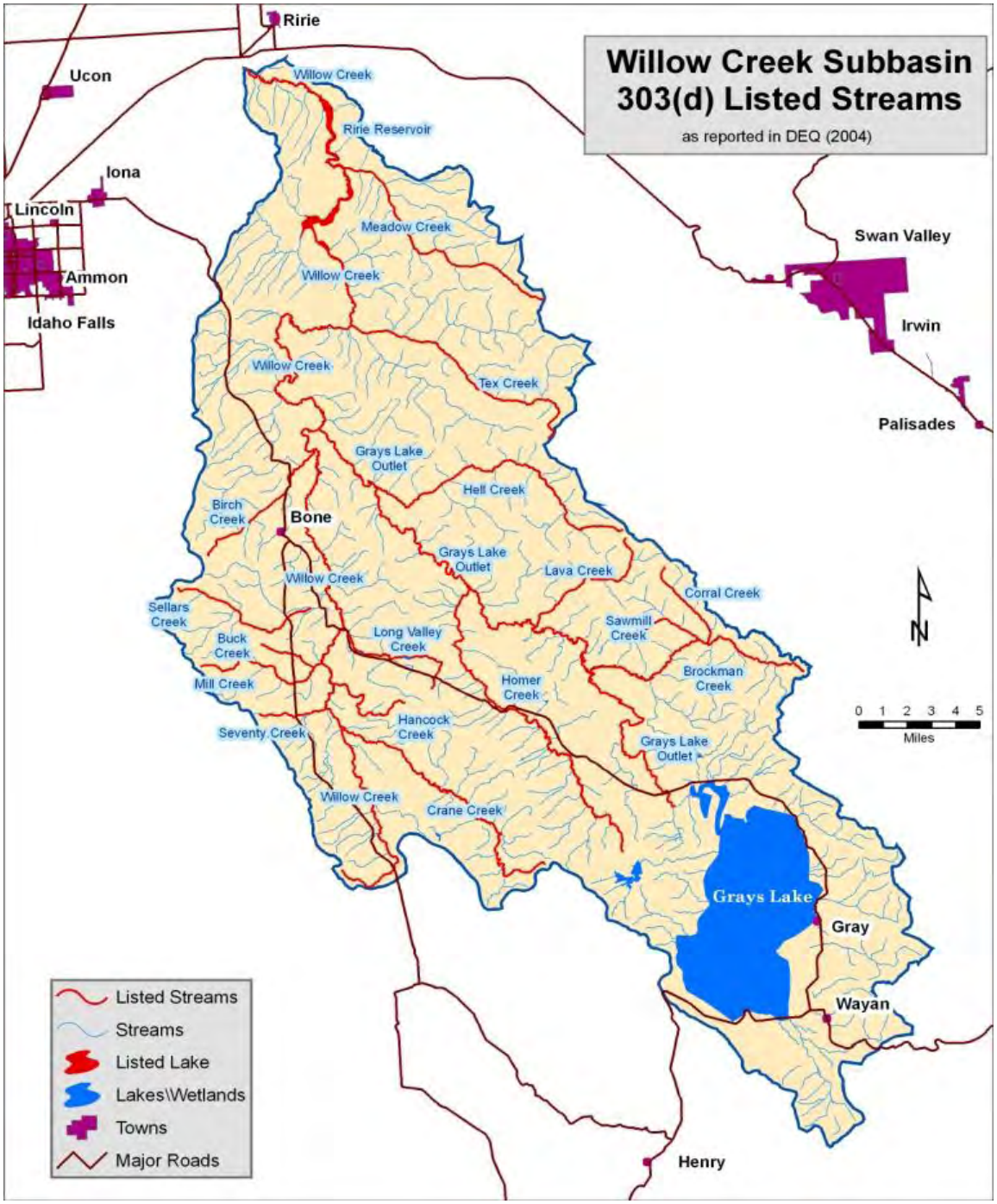


Figure 3. Listed Streams and Watersheds found in the Willow Creek Subbasin

Land Use

The primary land use in the Willow Creek subbasin is grazed rangeland (Figure 4, Table 2). Rangelands are located throughout the subbasin, but more so south of the town of Bone. Forested areas cover twenty percent of the subbasin. The next largest land use is grassland, which can be found intermittently throughout the subbasin. A majority of the grassland as well as the cropland is concentrated in the upper portion of the subbasin, north of the town of Bone and surrounding Ririe Reservoir. Winter wheat/spring barley/fallow or winter wheat/spring fallow rotations are typical for dry cropland areas. Minor portions of the subbasin are surface irrigated hayland with a small grains/alfalfa hay rotation. Another minor land use is dryland pasture seeded with brome, Idaho fescue, orchard grass, and wheatgrasses. Wetlands are found near Grays Lake and cover six percent of the subbasin.

The following information regarding infrastructure was taken from the Willow Creek Subbasin SBA-TMDL (IDEQ 2004).

> The majority of roads within the Willow Creek Subbasin are county and private. The overwhelming majority of the roads within the basin are unpaved. The only paved road in is the main road into the subbasin from Sunnyside Road in Idaho Falls. This road (Bone Road) is paved to Bone, where the road splits into two main unpaved roads. The Long Valley Road runs southeast towards the northernmost tip of the Grays Lake wetland complex. The Blackfoot Reservoir Road runs directly south towards the Blackfoot Reservoir (Blackfoot Reservoir subbasin).

Table 2. Land Use/Land Cover for the Willow Creek Subbasin

Land Use Category	*Acres*	*% of Subbasin*
Shrub/Rangeland	201,140	48.3
Forest	84,590	20.3
Grassland	63,580	15.3
Cropland	35,030	8.4
Wetlands	25,250	6.1
Developed	2,720	0.7
Hay/Pasture	2,500	0.6
Open Water	1,740	0.4
Barren Land	14	<0.1
TOTAL:	416,564	100

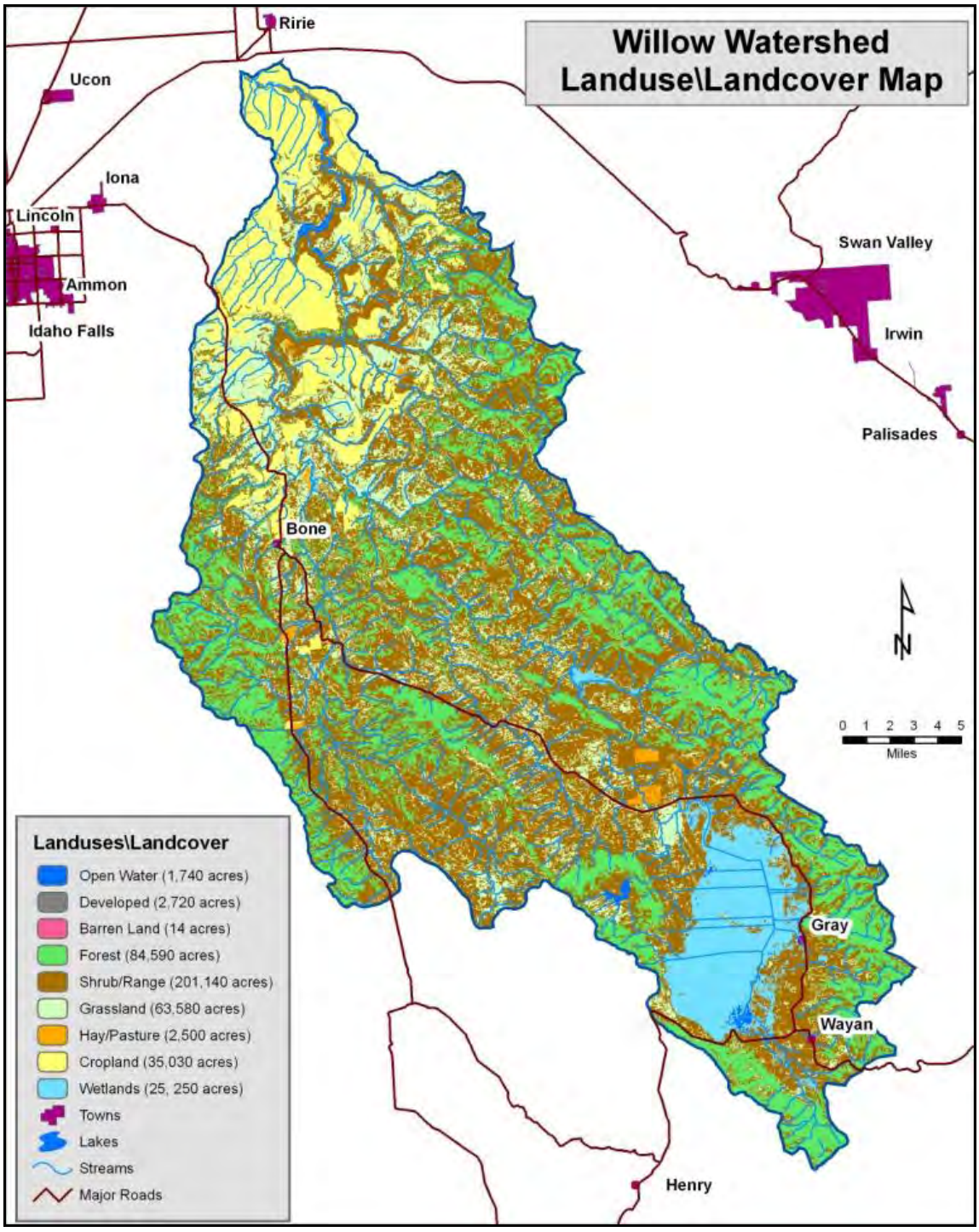


Figure 4. Land Uses\Land Cover for the Willow Creek Subbasin

Land Ownership

A land management map was generated using the most current BLM land status GIS layer. As shown in Figure 5 and Table 3, the Willow Creek subbasin is mostly privately owned, approximately sixty percent. The State of Idaho manages approximately seventeen percent of the land in subbasin. The Caribou-Targhee National Forest (USFS) manages almost nine percent of the land in the subbasin. The next largest land manager is the United States Fish and Wildlife Service (USFWS) which manages 21,720 acres surrounding Grays Lake National Wildlife Refuge. Grays Lake Wildlife Refuge is the second largest refuge in the state of Idaho.

Table 3. Land Management for the Willow Creek Subbasin

Land Management	*Acres*	*% of Subbasin*
Private	247,860	59.5
State of Idaho	69,960	16.8
United States Forest Service	36,060	8.7
National Wildlife Refuge	21,720	5.2
Bureau of Land Management	17,050	4.1
Bureau of Reclamation	9,830	2.4
Idaho Department of Fish and Game	8,600	2.1
Corps. Of Engineering	5,480	1.3
TOTAL	416,560	100

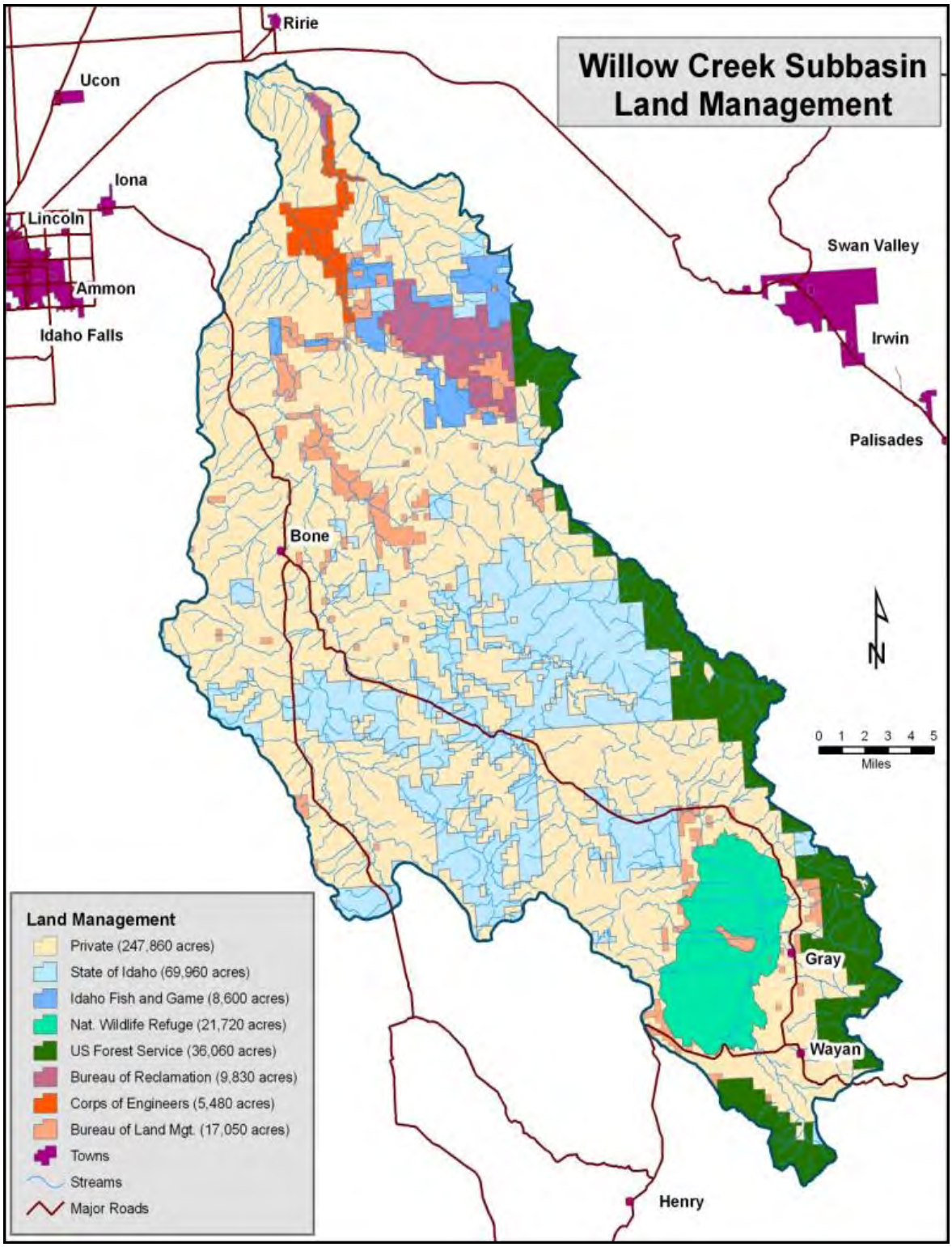


Figure 5. Land Management for the Willow Creek Subbasin

Accomplishments

Several projects have been completed in the past, particularly in the cropland areas. Three of the State Agricultural Water Quality Program (SAWQP) projects are summarized in Table 4. These projects were initiated in the 1980's and 1990's and treated more than 15,000 acres in mainly dryland crop areas. The Conservation Reserve Program (CRP) was initiated in the late 1980's, with many dryland acres being enrolled. The CRP program has contributed greatly to reducing dryland soil erosion.

Table 4. SAWQP Projects – Cropland BMPs

Completed BMP's – Idaho SAWQP Projects			
Practice	Badger Creek	Meadow Creek	Tex Creek
Water and Sediment Basins	8		70
No-Till	1502 ac		4,384 ac
Short Terraces	13,367 ft	14,741 ft	10,157 ft
Long Terraces	130,512 ft	50,803 ft	35,146 ft
Permanent Plantings	156 ac	161 ac	309 ac
Strip Cropping	1,049 ac	249 ac	775 ac
Chisel – Deep Tillage	4,000 ac	2,038	4,803 ac
Critical Acres	7,463	9,043	12,803
Acres Treated	4,754	3,433	6,875

Other BMPs have been implemented in the Willow Creek subbasin (Table 5). These are state and federal projects, such as those cost-shared by the NRCS Environmental Quality Incentive Program (EQIP). State and federal BMPs completed before 2005 can be found in the Willow Creek SBA-TMDL on Page 90, Figure 27 (IDEQ 2004). Federal BMPs completed from 2005 to 2009 are represented in Figure 6.

Table 5. Federal BMPs completed from 2005 to 2009 in the Willow Creek Subbasin

PRACTICE NAME	PRACTICE NUMBER	UNIT	2009	2008	2007	2006	2005	TOTAL
Access Control	472	ac	3,801.5					**3,801.5**
Brush Management	314	ac	320.0			1,904.3		**2,224.3**
Conservation Cover	327	ac	4,833.8	746.0	1,421.8	1,732.0	708.7	**9,442.3**
Conservation Completion Incentive					1.0			**1.0**
Critical Area Planting	342	ac	1.0					**1.0**
Fence	382	ft	8,312.0	3,910.5	18,174.4	18,710.0	5,843.9	**54,950.8**
Forage Harvest Management	511	ac	2,602.1	357.1		242.8		**3,202.0**
Heavy Use Area Protection	561	ac			0.1	0.3		**0.4**
Irrigation Water Conveyance, Pipeline, High-Pressure, Underground, Plastic	430DD	ft	6,536.0					**6,536.0**
Irrigation Water Conveyance, Pipeline, Steel	430FF	ft	35.0					**35.0**
Irrigation Water Management	449	ac	29.1					**29.1**
Nutrient Management	590	ac		29.1				**29.1**
Pest Management	595	ac	4,015.1	3,982.3	5,850.1	161.0	383.4	**14,391.9**
Pipeline	516	ft	1,293.0	10,681.0	10,207.0	17,571.0	4,784.0	**44,536.0**
Prescribed Grazing	528	ac	5,094.8	7,722.6	11,341.3		520.0	**24,678.7**
Pumping Plant	533	no	1.0					**1.0**
Spring Development	574	no	1.0	8.0	15.0	15.0	15.0	**54.0**
Streambank and Shoreline Protection	580	ft	400.0					**400.0**
Structure for Water Control	587	no	1.0					**1.0**
Tree/Shrub Establishment	612	ac	1.0					**1.0**
Upland Wildlife Habitat Management	645	ac	4,845.6	8,474.9	6,931.0	618.6	654.1	**21,524.2**
Use Exclusion	472	ac		3,617.5	1,368.4	189.4	280.4	**5,455.7**
Waste Storage Facility	313	no	1.0					**1.0**
Water Well	642	no				1.0		**1.0**
Watering Facility	614	no	1.0	16.0	17.0	25.0	14.0	**73.0**

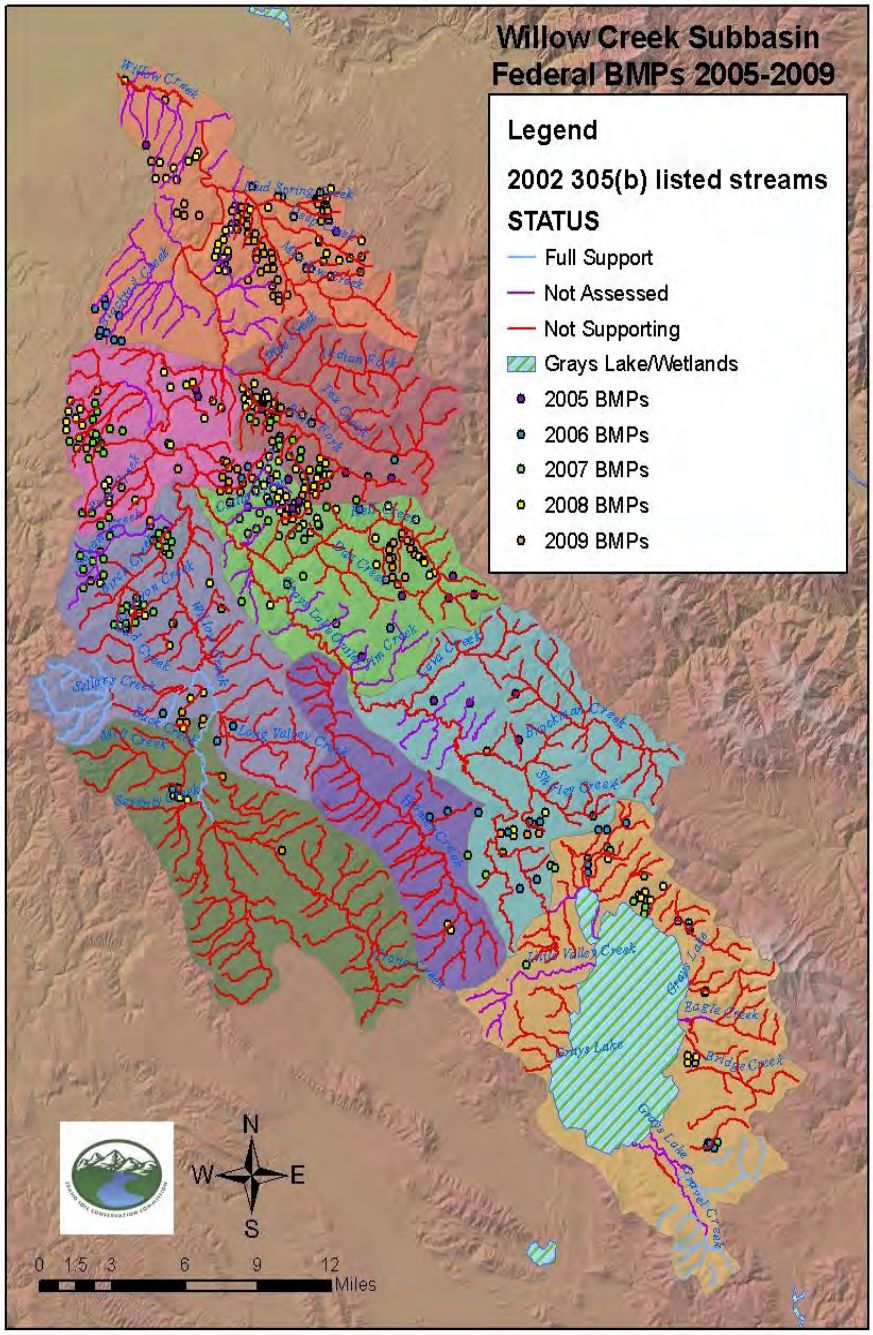


Figure 6. 2005-2009 Federal BMPs applied in the Willow Creek Subbasin

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. Designated beneficial uses and water quality criteria assigned to Willow Creek (mainstem) are cold water aquatic life, domestic water supply, primary contact recreation, salmonid spawning, secondary contact recreation, and special resource water of concern. Designated, existing, and/or presumed beneficial uses for assessment units in the Willow Creek Subbasin are listed below in Table 6 (IDEQ 2004). In order for beneficial uses to be supported, water quality criteria (see below) must not be exceeded. The IDEQ Beneficial Use Reconnaissance Program (BURP) collects water quality and habitat data in an effort to monitor and assess stream condition. Streams listed in the Willow Creek subbasin do not meet the narrative and/or numeric criteria for cold water aquatic life based on fish, habitat, and macroinvertebrate data collected by BURP crews. The following is a list of numeric criteria for some of the beneficial uses.

- Cold water aquatic life-<22° C daily maximum or <19° C daily average
- Domestic water supply (DWS)
- Primary Contact Recreation (PCR)-< 126 *E.coli*/100 ml (geometric mean) or <406 *E.coli*/100 ml (instantaneous)
- Salmonid Spawning (SS)-<13° C daily maximum or <9° C daily average (during rainbow trout and bull trout spawning and incubation periods)
- Secondary Contact Recreation (SCR)-< 126 *E.coli*/100 ml (geometric mean) or <576 *E.coli*/100 ml (instantaneous)
- Special Resource Water of Concern (SRW)

Table 6. Beneficial Uses for Assessment Units in the Willow Creek Subbasin (IDEQ 2004).

Assessment Units	*Waterbody*	*Description*	*Beneficial Use(s)*	*Support Status*
SK006_02 SK006_03	Birch Creek	Headwaters to Willow Cr.	CWAL and PCR or SCR	CWAL=NS
SK024_02 SK024_03 SK025_02 SK025_03	Brockman Creek	Headwaters to Grays Lake Outlet	CWAL and PCR or SCR	CWAL & SS=NS SCR=FS
SK012_02	Buck Creek	Headwaters to Mill Creek	CWAL and PCR or SCR	CWAL & SS=NS
SK026_02	Corral Creek	Headwaters to Brockman Creek	CWAL and PCR or SCR	CWAL=NS
SK014_02	Crane Creek	Headwaters to Willow Creek	CWAL and PCR or SCR	CWAL & SS=NS SCR=FS
SK020_02 SK016_04 SK017_04 Sk019_04	Grays Lake Outlet	Grays Lake to Above Falls; Grays Lake to Willow Creek	CWAL and PCR or SCR	CWAL & SS=NS SCR=FS
SK029_02 SK029_03	Hell Creek	Headwaters to Grays Lake Outlet	CWAL and PCR or SCR	CWAL=NS
SK018_02 SK018_03	Homer Creek	Headwaters to Grays Lake Outlet	CWAL and PCR or SCR	CWAL=NS
SK028_02 SK028_03	Lava Creek	Headwaters to Grays Lake Outlet	CWAL and PCR or SCR	CWAL=NS
SK015_02	Long Valley Creek	Headwaters to Willow Creek	CWAL and PCR or SCR	CWAL & SS=NS
SK032_02 SK032_03	Meadow Creek	Headwaters to Ririe Reservoir	CWAL and PCR or SCR	CWAL & SS=NS SCR=FS
SK012_02 SK012_03	Mill Creek	Headwaters to Willow Creek	CWAL and PCR or SCR	CWAL & SS=NS
SK005_02	Rock Creek	Headwaters to Willow Creek	CWAL and PCR or SCR	CWAL, PCR, & SS=NS
SK027_02	Sawmill Creek	Headwaters to Brockman Creek	CWAL and PCR or SCR	CWAL=NS
SK010_02 SK010_03	Sellars Creek	S.F. Sellars Cr. to Willow Creek	CWAL and PCR or SCR	CWAL & SS=NS SCR=FS
SK011_02	Seventy Creek	Headwaters to Willow Creek	CWAL and PCR or SCR	CWAL=NS
SK031_02 SK031_03	Tex Creek	Headwaters to Indian Fork	CWAL and PCR or SCR	CWAL=NS
SK001_05 SK004_05 SK005_05 SK008_04 SK005_04 SK011_04 SK013_03	Willow Creek	Ririe Dam to HUC boundary; Grays Lake Oultet to Ririe Reservoir: Headwaters to Grays Lake Outlet	CWAL, PCR, SCR, SS	CWAL=NS PCR=NS SS=NS

CWAL=Cold Water Aquatic Life, PCR=Primary Contact Recreation, SCR=Secondary Contact Recreation, SS=Salmonid Spawning, FS=Fully Support, NS=Not Supporting

Pollutants

This section focuses on particular pollutants that result in streams failing to meet beneficial use(s). Twenty segments (18 waterbodies) in the Willow Creek subbasin were listed on the 1998 303(d) list (Table 7). Sedimentation/siltation was listed as the primary pollutant for all of the listed streams in the subbasin. In addition, Brockman Creek, Grays Lake Outlet, and Hell Creek were listed as impaired by nutrients. Seventy Creek and Sellars Creek were described as flow altered. Buck Creek was listed for unknown pollutants. In 2001 EPA listed Corral Creek, Lava Creek, Long Valley Creek, Mill Creek, Sawmill Creek, Sellars Creek, and Seventy Creek as impaired by temperature.

In the 2002 integrated report, additional pollutants were assigned to some of the streams. A segment of Brockman Creek, Meadow Creek, and tributaries (AU# 005_02, 008_02) to Willow Creek were listed for pathogens. Crane Creek, a segment of Grays Lake Outlet, Bulls Fork, Tex Creek, Mud Creek, and tributaries (AU# 005_02, 008_02, 011_02, 013_02) to Willow Creek were listed for unknown pollutants. Sellars Creek and Willow Creek were listed as flow altered. Temperature was also added as a source of use impairment for a segment of Grays Lake Outlet and Willow Creek in 2006.

The current status of streams listed in the Willow Creek subbasin can be found in the 2008 303 (b)/305 (d) integrated report. Several changes have been made since the 2002 integrated report. Table 7 shows the pollutant status of listed streams in the subbasin from 1998 to 2008. Tributaries (AU# 005_02, 008_02, 011_02, 013_02) to Willow Creek are not listed in Table 7, but they are described in the following text. AU# 005_02 and 008_02 are listed for combined biota/habitat bioassessments and fecal coliform. AU#011_02 is listed for other flow regime alterations and water temperature. AU#013_02 is listed for combined biota/habitat bioassessments. Willow Creek is newly listed as impaired by fecal coliform. Birch Creek, Long Valley Creek, and a segment of Willow Creek are recently listed as impaired by non-pollutants or flow altered. Crane Creek is listed as impaired by temperature. Brockman Creek is listed as impaired by fecal coliform and unknown pollutants. Hell Creek is currently listed for unknown pollutants.

Streams with an approved TMDL for a given pollutant are not described in Table 7, but are instead found in Table 1. Tables 8 and 9 show the reduction needed for streams with approved TMDL(s) to meet the nutrients, sediment, and temperature load requirements. Please refer to the SBA-TMDL for more detailed information regarding the load allocations (IDEQ 2004).

Table 7. Sequential Listing of Impaired Streams and their Pollutants

Stream	*Description*	*Assessment Units*	*1998 Listing*	*2002 Listing*	*2008 Listing*
Birch Creek	Headwaters to Willow Creek	SK006_02 SK006_03	Sediment	Sediment	Low flow alterations
Brockman Creek	Corral Creek to mouth	SK024_02 SK024_03	Nutrients Sediment	Pathogens Nutrients Sediment	Fecal coliform
Brockman Creek	Source to Corral Creek	SK025_02 SK025_03	Nutrients Sediment	Nutrients Sediment	Unknown Nutrients suspected
Buck Creek	Headwaters to Mill Creek	SK012_02	Unknown		
Bulls Fork	Source to mouth	SK032_02		Unknown	Combined biota/habitat
Corral Creek	Headwaters to Brockman Creek/Source to mouth	SK026_02	Sediment Temperature	Sediment Temperature	
Crane Creek	Headwaters to Willow Creek/Source to mouth	SK014_02 SK014_03	Sediment	Unknown Sediment	Temperature Combined biota/habitat
Grays Lake		SK020_02			Combined biota/habitat
Grays Lake Outlet	Grays Lake to Above Falls/Grays Lake to Brockman Creek	SK020_02 SK020_04	Nutrients Sediment	Nutrients Sediment	Sedimentation/siltation, Unknown Nutrients suspected
Grays Lake Outlet	Grays Lake to Willow Creek/ Brockman Creek to mouth	SK016_04 SK017_04 Sk019_04		Unknown Temperature	Combined biota/habitat
Hell Creek	Headwaters to Grays Lake Outlet/Source to mouth	SK029_02 SK029_03	Nutrients Sediment	Nutrients Sediment	Unknown Nutrients suspected
Homer Creek	Headwaters to Grays Lake Outlet/Source to mouth	SK018_02 SK018_03	Sediment	Sediment	
Lava Creek	Headwaters to Grays Lake Outlet/Source to mouth	SK028_02 SK028_03	Sediment Temperature	Sediment Temperature	
Long Valley Creek	Headwaters to Willow Creek	SK015_02	Sediment Temperature		
Meadow Creek	Headwaters to Ririe Reservoir	SK032_02 SK032_03	Sediment	Pathogens Sediment	
Mill Creek	Headwaters to Willow Creek/Source to mouth	SK012_02 SK012_03	Sediment Temperature	Sediment Temperature	
Mud Creek	Source to mouth	SK009_02		Unknown	Combined Biota/Habitat
Ririe Reservoir		SK002_03 SK002_05	Sediment		Sedimentation/siltation

Stream	*Description*	*Assessment Units*	*1998 Listing*	*2002 Listing*	*2008 Listing*
Sawmill Creek	Headwaters to Brockman Creek/Source to mouth	SK027_02	Sediment Temperature	Sediment Temperature	
Sellars Creek	S FK Sellars to Willow Creek/Source to mouth	SK010_02 SK010_03	Sediment Temperature	Sediment Temperature	
Seventy Creek	Headwaters to Willow Creek	SK011_02	Sediment Temperature		
Tex Creek	Headwaters to Indian Fork/Source to mouth	SK031_02 SK031_03	Sediment	Sediment Unknown	
Willow Creek	Ririe Dam to HUC boundary (Eagle Rock Canal)	SK001_05	Sediment	Sediment	Sedimentation/siltation
Willow Creek	Grays Lake Outlet to Ririe Reservoir	SK004_05 SK005_05	Sediment	Sediment	
Willow Creek	Sellars Creek to Grays Lake Outlet	SK008_04 SK005_04		Temperature	Temperature
Willow Creek	Headwaters to Sellars Creek	SK011_04 SK013_03	Sediment		

Table 8. Temperature Reductions for [2002] 303(d) Listed Streams (IDEQ 2004).

Stream	Temperature Statistic	CURRENT LOAD Highest Recorded Temperature	LOAD CAPACITY Criteria	LOAD ALLOCATION Temperature reduction	% Reduction to meet load capacity
Corral Creek	Max Daily	22.39°C	13°C	-9.39°C	42%
	Daily Ave	21.95°C	9°C	-12.95°C	59%
Homer Creek	Max Daily	26.42°C	13°C	-13.42°C	51%
	Daily Ave	18.79°C	9°C	-9.79°C	52%
Hell Creek	Max Daily	19.51°C	13°C	-6.51°C	33%
	Daily Ave	17.41°C	9°C	-8.41°C	48%
Tex Creek	Max Daily	24.19°C	13°C	-11.19°C	46%
	Daily Ave	17.96C	9°C	-8.96°C	50%
Sawmill Creek	Max Daily	20.9°C	13°C	-7.9°C	38%
	Daily Ave	18.11°C	9°C	-9.11°C	50%
Grays Lake Outlet (Homer Creek to mouth)	Max Daily	28.34°C	13°C	-15.34°C	54%
	Daily Ave	21.58°C	9°C	-12.58°C	58%
Grays Lake Outlet (Outlet to Homer Creek)	Max Daily	28.34°C	13°C	-15.34°C	54%
	Daily Ave	21.58°C	9°C	-12.58°C	58%
Brockman Creek	Max Daily	19.70°C	13°C	-6.70°C	34%
	Daily Ave	17.84°C	9°C	-8.84°C	50%
Rock Creek	Max Daily	24.54°C	13°C	-11.54°C	47%
	Daily Ave	21.97°C	9°C	-12.97°C	60%
Willow Creek (Headwaters to Ririe Reservoir)	Max Daily	24.54°C	13°C	-11.54°C	47%
	Daily Ave	21.97°C	9°C	-12.97°C	60%
Sellars Creek	Max Daily	26.7°C	13°C	-13.7°C	51%
	Daily Ave	18.51°C	9°C	-9.51°C	51%
Mill Creek	Max Daily	24°C	13°C	-11°C	46%
	Daily Ave	18.2°C	9°C	-9.2°C	51%
Lava Creek	Max Daily	22.8°C	13°C	-9.8°C	43%
	Daily Ave	18.44°C	9°C	-9.44°C	51%

Table 9. Identified Reductions Needed for [2002] §303(d) Listed Stream Segments

Assessment Units of ID17040205	*TMDL Developed*	*Erosion Rate Reduction Needed (tons/mile/year)*	*Percent Sediment Reduction Required*	*Nutrient Reduction*	*Percent Nutrient Reduction Required*
SK024_02 SK024_03 SK025_02 SK025_03	Brockman Creek	-359	93		
SK026_02	Corral Creek	-208	92		
SK014_02	Crane Creek	-147	86		
SK029_02 SK029_03	Hell Creek	-363	90		
SK018_02 SK018_03	Homer Creek	-391	95		
SK028_02 SK028_03	Lava Creek	-521	97		
SK032_02 SK032_03	Meadow Creek	-29	59		
SK012_02 SK012_03	Mill Creek	-18	68		
SK027_02	Sawmill Creek	-321	94		
SK010_02 SK010_03	Sellars Creek	-293	96		
SK011_02	Seventy Creek	-277	96		
SK031_02 SK031_03	Tex Creek	-4	50		
SK001_05 SK004_05 SK005_05 SK008_04 SK005_04 SK011_04 SK013_03	Willow Creek	-199	93	TP: -3 N: -32	TP: 23 N: 67

Water Quality Monitoring

All data summarized in this plan were collected following the publication of the Willow Creek Subbasin SBA-TMDL. A more detailed inventory of past water quality monitoring data for the Willow Creek subbasin can be found in the Willow Creek Subbasin SBA-TMDL (IDEQ 2004). Water quality data collected from June through October 2003 by IASCD personnel was reported in Appendix F of Willow Creek Subbasin SBA-TMDL.

Water quality data reported in the SBA-TMDL was only a portion of the monitoring data for the Willow Creek Subbasin Phase I. IASCD personnel collected water quality data

(ammonia, nitrogen, total phosphorus, orthophosphorous, suspended sediment, and discharge) from June 2003 through December 2004 for eight sites (Jenkins 2006). Based on data from these sample sites (Birch Creek, Grays Lake Outlet, Homer Creek, Meadow Creek, Sellars Creek, Tex Creek, and two sites on Willow Creek), sediment and temperature are the most widespread concerns in the subbasin. Five out of the eight sample sites exceeded the 25 mg/L sediment target and two sites occasionally exceeded the 80 mg/L target. All of the sites, except for one on Meadow Creek, exceeded the salmonid spawning criteria of 13°C. Overall, Birch Creek had the poorest water quality. Birch Creek demonstrated the highest mean total suspended sediment concentrations for the sample period. Birch Creek also regularly exceeded the target concentration of 0.1 mg/L total phosphorus. Birch Creek, along with Sellars Creek and a site on Willow Creek exceeded the target concentration of 0.3 mg/L nitrogen.

As a follow-up to the Phase I monitoring, further water quality data was collected by IASCD for nine sites from March through September 2005 (Jenkins 2007). Phase II monitoring sites were located on Birch Creek, Mill Creek, Sellars Creek, Seventy Creek, Squaw Creek, and four sites on Willow Creek. Birch Creek and a tributary, Squaw Creek, regularly exceeded the 80 mg/L total suspended sediment criteria for the sample period. Birch and Squaw Creeks also regularly exceeded the total phosphorus criteria of 0.1 mg/L. Sellars Creek also exceeded the suspended sediment criteria. The nitrogen target of 0.3 mg/L was exceeded by all nine sites for a majority of the sampling period. As stated in the Phase II monitoring report, "Birch and Squaw creeks exhibited the poorest water quality of the streams monitored and should be prioritized for BMP implementation."

Agricultural Water Quality Inventory and Evaluation

The following information is based on the Soil Survey of Bingham and Bonneville County Areas, Idaho (Miles 1981; Salzmann and Harwood 1973, the Willow Creek Subbasin RWA (NRCS 2007) and conservation system guides for Bingham and Bonneville Counties (https://csg.sc.egov.usda.gov/CSGReporteFOTG.aspx).

Dry Cropland

Cropland Inventory and Evaluation

Summary-The Willow Creek subbasin contains 35,030 of dry cropland. Dry cropland is typically planted as a winter wheat/fallow rotation.

Resource Setting-Precipitation is from 10 to 14 inches per year. Elevation ranges from approximately 4,000 feet to 5,500 feet. Topography consists of flat benches and hills. Soils are generally silt loams. Average frost free period ranges from 90 to 120 days.

Current Condition -Currently much of the dry cropland in the Willow Creek subbasin has been treated with past conservation programs such as the SAWQP program or is enrolled in the CRP. Some cropland was not covered in those earlier programs, prior to 2005, and is not currently in the CRP. Some cropland is still following traditional summer fallow crop rotations. Others currently use conservation tillage practices. Some

lands that were treated with terraces or water and sediment basins and that are not in the CRP need repair work performed on the structures to keep them functional.

Some CRP contracts are due to expire in the next few years, and it is unknown at this time, how many of those contracts will not be renewed because of economic conditions, sale of land, or other issues. Some CRP land has been removed from the program early by landowners. It is unknown at this time how much of this acreage will be returned to crop production or left in permanent vegetative cover.

Suggested BMPs on Croplands in the Willow Creek Subbasin
NRCS practices which may be needed on cropland are: Contour Farming (330), Conservation Cover (340), Residue Management (345), Conservation Crop Rotation (328), Irrigation System Sprinkler (442), Irrigation Water Management (449), Nutrient Management (590), and Pest Management (595).

Resource Concerns
Past dry cropland BMP practices, including CRP, have been implemented but they may need to be updated or maintained. Cropland that currently is in the CRP program may be exiting in coming years. There are a number of NRCS sponsored EQIP contracts completed or are currently under way.

Pasture and Hayland

Pasture and Hayland Inventory and Evaluation

Summary – The Willow Creek subbasin contains 2,500 acres of private pasture and hayland. Pasture and hayland is the second largest private land use in the subbasin with almost one-third classified as grass/pasture/hay. Pasture and hayland is typically irrigated; however, some non-irrigated areas are used for forage for grazing animals. Irrigated pasture and hayland includes lower elevation pastures and higher elevation mountain valleys. Pasture and hayland plants are introduced perennial forage species, such as timothy, smooth bromegrass, meadow foxtail, and orchard grass or native grass/rush/sedge complexes. Soil erosion potential in this area may be from slight to very severe. Slope and depth to bedrock vary greatly.

Resource Setting – Pasture and hayland vegetation is a mixture of introduced and native perennial forage species including fescue, brome and western wheatgrass in higher elevation mountain valleys. Annual precipitation ranges from 6 to over 16 inches, and the growing season is relatively short, ranging from 50 to 160 days. Elevations range from 1,500 to 6,500 feet. Irrigation water is diverted from streams and distributed by earthen ditches and the tailwater returns to the perennial streams contributing to elevated stream temperatures. Soils vary from silty loams to gravelly sands, with 0 to 5% slopes.

Non-irrigated pastures are managed for forage production and season long livestock grazing. Livestock utilization is from late spring through fall and big game species are present in winter and early spring. Typical forage species may be introduced, including

wheat grasses, fescues, brome, orchard grass, sanfoin, clovers, and alfalfa. Invasive weeds typically are a concern. Livestock water is generally inadequate and often includes free access to creeks associated with pasture units.

Pasture and Hayland Assessment – We used NRCS' Pasture Condition Scoresheet (NRCS, 2008 and GLTI, 2001) on areas of the private pasture and hayland in the subbasin. The Pasture Condition Scoresheet was developed by NRCS' Grazing Lands Technology Institute (GLTI) to be used by landowners and resource professionals to visually assess 10 indicators of pasture condition and 6 factors affecting plant vigor.

Current Condition of Pasture and Hayland in the Willow Creek Subbasin
Pasture and hayland in this subbasin include non-irrigated and irrigated pastures and meadows located mainly in valley bottoms. Typically, these lands are cut for meadow hay and grazed in the fall. Some non-irrigated pastures are used for summer grazing. Pasture and hayland has the most impact on water quality because of its close proximity to the impaired creeks and their irrigation water return flows.

Suggested BMPs on Pasture and Hayland in the Willow Creek Subbasin
NRCS practices which may be needed on the pasture and hayland are: Fence (382), Above Ground, Multi-Outlet Pipeline (431), Irrigation System, Sprinkler (442), Irrigation System, Surface and Subsurface (443), Structure for Water Control (587), Irrigation Field Ditch (388), Irrigation Water Management (449), Pasture and Hay Planting (512), Prescribed Grazing (528), Heavy Use Area Protection (561), Nutrient Management (590), Pest Management (595), and Watering Facility (614).

Resource Concerns – Existing pasture and hayland condition and management may not meet NRCS resource quality criteria or landowner objectives. Facilitation practices may be needed for improvement. These concerns include; inefficient water use on irrigated land, plant productivity or vigor, noxious and invasive plants, forage quality and palatability, and inadequate domestic stock water.

Rangeland

Rangeland Inventory and Evaluation

Summary – The Willow Creek subbasin contains 201,140 acres of private rangeland. Rangeland is the largest public or private land use in the subbasin with over forty percent classified as rangeland. Rangeland varies from low elevation desert to high elevation, steep mountains. Elevation ranges from about 3,500 to 7,500 feet and precipitation ranges from 12 inches to greater than 16 inches. Low elevation desert is characterized by sagebrush and perennial bunchgrasses. Frequent fires have eliminated some areas of sagebrush, leaving annual cheatgrass and other invaders dominant. Carrying capacity can be limited by available water. The range is utilized by wildlife and livestock throughout the year. Mid elevation rangeland consists of sagebrush and perennial bunchgrasses with variable soils on nearly level flats to benches and rolling hills. High elevation range has precipitation greater than 16 inches, on steep slopes and high mountain valleys. Planned

grazing systems commonly include rest and rotation of pastures, livestock water pipelines, and livestock watering tanks, and fencing. Soil erosion in this area may be from slight to very severe. Slope and depth to bedrock varies greatly in the subbasin.

Resource Setting – Rangeland vegetation consists of sagebrush and perennial grasses. Precipitation is 12 inches to greater than16 inches, most of which falls as snow in winter and early spring outside the growing season. Elevation ranges from approximately 3,500 feet to 7,500 feet. Topography consists of steep slopes and high mountain valleys. Soils are loamy to gravelly. Average frost free period ranges from 50 to 140 days.

Rangeland Assessment – We utilized Rangeland Water Quality Indicators (WQI), on private rangeland in the subbasin. Rangeland Water Quality Indicators were derived from the Water Quality Indicators Guide (WQIG). The Range WQI allowed us to evaluate and to score the condition of 8 factors on rangelands to determine impacts to rivers and creeks and then rate the area in excellent, good, fair, or poor condition. Additionally, we utilized NRCS' Rangeland Health worksheet on private rangeland in the subbasin. This worksheet provided us with an evaluation of three rangeland health attributes; soil stability, hydrologic function, and biotic integrity. It enabled us to rate 17 indicators based on that indicator's degree of departure from the appropriate rangeland ecological site description.

Current Condition of Rangeland in the Willow Creek Subbasin

The majority of the rangeland in this subbasin is federally owned and managed by the BLM. However, there is a considerable amount of private rangeland. 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 in the same pastures have the most effect on water quality. This is because of their close association to riparian areas and the irrigation water return flows. The meadows usually are quite stable with little erosion, but flood water and irrigation return flows can carry manure and nutrients to the stream. Riparian vegetation has often been severely modified by haying and grazing. These are small areas of the subbasin, but are areas where management efforts should be concentrated.

Other areas where there are potential problems are small areas where the livestock water out of the creeks. These are generally located in the bottom of draws or even canyons. They are more common on the higher elevations and become rare at the north end of the subbasin where the canyons are deep and inaccessible.

Suggested BMPs on Rangelands in the Willow Creek Subbasin

Prescribed grazing is a major need throughout the subbasin. However, grazing practices need to be adapted to the conditions and problems in the area. Sage grouse are a major wildlife species of concern which have lost a major amount of habitat due to wildfire. Keeping the right amount of sagebrush and helping burn areas recover needs to be a component of any grazing system. An even greater concern must be fuel reduction and wildfire prevention. In a few areas lighter grazing is needed, but in most of the area

heavier and more concentrated grazing is needed for shorter periods of time. In other words, a grazing plan that puts a large amount of livestock in a pasture for one week and has 60% utilization on the grass followed by a long recovery period (one year or more) will result in a healthier range, more sage grouse and less wildfire than putting a small amount of livestock in a pasture for a long period of time even though utilization rate are 30% or less. Getting this done on pastures that contain a large amount of federal land will be extremely difficult due to court decisions and associated agreements.

NRCS practices which may be 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).

Resource Concerns – Existing management may not meet NRCS resource quality criteria or landowner objectives. Facilitating practices may be needed for range improvement and livestock distribution. These concerns include plant productivity; 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; and inadequate domestic stock water.

Riparian

Riparian Inventory and Evaluation

Stream Visual Assessment Protocol (SVAP)
SVAP is a qualitative assessment of the stream's health based on a score from 1 to 10 for most categories (with1being poor and 10 being excellent). Manure presence is scored from 1 to 5. Results from the SVAP are shown below in Table 10.

Stream Erosion Condition Inventory (SECI)
SECI is a qualitative assessment of the potential for streambank erosion and deposition into a stream. This assessment is rated from 0 to 3 for the following categories: bank erosion evidence, bank stability condition, bank cover/vegetation, and channel bottom stability. Lateral channel stability is rated from 0 to 2 and in-channel deposition is rated from 0 to -1. Reaches with the higher rankings are more likely to deliver sediment to the stream. SECI results are found in Table 10.

Riparian Assessment

The following narrative is a summary of observations from data collected during SVAP and SECI assessments for each of the twelve streams. Assessments were made only on private property where permission was granted. Maps displaying the SVAP rating condition are displayed in Appendix B.

Birch Creek
Water appearance, nutrient enrichment, pool abundance, and barriers to fish movement averaged the lowest scores across the six reaches. Water appearance ranked low because

of the low visibility and turbidity (cloudiness due to fine sediment) of the water and because of surface film and algal mats. Some reaches, in particular 1, 2, and 3, had greenish-colored water, dense macrophyte beds, and algal growth that may be caused by excess nutrients entering the stream. Pools, when present, were shallow. Channel alteration and man-made structures have caused channel incision and barriers to fish movement. Furthermore, there are some additional water quality concerns on a reach by reach basis. Reach 1 has very limited riparian vegetation and unstable banks due to livestock grazing. Reaches 3 and 4 have very few pools and shallow water. Reach 4 has a man-made structure that is a fish barrier and that has caused downstream down cutting. This reach also has evidence of livestock access to the riparian area. Reach 5 is actively down cutting and incising. Reach 6 shows evidence of livestock access and holding areas near the stream.

Brockman Creek

Brockman Creek is a tributary to Gray's Lake Outlet originating in the Caribou National Forest. There are three main tributaries to Brockman Creek: Corral Creek, Sawmill Creek, and Shirley Creek. There is a hot spring at the junction of the Brockman and Dan Creek Roads that flows into Brockman Creek. The area surrounding Brockman Creek is primarily grazed. The upper reach, reach 1 was on private land surrounded by National Forest land. It was dry at the time of the assessment so a full SVAP was not performed at that time. Reach 2 is also surrounded by public land except for an adjoining parcel of private land at the confluence of Sawmill Creek. This reach is dominated with beaver complex and willows, and appeared to be lightly grazed. It rated an excellent score. Reach 3 is below the hot spring and the confluence of Shirley Creek. This reach continued to the confluence of Brockman Creek with Gray's Lake Outlet. This reach was dry at the time of the SVAP, so a full SVAP was not performed. It was noted that there was some apparent bank erosion on the south bank in this reach where the south bank is raised considerably in relation to the north bank, which is willow dominated with several existing channels.

Buck Creek

The area surrounding Buck Creek is primarily grazed. A SVAP assessment was made on a segment of Buck Creek starting from the Blackfoot Reservoir Road to the lowest privately owned portion of the stream. Livestock had been grazing in the area with some erosion present where they had entered the streambed apparently causing some bank sloughing, but overall there is fair stream bank vegetative cover. There was a fair amount of shade cover from willows in the upper and middle part of the reach. The lower part of the reach had few willows and more sagebrush closer to the stream. The stream was also more incised. There were some fry or minnows in a pool near the road at the top of the reach, although overall there were few pools. The overall SVAP rating for Buck creek is fair.

Grays Lake Outlet

Reach 1 of Grays Lake Outlet is rated fair overall. Channel condition, hydrologic alteration, the riparian zone bank stability, water appearance, and barriers to fish movement were all good. The surrounding land is cropland that is currently enrolled in

the CRP, so there is currently no negative impact from livestock. Although there are some boulders in the stream, there is little instream fish cover, few pools, and few willows. Reach 2 included the confluence with Brockman Creek. This area is grazed, but overall the reach rated good. There is beaver activity in this reach contributing to less soil loss from bank erosion. There are some water gaps where livestock inter the stream. The lowest rating on this reach is a lack of canopy cover, with only a few willows present. Reach 3 is also grazed, and had a fair rating. Some bank restoration work in the past has been attempted on part of this reach with willow plantings, but with limited success.

Hell Creek

Water appearance, nutrient enrichment, instream fish cover, and pool abundance averaged the lowest scores across the four reaches. However, with the exception of nutrient enrichment and pool abundance, the above categories still scored good or greater for the SVAP rating. Water appearance was somewhat turbid (cloudiness due to fine sediment) and the visibility was slightly obscured. All of the reaches had slightly greenish or tea-colored water and moderate macrophyte and algal growth that can be caused by excess nutrients entering the stream. Only reaches 3 and 4 had shallow pools. Reaches 1 and 2 were a series of large, deep pools formed by beaver activity. On a reach by reach basis, there were some additional water quality concerns. Reach 1 had cattle manure present along streambanks. Reach 2 is currently stable and in good condition. Reach 3 had eroding banks caused by livestock access to some riparian areas. There was evidence of over-grazing, hoof shear, cattle crossing/holding areas, and manure along streambanks. Reach 4 also had evidence of livestock access to the riparian area. There were several cattle crossing areas and old manure piles, however, streambanks were in better condition.

Homer Creek

Water appearance, instream fish cover, pool abundance, invertebrate habitat, and canopy cover averaged the lowest scores across the five reaches. All of the above categories scored poor for the SVAP rating. Water appearance ranked low because of the low visibility and turbidity (cloudiness due to fine sediment and organic debris) of the water and because of the moderate macrophyte growth. Instream fish cover and invertebrate habitat scored low because there was not a diversity of habitat cover types. Pools, when present, were very shallow. Canopy cover scored low because a large majority of the water's surface was unshaded. On a reach by reach basis, there were some additional water quality concerns. Reach 1 had several minor headcuts. Reach 2 had eroding banks, but it had the second lowest percentage of erosion. Reach 3 had eroding banks caused by livestock access/crossings to some riparian areas and it also had considerable amounts of cattle manure along streambanks. There were two instream structures; an old wooden bridge and a concrete structure. Reach 4 had past evidence of livestock access to the riparian area. There were cattle crossings and high eroding banks. Reach 4 had very limited areas with houndstongue and pennycress present. The noxious weeds are manageable at this point. Reaches 4 and 5 had moderate algal growth and film present. Reach 5 had significant bank instability evidenced by numerous eroding banks, cracking, clumps, and slumps (19% eroding banks). There were also considerable amounts of

cattle manure along streambanks. The channel in this reach is incised and it has active headcuts. Upland vegetation extends to stream's edge along many areas.

Meadow Creek
Reach 1 at the upper part of Meadow Creek has more adjacent rangeland than the lower portion, some of which is grazed fairly heavily. At the time of the assessment, this reach was dry, so SVAP was not completed. Reach 2 is surrounded by some rangeland and a county maintained road directly along the stream, and dry cropland farther out. Not all of the rangeland near the stream is currently being grazed. Most categories of the assessment rated good, as did the stream reach overall. Canopy cover was fair with willows along the stream. There is some erosion due to the county maintained road adjacent to the stream. A portion of the cropland adjacent to Meadow Creek was previously treated during the Willow Creek 208 Project Water Pollution Abatement Plan carried out in the early 1980's through the East Side Soil and Water Conservation District, and much is currently enrolled in the CRP.

Rock Creek
A SVAP assessment was made on a segment of Rock Creek west of the Bone Road. The area surrounding the reach is a mix of dry cropland and native range. The owners only allow livestock to graze in the area in the late fall after grain harvest before winter. The upper end of the reach is steep and somewhat incised, but becomes less steep at the lower end. Overall the stream is in good shape with very good invertebrate habitat and water appearance. There are few pools, but good bank stability and vegetation. The reach only rated fair on the SVAP however, due to an apparent fish barrier just below the reach where a pond has been constructed on Rock Creek on adjacent land.

Sawmill Creek
Sawmill Creek is a tributary to Brockman Creek. Sawmill Creek originates on public land with a parcel on private land near the confluence with Brockman Creek. The area surrounding Sawmill Creek is primarily grazed. A SVAP assessment was made in on the only private segment of Sawmill Creek. Cattle had been grazing in the area with some erosion present where they had entered the streambed. There was some shade cover from willows, and beaver activity was observed. Water appearance was good, but not a lot of instream fish cover was observed. The overall rating for Sawmill creek is good.

Sellars Creek
Bank stability, water appearance, barriers to fish movement, instream fish cover, invertebrate habitat, and canopy cover averaged the lowest scores across the seven reaches. Banks are unstable where there is erosion and lack of native, perennial vegetation. The lack of vegetation negatively impacts fish by decreasing suitable habitat and increasing water temperature. Water appearance ranked low because of the low visibility and turbidity (cloudiness due to fine sediment) of the water. Channel alteration and man-made structures have caused channel incision and barriers to fish movement. Two man-made structures were cited as probable barriers to fish movement. Some reaches, in particular SC 3 and SC 7 had dense macrophyte beds and algal growth that can be caused by nutrient enrichment.

Seventy Creek
Barriers to fish movement, instream fish cover, pools, invertebrate habitat, and canopy cover averaged the lowest scores across the six reaches. Channel alteration and man-made structures have caused barriers to fish movement. Culverts have collected debris. One man-made structure located in reach SevCr6 was cited as probable barrier to fish movement. Shallow water, lack of pool/riffle complexes, and lack of canopy cover (native, perennial, woody vegetation) in riparian areas negatively impact fish by decreasing suitable habitat and increasing water temperature. Some reaches, SevCr 1, SevCr 4, and SevCr6, had dense macrophyte beds and algal growth that can be caused by nutrient enrichment.

Willow Creek
Reach 1 was on the upper end of Willow creek where stream flow was minimal. There appeared to be good vegetation and bank stability, water appearance was good. There was some evidence of livestock access to the stream and a lack of stream canopy cover, pools and invertebrate habitat. Overall reach 1 rated fair. Reach 2 was wider than reach 1 with good bank stability and vegetative cover. The water was slow moving with root mats. There were some isolated boulders in the stream, but few pools and poor canopy cover. Overall reach 2 rated fair. Reach 3 was wide and shallow. Channel condition and bank condition was good. There was some evidence of livestock entering the stream contributing to bank erosion, although there was fair bank vegetative cover. There were a few pools, but little canopy cover. Overall reach 3 rated fair. Reach 4 had good bank stability and vegetative cover. Water appearance was good, with good instream cover and invertebrate habitat. Overall reach 4 rated good. Reach 5 had good water appearance and bank stability. There were pools and good invertebrate habitat. There was some evidence of livestock entering the stream contributing to some bank erosion. Overall the reach rated good.

Suggested Riparian BMPs
NRCS practices which may be recommended for riparian areas in this subbasin are: Channel Bank Vegetation (322), Channel Stabilization (584), Fence (382), Riparian Forest Buffer (391), Riparian Herbaceous Cover (390), Streambank & Shoreline Protection (580), Stream Habitat Improvement and Management (395), Use Exclusion (472), Wetland Wildlife Habitat Management (644), Wetland Enhancement (659), and Wetland Restoration (657).

Resource Concerns
Channel erosion may be the largest source of sedimentation in the Willow Creek subbasin. Channel bank erosion from livestock traffic contributes suspended sediment with attached nutrients. In addition nutrient and bacteria enrichment from direct manure deposition or manure-laden runoff can also enter into streams. Irrigated and untreated dryland cropland erosion can deposit into streams.

Table 10. Riparian Assessment Summary

Willow Creek Subbasin-Riparian Assessment Summary

Stream Name	Reach	Length (miles)	SVAP	SECI	Estimated Erosion Rate (Tons/Year)	Estimated Erosion Rate (Tons/Mile/Year)
Birch Creek	BC 1	0.3	Poor	Moderate	61.5	205.0
	BC 2	0.8	Fair	Slight	27.4	34.3
	BC 3	0.5	Fair	Slight	15.6	31.2
	BC 4	0.8	Fair	Slight	2.5	3.1
	BC 5	0.9	Good	Slight	21.4	23.8
	BC 6	0.3	Good	Slight	10	33.3
Brockman Creek	BrkCr 2	0.5	Excellent	Slight	0.0	0.0
Buck Creek	BKC 1	0.6	Fair	Slight	10.5	17.5
Gray's Lake Outlet	GLO 1	0.6	Fair	slight	2.8	4.7
	GLO 2	3.6	Good	slight	0.0	0.0
	GLO 3	1.2	Fair	slight	37.8	31.5
Hell Creek	HC 1	0.4	Good	Slight	0.0	0.0
	HC 2	2.3	Good	Slight	0.0	0.0
	HC 3	2.1	Good	Slight	210.4	100.2
	HC 4	1.2	Good	Slight	11.9	9.9
Homer Creek	HMC 1	0.5	Fair	Slight	13.5	27.0
	HMC 2	3.4	Fair	Slight	131.8	38.8
	HMC 3	2.3	Poor	Slight	155.6	67.7
	HMC 3	1.5	Fair	Slight	92.4	61.6
	HMC 4	1.2	Fair	Slight	20.3	16.9
	HMC 5	3.2	Poor	Moderate	813.0	254.1
Meadow Creek	MDC 2	0.5	Good	Slight	16.4	32.8
Rock Creek	RC 1	1.0	Fair	Slight	15.4	15.4
Sawmill Creek	SMC 1	0.5	Good	Slight	14.6	29.2
Sellers Creek	SC 3	0.4	Fair	Slight	32.0	80.0
	SC 4	1.0	Poor	Slight	30.5	30.5
	SC 5	0.5	Poor	Slight	99.8	199.6
	SC 7	0.7	Fair	Slight	99.2	141.7
	SC 8	0.7	Fair	Slight	25.8	36.9
	SC 9	0.2	Fair	Slight	24.3	121.5
	SC 12	0.3	Fair	Slight	8.3	27.7
Seventy Creek	SevCr 1	0.3	Poor	Slight	16.1	53.1
	SevCr 2	0.4	Good	Slight	16.8	38.6
	SevCr 3	0.5	Fair	Slight	17.1	36.1
	SevCr 4	0.4	Poor	Slight	9.7	27.0
	SevCr 5	0.8	Good	Slight	14.7	19.3
	SevCr 6	0.4	Good	Slight	15.0	35.4
Willow Creek	WC 1	0.4	Fair	Slight	3.6	9.0
	WC 2	0.7	Fair	Slight	35.0	50.0
	WC 3	0.6	Fair	Slight	43.2	72.0
	WC 4	0.1	Good	Slight	1.2	12.0
	WC 5	0.3	Good	Slight	2.5	8.3

Invasive Species

Aquatic and terrestrial noxious weeds that may exist in Bingham and Bonneville counties are listed below (University of Idaho, 2008). Invasive species were recorded during agricultural inventory and evaluation in order to determine future control measures.

- Black henbane, buffalobur, Canada thistle, common crupina, Dalmatian toadflax, diffuse knapweed, Dyer's woad, field bindweed, houndstongue, jointed goatgrass, leafy spurge, milium, muskthistle, perennial pepperweed, perennial sowthistle, plumeless thistle, poison hemlock, policeman's helmet, puncturevine, purple loosestrife, rush skeletonweed, Russian knapweed, saltcedar, Scotch broom, Scotch thistle, spotted knapweed, tansy ragwort, toothed spurge, white bryony, whitetop, yellow starthistle, and yellow toadflax

Threatened and Endangered Species

Yellowstone cutthroat trout (*Oncorhynchus clarki bouvieri*) is a native species and the species of greatest concern in the subbasin. According to fish count data and local knowledge, cutthroat trout numbers have diminished significantly over the years. Problems include habitat degradation, stream flow alteration, diversions that prevent migration, and the introduction of non-native salmonids. Human activities and fish eradication and subsequent stocking programs have played a major role in the frequency and distribution of species within the subbasin (IDEQ 2004)

The Yellowstone cutthroat is considered a state sensitive species in Idaho and is carefully managed by the Idaho Department of Fish and Game (IDFG). In 1998 it was petitioned to become a threatened species, but after review in February 2001, the USFWS declined the petition to list the Yellowstone cutthroat under the Endangered Species Act.

The Canada lynx, *Lynx canadensis,* and the bald eagle, *Haliaeetus leucocephalus*, are listed as threatened and their home range area falls within the Willow Creek subbasin. Ute Ladies' Tresses, *Spiranthes diluvialis,* is known to occur in Bonneville county, but there are no records of this plant existing in the Willow Creek subbasin (http://www.natureserve.org).

Agricultural conservation planning will be coordinated with other species recovery and protection efforts in the subbasin to consider listed species' habitats and address any potential impacts from BMP implementation. Improvements in water quality, achieved from BMPs installed on agricultural lands, are not expected to adversely affect these listed species and should improve or enhance their habitat. Any BMP implementation that will affect T&E species or habitat will follow Endangered Species Act (ESA) consultation requirements.

Wetlands

Wetlands are lands that are inundated by water or have saturated soil for significant periods of time. Wetlands are important because they contain a wide variety of plant and animal species and they function as natural filters (http://www.epa.gov/owow/wetlands).

Grays Lake is a large wetland complex found at the lower end of the subbasin (http://www.fws.gov/wetlands/Data/Mapper.html). It has been designated a national wildlife refuge by the U.S. Fish and Wildlife Service (http://www.seidaho.org/grays_lake.html, http://www.npwrc.usgs.gov/projects/grayslk/).

TREATMENT

For this plan we assessed impacts to water quality on 303(d) listed streams from agricultural lands and recommended priorities for installing BMPs to meet water quality objectives stated in the SBA-TMDL. Data from water quality monitoring, field inventory and evaluations, and the SBA-TMDL were used to identify critical agricultural areas affecting water quality and set priorities for treatment.

Critical Areas

Areas of agricultural lands that contribute excessive pollutants to waterbodies are defined as critical areas for BMP implementation. Critical areas are prioritized for treatment based on their proximity to a waterbody of concern and the potential for pollutant transport and delivery to the receiving waterbody. Critical areas are those areas in which treatment is considered necessary to address resource concerns affecting water quality. Critical areas in this plan are cropland, pastureland, rangeland, riparian areas adjacent to Willow Creek and its tributaries, which may serve as a direct pathway for nutrient, sediment, and temperature loading to these creeks.

Treatment Units (TU)

The following treatment units (TUs) describe areas in the Willow Creek subbasin with similar land uses, soils, productivity, resource concerns, and treatment needs. The Willow Creek subbasin can be broken into four treatment units: 1) Dry Cropland, 2) Grass/Pasture/Hayland, 3) Rangeland, and 4) Unstable and Erosive Streambanks/Riparian Areas (Table 11). These TUs not only provide a method for delineating and describing land use, but are also used to evaluate land use impacts to water quality and in the formulation of alternatives for solving water quality problems. BMPs to improve water quality are suggested for each treatment unit and can be found in Table 11.

Table 11. Treatment Units in the Willow Creek Subbasin.

Treatment Unit #	***Dry Cropland 4-20% slopes in the Willow Creek Subbasin, 4,000 to 5,500 ft elevation Average Precipitation from 10 to 14 inches, 90 to 120 frost-free days***		
Acres	**Soils**	**Resource Problems**	**Critical Acres**
35,030	• Silt loam • Moderately deep and well drained	- plant productivity, health, and vigor - plant condition - noxious and invasive plants - soil condition-OM depletion - soil erosion-sheet and rill - water quality-excess suspended sediment or turbidity in surface waters	24,700
Treatment Unit #	***Grass, Pasture and Hayland 0-5% slopes in the Willow Creek Subbasin, 1,500 to 6,500 ft elevation. Average Precipitation from 6 to >16 inches, 50 to 160 frost-free days***		
Acres	**Soils**	**Resource Problems**	**Critical Acres**
66,080	• Silty loam to gravelly sand • Moderately deep and well drained • Shallower soils on rock outcrop, 30" to basalt	- plant productivity, health, and vigor - noxious and invasive plants - 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 - water quality-excess nutrients, organics, suspended sediment in surface waters	22,553
Treatment Unit #	***Rangeland 5-60% slopes in the Willow Creek Subbasin, 3,500 to 7,500 ft elevation Average Precipitation from 12 to >16 inches, 50 to 140 frost-free days***		
Acres	**Soils**	**Resource Problems**	**Critical Acres**
201,140	• Loamy to gravelly • Moderately deep and well drained • Shallower soils on rock outcrop, 30" to basalt	- plant productivity, health, and vigor - noxious and invasive plants - wildfire hazard - forage quality and palatability - plant establishment and growth - inadequate quantity/quality of feed/forage for domestic animals - inadequate domestic stock water	165,910
Treatment Unit #	***Riparian 0-2% slopes in the Willow Creek Subbasin Elevation and precipitation varies across the subbasin***		
Acres	**Soils**	**Resource Problems**	**Critical Acres**
	• Alluvium, loamy to gravelly • Moderately deep and well drained	- streambank erosion - soil compaction - surface water quality (nutrients, organics, suspended sediment, and temperature) - plant productivity, health and vigor - noxious and invasive plants - plant establishment and growth - inadequate cover/shelter for wildlife and fish	51

Recommended BMPs and Estimated Costs

BMPs appropriate for the reduction of agricultural impacts to water quality in the Willow Creek subbasin and their installation costs are listed below in Table 12. Individual conservation planning with willing landowners will determine the most appropriate BMPs to install on a case by case basis. The information included in Table 11 provides an estimate only of the BMPs recommended for treatment and their approximate costs. A more precise set of BMPs will be determined at the time of conservation planning with a particular landowner.

IMPLEMENTATION PRIORITY

Recommended Priorities for BMP implementation

Best management practices (BMPs) are defined as a practice or combination of component practices determined to be the most effective, workable means of preventing or reducing the amount of pollution generated by nonpoint sources to 303 (d) listed streams.

Nonpoint source loads are largely driven by climatic conditions and the effects of some best management practices (bank stabilization, etc.) may take years to be fully realized. The agricultural implementation plan should be viewed as a dynamic document, subject to change as current conditions dictate. The primary focus of this implementation plan is to address nonpoint pollution sources.

For the Willow Creek subbasin, the most practical and cost-effective implementation strategy involves a phased or incremental approach. Table 13 lists the streams prioritized for treatment. Streams in the Willow Creek subbasin were ranked using TMDL load reductions, field evaluation and inventory, streambank stability, and water quality data. This priority ranking helps to determine which streams should be targeted for the first phase of implementation. Streams with a high priority ranking require a greater sediment load reduction to meet TMDL, have poorer water quality, have a poor to fair SVAP rating, and have a moderate SECI rating (or greater potential for sediment deposition).

Table 12. Recommended Treatment BMPs and Estimated Costs

PRACTICE	AMOUNT	UNIT	UNIT COST	ESTIMATED COST
Treatment Unit - Cropland				
Conservation Crop Rotation	24,700	ac	$0	$0
Residue / Tillage Mgt., Direct Seed 3 years	1,235	ac	$30 / yr	$111,150
Chemical Fallow	6,175	ac	$25	$154,375
Deep Tillage	12,350	ac	$20	$247,000
Pasture and Hayland Planting	250	ac	$54	$13,500
Cons. Cover (green manure)	250	ac	$30.75	$7,688
Terraces	100,000	ft	$1.45	$145,000
Water and Sediment Basins	100	ea	$495	$49,500
Nutrient Management	10,000	ac	$4.95	$49,500
Subtotal				**$777,713**
Treatment Unit – Range / Pastureland				
Pest Management	2,265	ac	$30	$67,950
Prescribed Grazing	1,957	ac	$7	$13,699
Range Planting	557	ac	$103	$57,371
Spring development	105	ea	$1,800	$189,000
Watering Facility	190	ea	$1,233	$234,270
Pipeline (PVC, HDPE, or PE pipe 2")	125,000	ft	$2.40	$300,000
Wells / Pumps	20	ea	$6,642	$132,840
Upland Wildlife Habitat Mgt.	1,542	ac	$10	$15,420
Subtotal				**$1,010,550**
Treatment Unit - Riparian				
Channel bank vegetation, willow pole	13,559	ft	$2.05	$27,796
Channel stabilization, rock rip-rap, barbs	600	ft	$18.75	$11,250
Fence - barb	114,302	ft	$2.02	$230,890
Riparian herbaceous cover	35	ac	$225	$7,875
Ponds	25	ea	$688	$17,200
Stream crossing	12	ea	$2,625	$31,500
Streambank and shoreline protection	6,500	ft	$45	$292,500
Structure for water control	25	ea	$250	$6,250
Tree/shrub establishment, planting only	320	ea	$0.75	$240
Use exclusion	1,500	ac	$34	$51,000
Wetland wildlife management	34	ac	$10	$340
Subtotal				**$676,841**
TOTAL COST				**$2,465,104**

Table 13. Streams Prioritized for Treatment in the Willow Creek Subbasin

Stream	Temperature Listing	Sediment Load Ranking	Nutrient Load Ranking	Water Quality data	SVAP Ranking	SECI Ranking	Priority Ranking
Birch Creek				1	7	1	High
Homer Creek		2			1	2	High
Lava Creek	Yes	1					High
Rock Creek					5		High
Sellars Creek	Yes	6		2	2		High
Seventy Creek	Yes	7			3		High
Willow Creek		9	1	3	4		High
Brockman Creek		4			12		Medium
Buck Creek					6		Medium
Corral Creek	Yes	8					Medium
Gray's Lake Outlet					8		Medium
Hell Creek		3			11		Medium
Sawmill Creek	Yes	5			9		Medium
Crane Creek		10					Low
Long Valley Creek	Yes						Low
Meadow Creek		11			10		Low
Mill Creek	Yes	12					Low
Tex Creek		13					Low

FUNDING

A significant collaborative effort combining technical and financial assistance is needed to adequately address the TMDL concerns within the Willow Creek subbasin. Potential sources of funding are (but are not limited to):

CWA §319 –These are Environmental Protection Agency funds allocated to the Idaho Department of Environmental Quality (IDEQ) which administers the Clean Water Act §319 Non-point Source Management Program. Funds focus on projects to improve water quality and are usually related to the TMDL process. 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.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.id.us/programs.htm

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

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/

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.id.us/programs.htm

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

Habitat Incentive Program (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

Forestland Enhancement Program - The Forest Land Enhancement Program (FLEP) was part of Title VIII of the 2002 Farm Bill. FLEP replaces the Stewardship Incentives Program (SIP) and the Forestry Incentives Program (FIP). FLEP is optional in each State and is a voluntary program for non-industrial private forest (NIPF) landowners. It

provides for technical, educational, and cost-share assistance to promote sustainability of the NIPF forests. http://www.fs.fed.us/spf/coop/programs/loa/flep.shtml

OUTREACH

Conservation partners in the Willow Creek subbasin will use their combined resources to provide information about ways to improve water quality to agricultural landowners and operators within the 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 planning and implementation process
- Inform the public about water quality projects and 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 land uses on the sub-basin

MONITORING AND EVALUATION

Monitoring is an important component of the TMDL planning and implementation process. Due to the phased structure of the TMDL, an on-going, long-term monitoring effort is required to determine beneficial use status. The results of this monitoring effort will be used to evaluate the changing condition of the subbasin and may lead to adjustments in pollutant targets throughout the implementation phase of the TMDL.

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.

Digital photographs will be used to document before and after conditions of individual project sites. This documentation should prove useful for reviewing qualitative changes in resource conditions.

Gully erosion sites needing treatment will be identified; gully measurements will be collected. Subsequent gully measurements will be taken during the spring(s) of the year(s) following structural practice installation to determine effectiveness of the BMP.

RUSLE (Revised Universal Soil Loss Equation) will be used to calculate reduction in erosion for cropland acres that transition to high residue conservation tillage systems.

Watershed Level

At the watershed level, there are many governmental and private groups involved with water quality monitoring. The Idaho Department of Environmental Quality has used 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 waterbodies and their 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 subbasin 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.

REFERENCES

[BLM] Bureau of Land Management. 2000. "Interpreting Indicators of Rangeland Health", Technical Reference 1734-6, www.blm.gov/nstc/library/pdf/1734-6.pdf.

[EPA] Environmental Protection Agency. 2009. Function and values of wetlands. (http://www.epa.gov/owow/wetlands/).

Garrison, Amos. 1981. Soil Survey of Bonneville County Area, Idaho. Natural Resource Conservation Service and Soil Conservation District. Boise, Idaho.

[IDEQ] Idaho Department of Environmental Quality. 2008. 2008 Nitrate Priority Area, Delineation and Ranking Process. IDEQ. Boise, Idaho.

[IDEQ] Idaho Department of Environmental Quality. 2004. Willow Creek Subbasin Assessment and TMDLs. IDEQ. Boise, Idaho.

[IDEQ] Idaho Department of Environmental Quality. 2005. Integrated Report. http://www.deq.idaho.gov/water/data_reports/surface_water/monitoring/integrated_report.cfm.

[IDWR] Idaho Department of Water Resources. 2000. Idaho GIS Data website. http://www.idwr.state.id.us/gisdata/gis_data.htm.

[ISDA] Idaho State Department of Agriculture. 2000. The Idaho Beef Cattle Environmental Control Memorandum of Understanding, 7pp. ISDA. Boise, Idaho.

[ISDA] Idaho State Department of Agriculture. 2000. Beef Cattle Animal Feeding Operation Program, 3pp. ISDA. Boise, Idaho.

[NRCS] Natural Resource Conservation Service. 2004. NRCS CRA Report. ftp://ftpfc.sc.egov.usda.gov/ID/technical/pdffiles/IdahoCRAReport.pdf.

[NRCS] Natural Resource Conservation Service. 2010. Guidance Documents for Resource Management Systems. https://csg.sc.egov.usda.gov/CSGReporteFOTG.aspx

[NRCS] Natural Resource Conservation Service. 2008. Idaho 2008 State EQIP. http://www.id.nrcs.usda.gov/programs/eqip/2008/eqip_practices_08.html

[NRCS] Natural Resource Conservation Service. 2003. National Range and Pasture Handbook, Grazing Lands Technology Institute. http://www.glti.nrcs.usda.gov/technical/publications/nrph.html

[NRCS] Natural Resource Conservation Service. 2008. Guidance Documents for Resource Management Systems Field Office Technical Guide, Section III, Butte County, Idaho. https://csg.sc.egov.usda.gov/CSGReporteFOTG.aspx?csg_statecounty_code=16033

[NRCS] Natural Resource Conservation Service. 2008. ID-CPA-015 Pasture Condition Scoresheet. ftp://ftp-fc.sc.egov.usda.gov/ID/technical/range_forms/cpa_015.xls

[NRCS] Natural Resource Conservation Service. 2007. Willow Creek Subbasin-17040205 Rapid Watershed Assessment. http://www.id.nrcs.usda.gov/technical/watersheds.html

Salzmann, R.A. and J.O. Harwood. 1973. Soil Survey of Bingham Area, Idaho. Natural Resource Conservation Service and Soil Conservation District. Boise, Idaho.

[USDA] United States Department of Agriculture, NRCS. 2009. Ecological Site Description System. www.esis.sc.egov.usda.gov.

[USDA] United States Department of Agriculture. 2009. National Coordinated Common Resource Area (CRA) Geographic Database http://soils.usda.gov/survey/geography/cra.html

[USDA] United States Department of Agriculture. 2001. Guide to Pasture Condition Scoring. ftp://ftp-fc.sc.egov.usda.gov/GLTI/technical/publications/pasture-score-guide.pdf

[USDA] United States Department of Agriculture. 2009. USDA Geospatial Data Gateway. http://lighthouse.nrcs.usda.gov/gateway/gatewayhome.html

[USFWS] United States Fish and Wildlife Service. 2009. Wetland mapper. http://www.fws.gov/wetlands/Data/index.html

[USFWS] United States Fish and Wildlife Service. 2003. Idaho endangered, threatened, proposed, and candidate species by county, Bingham and Bonneville Counties. U.S. Fish and Wildlife-Pacific Region.

[USGS] United States Geologic Society. 2009. Non-indigenous aquatic species. http://nas.er.usgs.gov/queries/huc6nw.asp

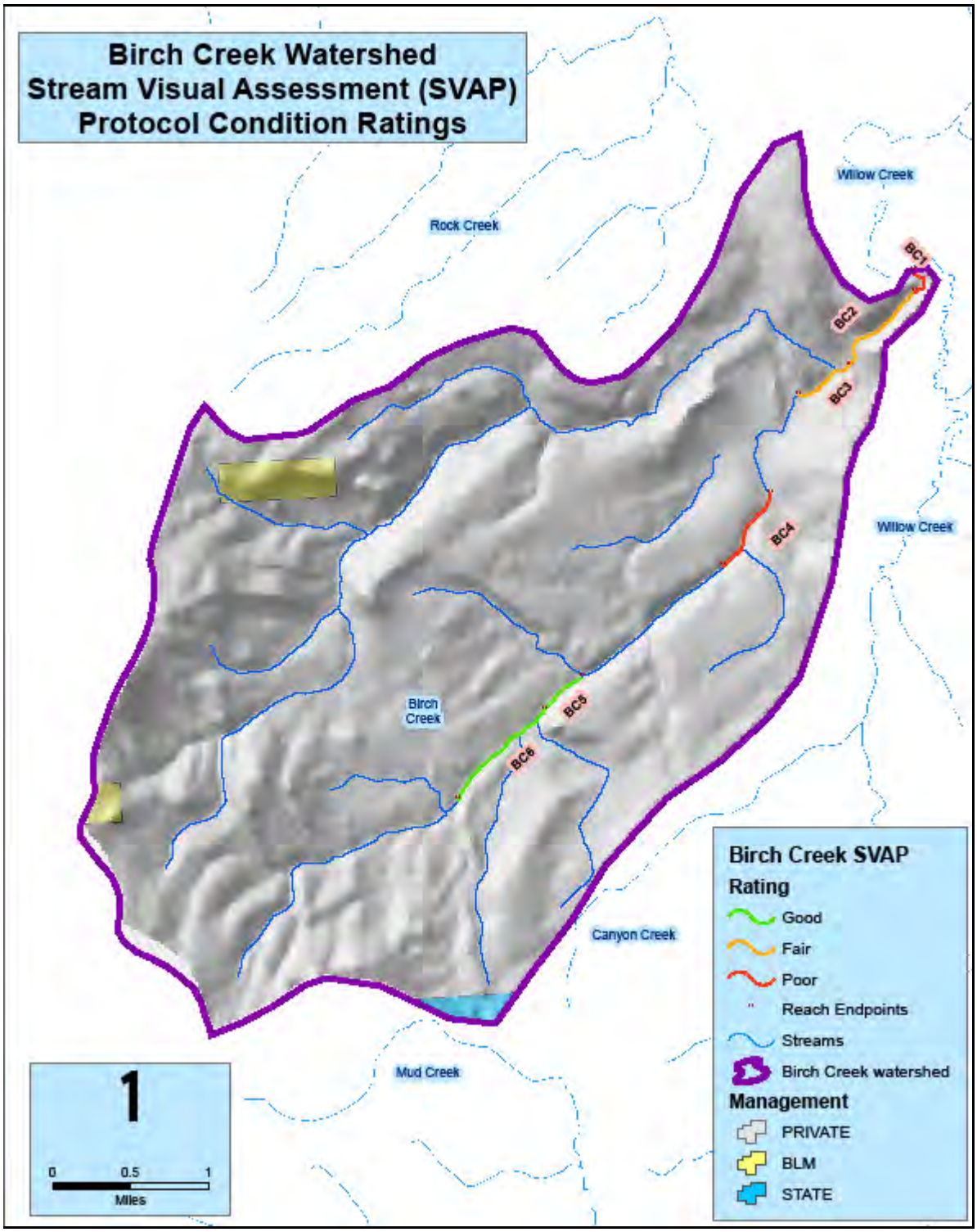
[USGS] United States Geologic Society. 1992. National Land Cover Dataset (NLCD). http://edcwww.cr.usgs.gov/products/landcover/nlcd.html

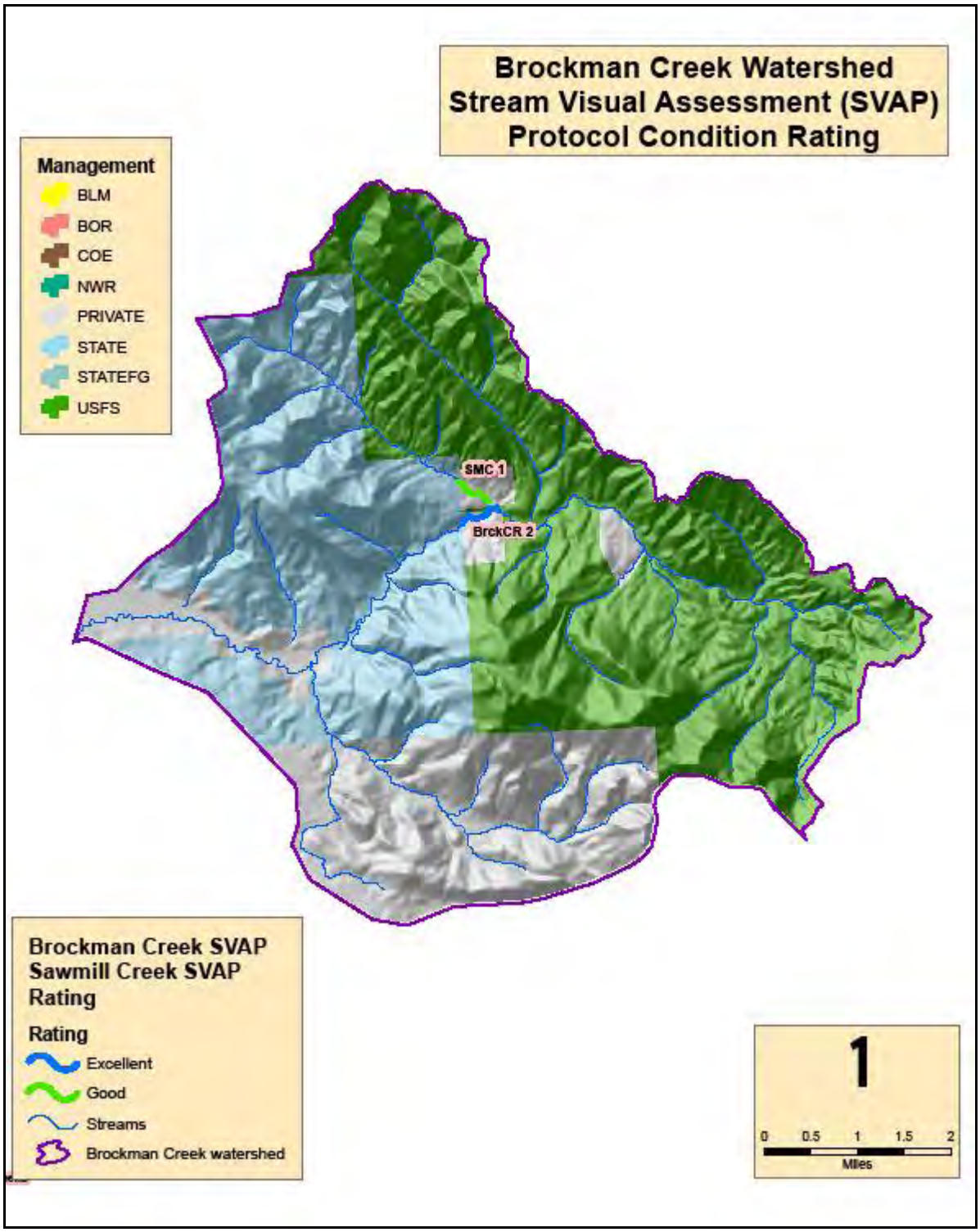
Appendix A: Acronyms/Abbreviations

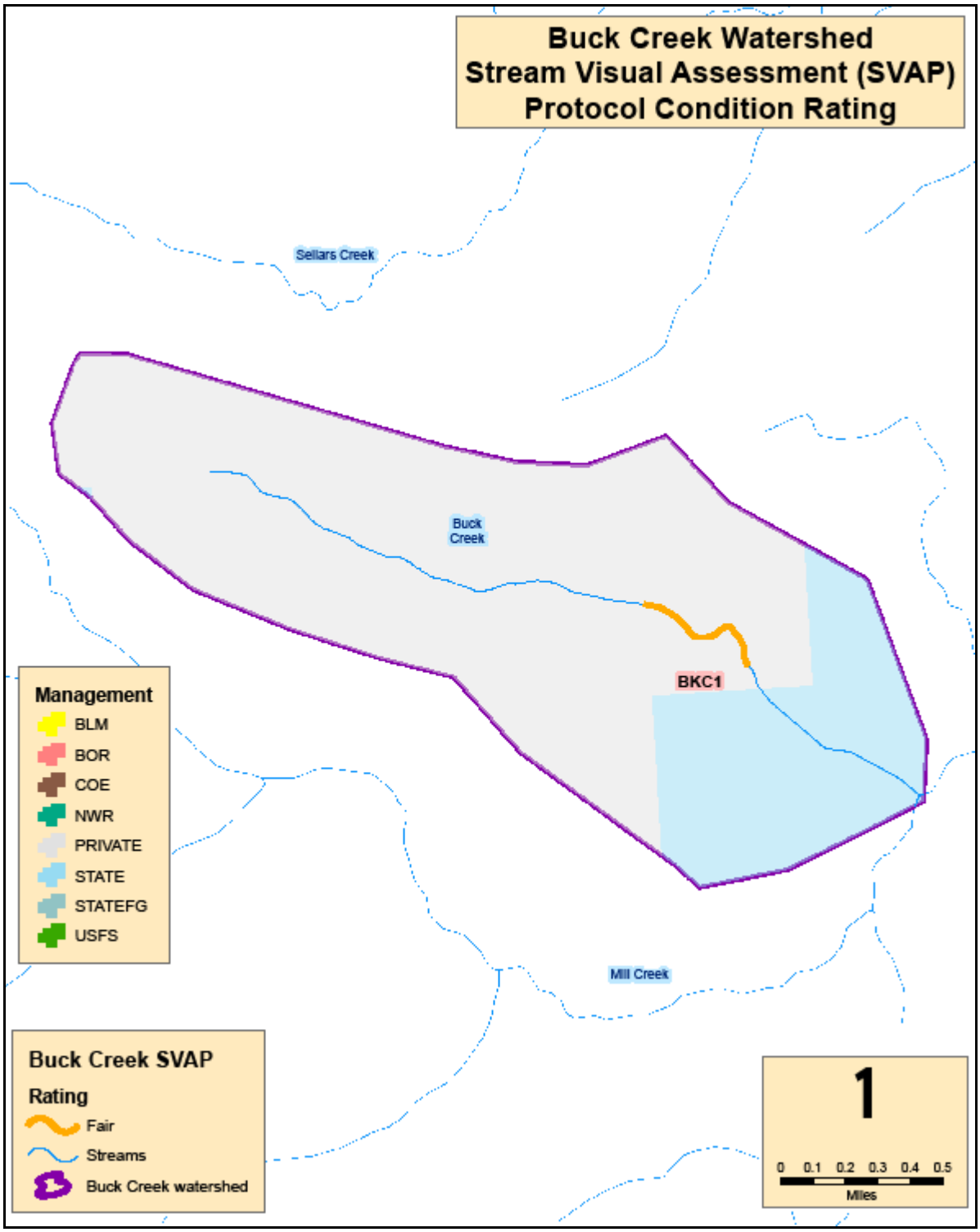
BMP -	Best Management Practice
BURP -	Beneficial Use Reconnaissance Project
CFR -	Code of Federal Regulations
cfs -	cubic feet per second
CRP -	Conservation Reserve Program
CWA -	Federal Clean Water Act
CWE -	Cumulative Watershed Effects
ESSWCD-	East Side Soil and Water conservation District
DO -	dissolved oxygen
EPA -	U.S. Environmental Protection Agency
FPA -	Idaho State Forest Practices Act
FSA -	USDA Farm Service Agency
GWWTF -	Genesee Waste Water Treatment Facility
HEL -	Highly Erodible Land
IASCD-	Idaho Association of Soil Conservation Districts
IDEQ -	Idaho Department of Environmental Quality
IDHW-	Idaho Department of Health and Welfare
IDL -	Idaho State Department of Lands
ISCC -	Idaho State Soil Conservation Commission
ISDA-	Idaho State Department of Agriculture
IWRRI -	Idaho Water Resources Research Institute
kg/d -	kilograms per day
LA -	Load Allocation
MCL -	maximum contaminant level
mg/l -	milligrams per liter
NBSCD -	North Bingham Soil Conservation District
NPDES -	National Pollution Discharge Elimination System
NPS -	Nonpoint Source Pollution
NRCS -	USDA Natural Resource Conservation Service
RUSLE -	Revised Universal Soil Loss Equation
SAWQP -	State Agricultural Water Quality Program
SBA -	Subbasin Assessment
TMDL -	Total Maximum Daily Load
TP -	total phosphorus
USDA -	United States Department of Agriculture
USGS -	United States Geologic Service
VFS -	Vegetative Filter Strip
WAG -	Watershed Advisory Group
WLA -	Waste Load Allocation
WQPA -	Water Quality Program for Agriculture (ISCC)

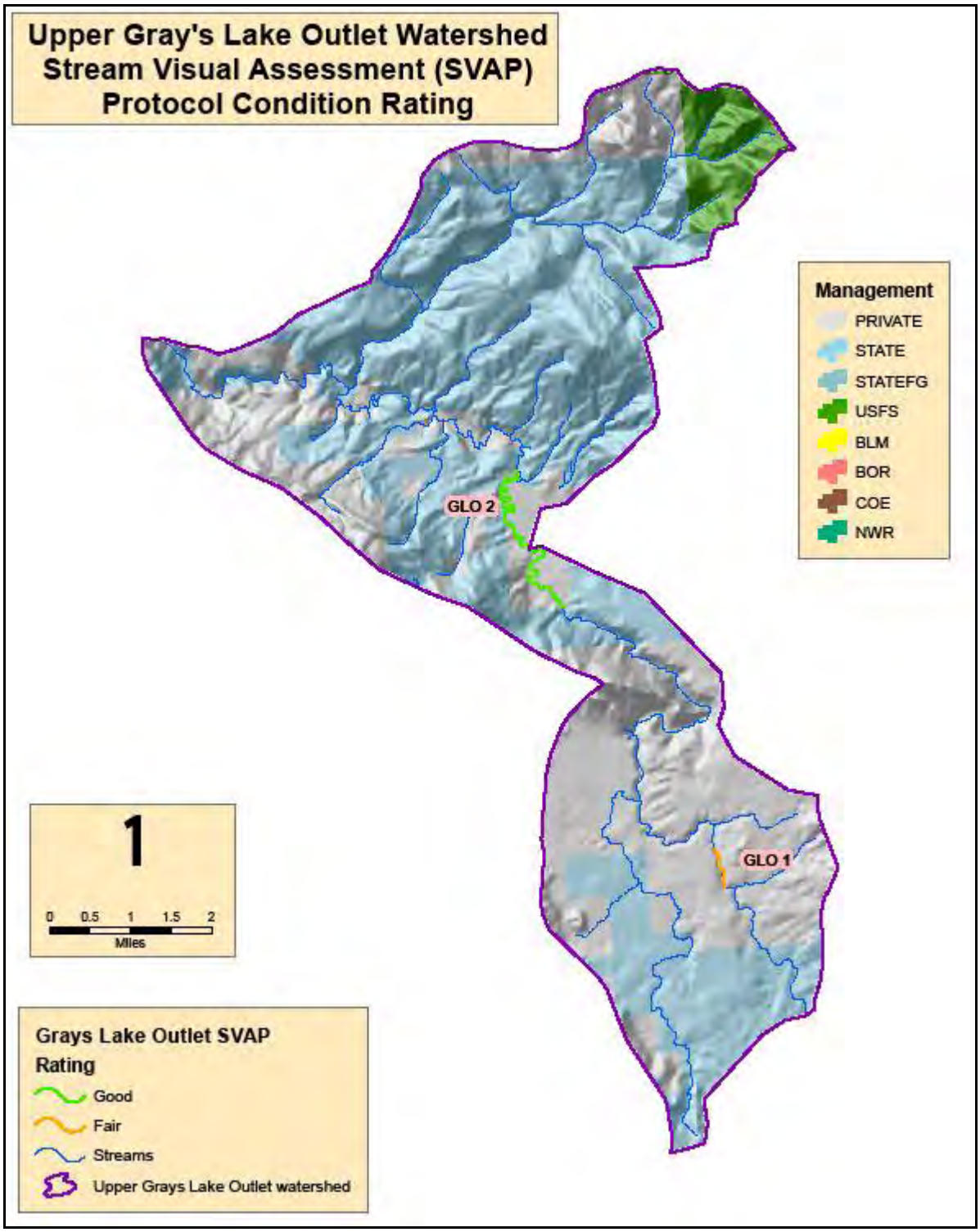
Appendix B

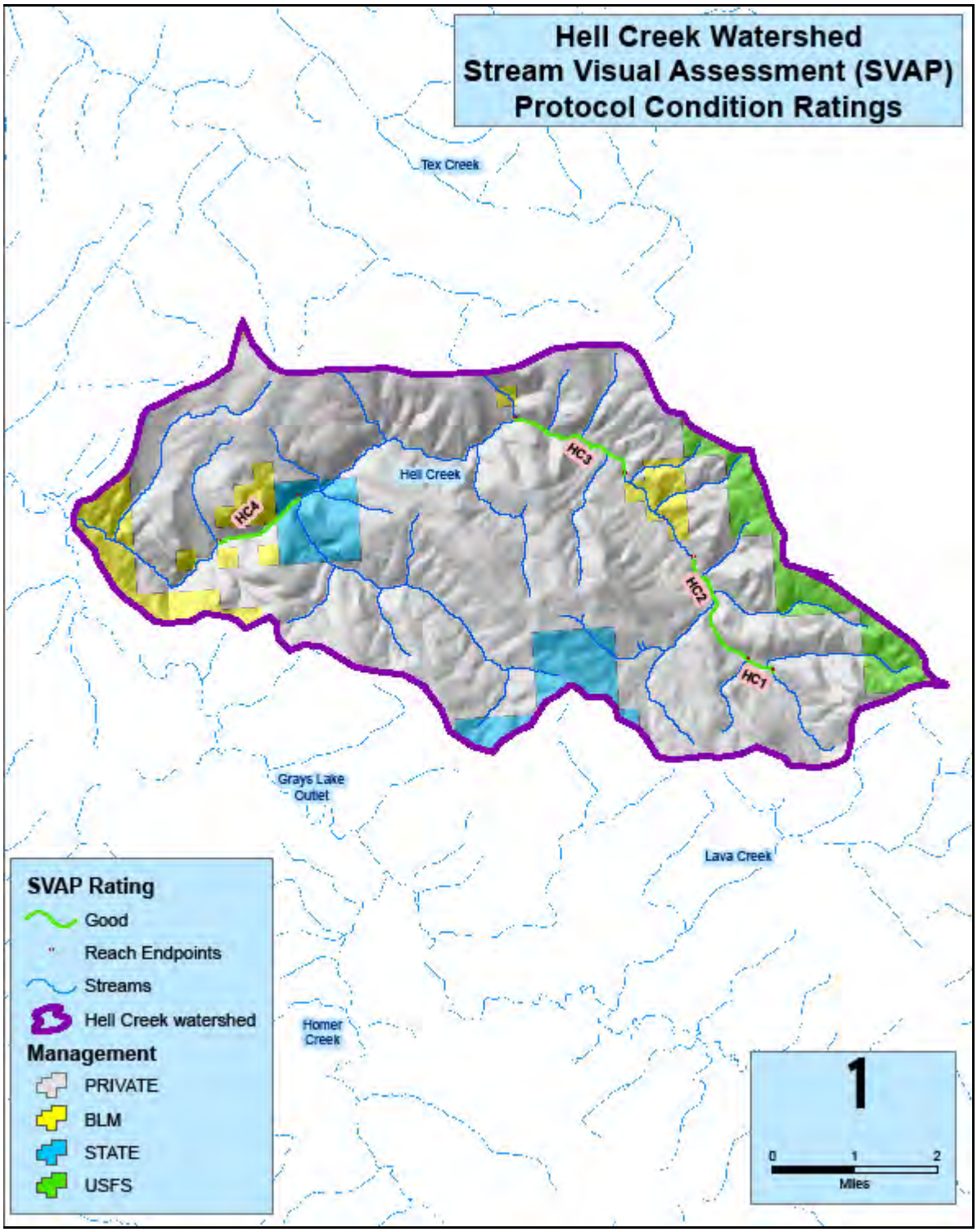
Stream Visual Assessment (SVAP) Protocol Ratings by Watershed

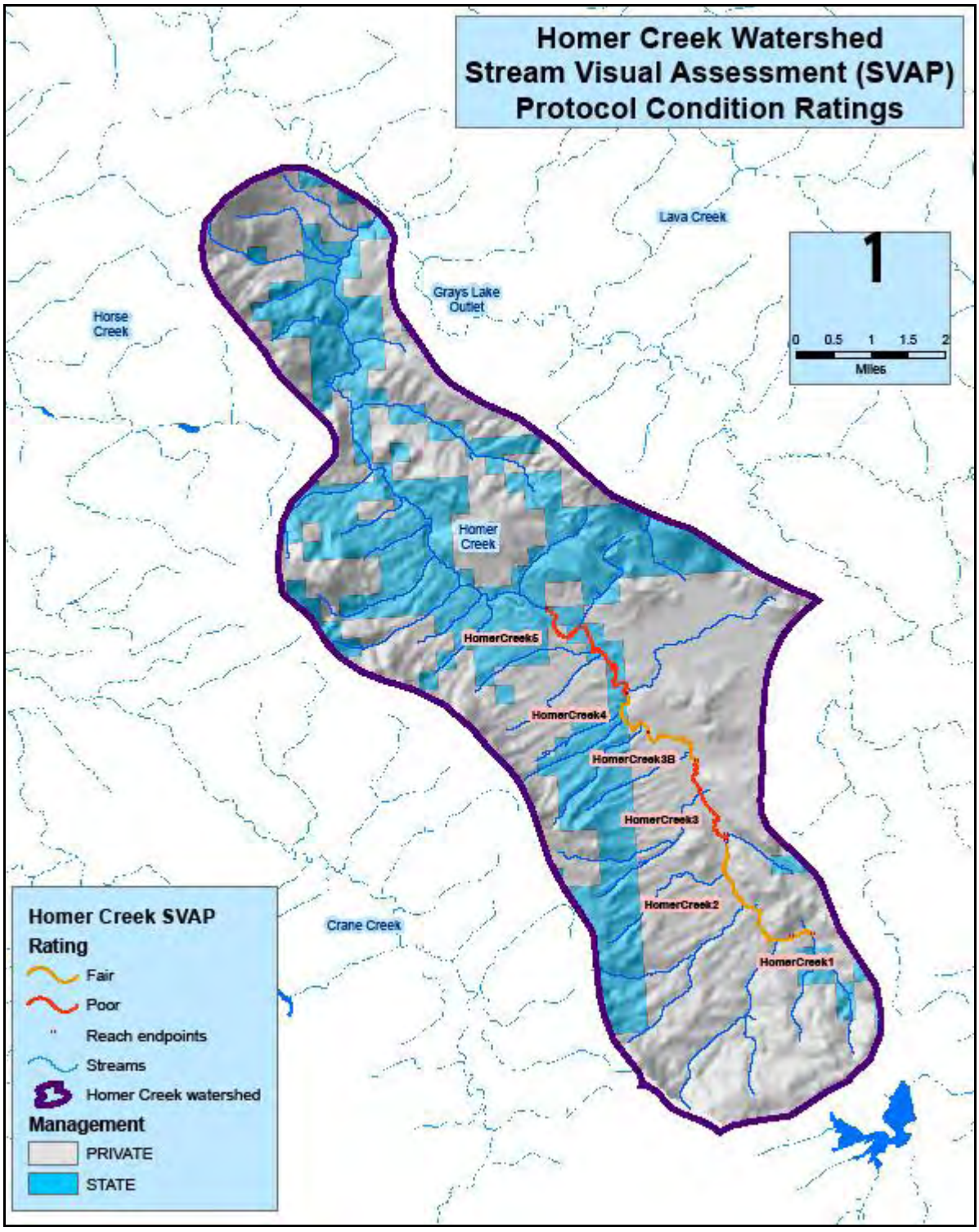

Birch Creek Watershed
Stream Visual Assessment (SVAP)
Protocol Condition Ratings
Willow Creek
Rock Creek
BC1
BC2
BC3
BC4
Willow Creek
Birch
Creek
BC5
BC6
Canyon Creek
Mud Creek
1
0
0.5
1
Miles
Birch Creek SVAP
Rating
Good
Fair
Poor
Reach Endpoints
Streams
Birch Creek watershed
Management
PRIVATE
BLM
STATE

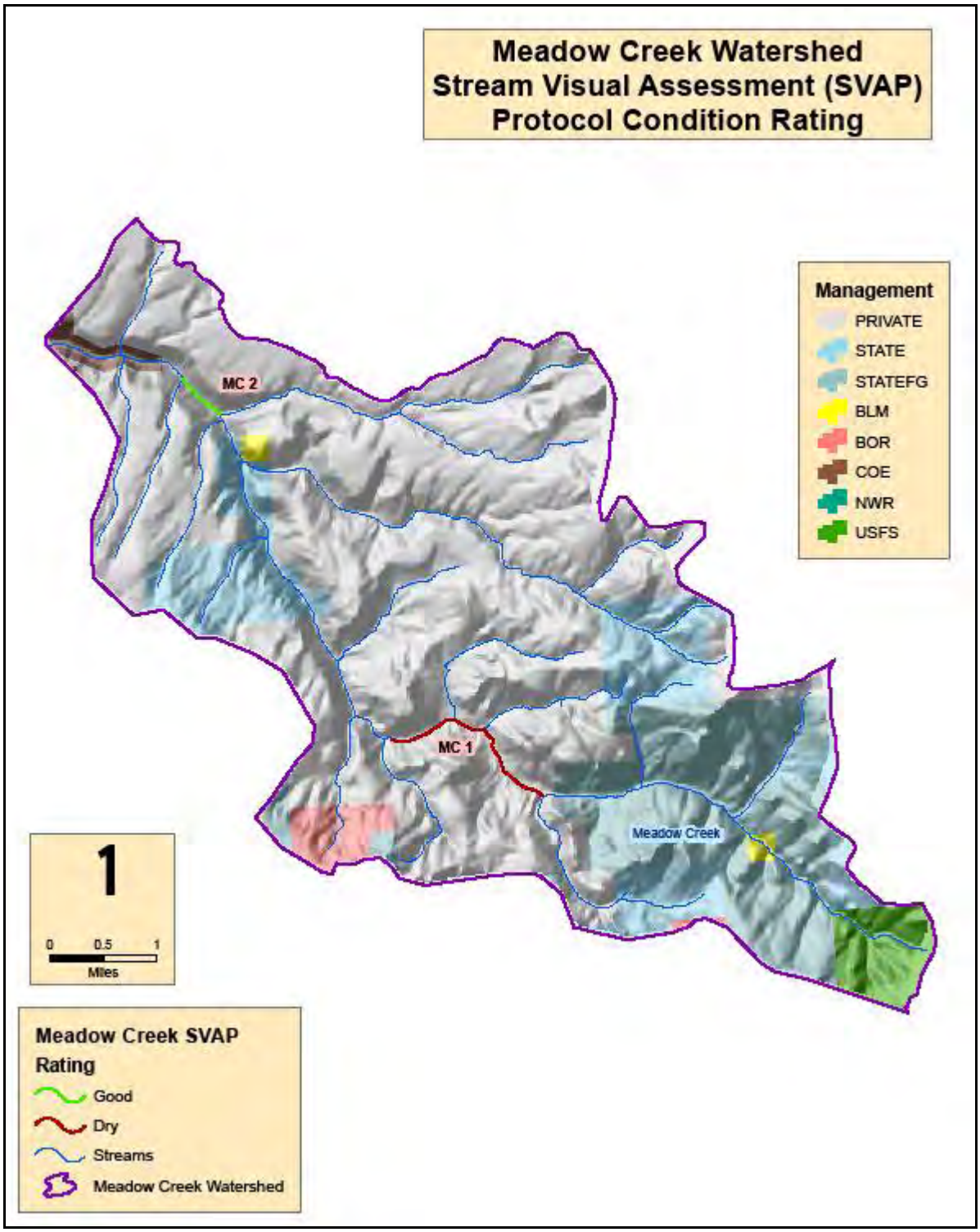

Brockman Creek Watershed
Stream Visual Assessment (SVAP)
Protocol Condition Rating
Management
BLM
BOR
COE
NWR
PRIVATE
STATE
STATEFG
USFS
SMC 1
BrckCR 2
Brockman Creek SVAP
Sawmill Creek SVAP
Rating
Rating
Excellent
Good
Streams
Brockman Creek watershed
1
0 0.5 1 1.5 2
Miles

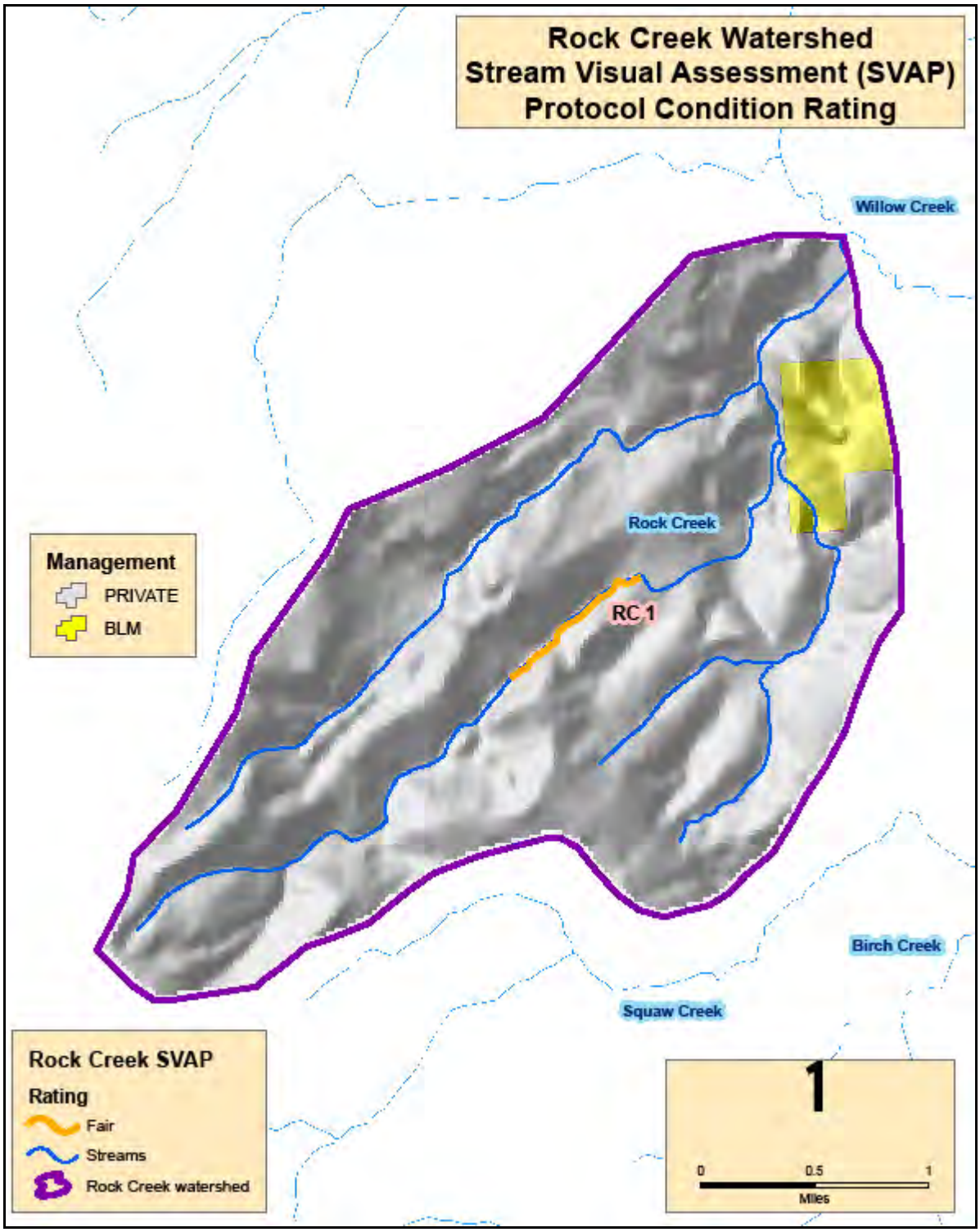

Buck Creek Watershed
Stream Visual Assessment (SVAP)
Protocol Condition Rating
Sellars Creek
Buck Creek
BKC1
Mill Creek
Management
BLM
BOR
COE
NWR
PRIVATE
STATE
STATEFG
USFS
Buck Creek SVAP
Rating
Fair
Streams
Buck Creek watershed
1
0 0.1 0.2 0.3 0.4 0.5
Miles


Upper Gray's Lake Outlet Watershed
Stream Visual Assessment (SVAP)
Protocol Condition Rating
Management
PRIVATE
STATE
STATEFG
USFS
BLM
BOR
COE
NWR
GLO 2
GLO 1
1
0 0.5 1 1.5 2
Miles
Grays Lake Outlet SVAP
Rating
Good
Fair
Streams
Upper Grays Lake Outlet watershed

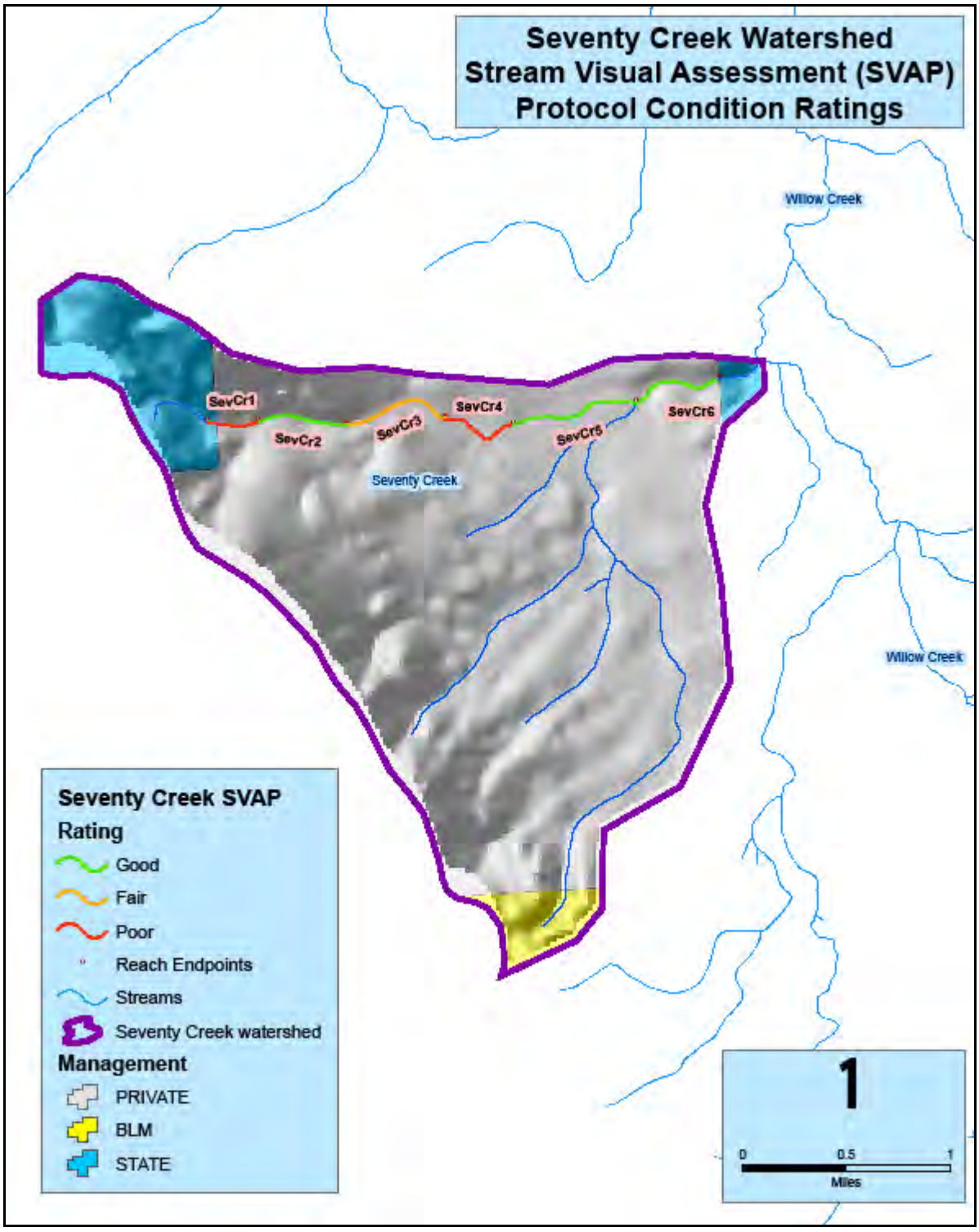

Hell Creek Watershed
Stream Visual Assessment (SVAP)
Protocol Condition Ratings
Tex Creek
Hell Creek
HC4
HC3
HC2
HC1
Grays Lake
Outlet
Lava Creek
Homer
Creek
SVAP Rating
Good
Reach Endpoints
Streams
Hell Creek watershed
Management
PRIVATE
BLM
STATE
USFS
1
0
1
2
Miles

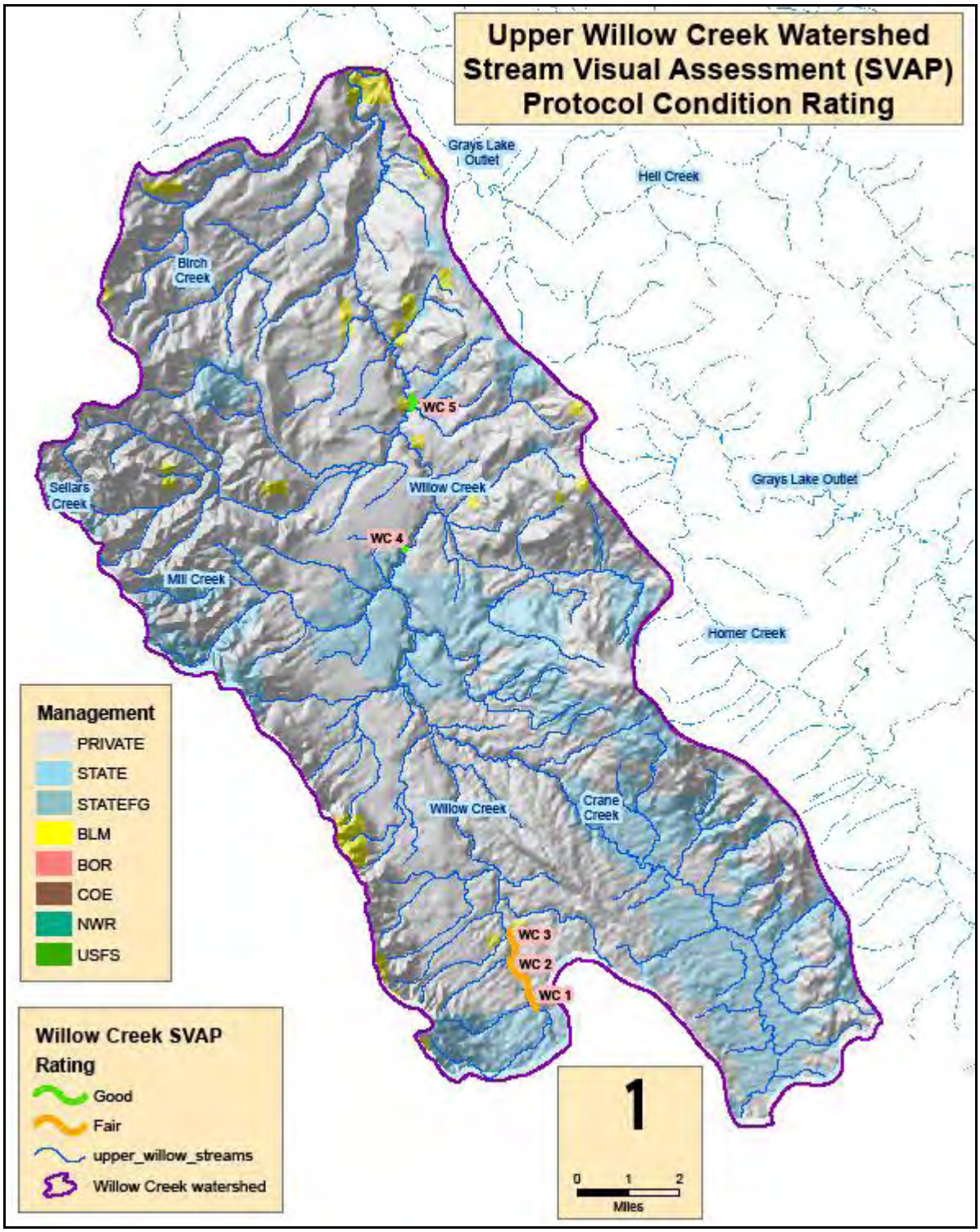

Homer Creek Watershed
Stream Visual Assessment (SVAP)
Protocol Condition Ratings
Lava Creek
Grays Lake Outlet
Horse Creek
Homer Creek
HomerCreek5
HomerCreek4
HomerCreek3B
HomerCreek3
HomerCreek2
HomerCreek1
Crane Creek
1
0 0.5 1 1.5 2
Miles
Homer Creek SVAP Rating
Fair
Poor
Reach endpoints
Streams
Homer Creek watershed
Management
PRIVATE
STATE


Meadow Creek Watershed
Stream Visual Assessment (SVAP)
Protocol Condition Rating
Management
PRIVATE
STATE
STATEFG
BLM
BOR
COE
NWR
USFS
MC 2
MC 1
Meadow Creek
1
0
0.5
1
Miles
Meadow Creek SVAP
Rating
Good
Dry
Streams
Meadow Creek Watershed


Rock Creek Watershed
Stream Visual Assessment (SVAP)
Protocol Condition Rating
Willow Creek
Rock Creek
RC 1
Birch Creek
Squaw Creek
Management
PRIVATE
BLM
Rock Creek SVAP
Rating
Fair
Streams
Rock Creek watershed
1
0
0.5
1
Miles


Sellars Creek Watershed
Stream Visual Assessment (SVAP)
Protocol Condition Ratings
Willow Creek
Mud Creek
Sellars Creek
SC 12
SC 9
SC 8
SC 7
SC 5
SC 4
SC 3
Buck Creek
Mill Creek
Sellars Creek SVAP
Rating
Fair
Poor
Reach Endpoints
Streams
Sellars Creek watershed
Management
BLM
PRIVATE
STATE
1
0
0.5
1
Miles


Seventy Creek Watershed
Stream Visual Assessment (SVAP)
Protocol Condition Ratings
Willow Creek
SevCr1
SevCr2
SevCr3
SevCr4
SevCr5
SevCr6
Seventy Creek
Willow Creek
Seventy Creek SVAP
Rating
Good
Fair
Poor
Reach Endpoints
Streams
Seventy Creek watershed
Management
PRIVATE
BLM
STATE
1
0
0.5
1
Miles


Upper Willow Creek Watershed
Stream Visual Assessment (SVAP)
Protocol Condition Rating
Grays Lake Outlet
Hell Creek
Birch Creek
WC 5
Sellars Creek
Willow Creek
Grays Lake Outlet
WC 4
Mill Creek
Homer Creek
Management
PRIVATE
STATE
STATEFG
BLM
BOR
COE
NWR
USFS
Willow Creek
Crane Creek
WC 3
WC 2
WC 1
Willow Creek SVAP Rating
Good
Fair
upper_willow_streams
Willow Creek watershed
1
0 1 2
Miles