BEAVER-CAMAS SUBBASIN
17040214
TOTAL MAXIMUM DAILY LOAD
IMPLEMENTATION PLAN FOR AGRICULTURE

Developed for:
The Idaho Department of Environmental Quality

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In Cooperation With:
Clark Soil Conservation District
USDA-Natural Resources Conservation Service

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INTRODUCTION

The Beaver Camas Subbasin Assessment and Total Maximum Daily Loads (SBA-TMDL) was completed by the Idaho Department of Environmental Quality (IDEQ) and approved by the Environmental Protection Agency (EPA) in 2005. The Idaho State Soil and Water Conservation Commission (SWC) is responsible for preparing the Beaver-Camas Subbasin TMDL Implementation Plan for Agriculture.

PURPOSE

The purpose of this plan is to recommend Best Management Practices (BMPs) that will improve or restore physical, chemical, and biological functions of impaired reaches in the Beaver-Camas subbasin. The plan will build upon past conservation accomplishments made through the Natural Resources Conservation Service (NRCS), the Clark Soil Conservation District (SCD), the Yellowstone SCD, and the Jefferson Soil and Water Conservation District (SWCD).

The Beaver-Camas Subbasin Total Maximum Daily Load (TMDL) Implementation Plan for Agriculture outlines an adaptive management approach for implementation of best management practices (BMPs) on agricultural lands to meet the requirements of the TMDL.

GOALS AND OBJECTIVES

The goal of this plan is to provide a strategy for agriculture to assist and/or complement other efforts in restoring and protecting beneficial uses for water quality impaired streams in the Beaver-Camas subbasin. The DEQ identifies water quality impaired streams in an integrated report compiled every two years. Table 1 identifies 1998 listed stream segments, their pollutants, and the SBA-TMDL recommendations for future listing based on Table B in the Beaver-Camas Subbasin SBA-TMDL.

The objective of this plan is to provide guidance to the Clark SCD, the Yellowstone SCD, the Jefferson SWCD, and agricultural producers concerning ways to reduce the amount of sediment and nutrients entering these waterbodies and to reduce water temperatures by decreasing solar loading. Agricultural pollutant reductions will be achieved by on-farm conservation planning with individual operators and application of BMPs in agricultural critical areas.

TABLE 1. STATUS OF 1998 303(D) LISTED STREAMS IN THE BEAVER-CAMAS SUBBASIN (IDEQ 2005)

Waterbody	1998 §303(d) Listed Pollutants	TMDL Developed for	SBA-TMDL Recommended Listing
Beaver Creek (Spencer to Dubois)	Flow, Habitat, Nutrients, Sediment, Temperature	Temperature	Flow, Habitat, Temperature
Beaver Creek (Dubois to Camas Creek)	Flow, Habitat, Nutrients, Sediment, Temperature	None	Flow, Habitat, Nutrients, Sediment, Temperature
Beaver Creek (Headwaters to Spencer)	Temperature	Temperature	Temperature
Camas Creek (Spring Creek to HWY 91)	Flow, Habitat, Nutrients, Sediment, Temperature	Sediment, Temperature	Flow, Habitat, Sediment, Temperature
Camas Creek (HWY 91 to Mud Lake)	Flow, Nutrients, Sediment	None	Flow
Cow Creek (Headwaters to Thunder Gulch)	Unknown	None	None
Dairy Creek (Headwaters to Mouth)	Temperature	Temperature	Temperature
East Camas Creek (Headwaters to Mouth)	Temperature	Temperature	Temperature
Modoc Creek (Headwaters to Mouth)	Temperature	Temperature	Temperature
Threemile Creek (Headwaters to Mouth)	Temperature	Temperature	Temperature
West Camas Creek (Headwaters to Mouth)	Temperature	Temperature	Temperature

BACKGROUND

PROJECT SETTING

The subbasin is located in the Upper Snake River Basin in eastern Idaho (Figure 1). It is bounded on the north by the Continental Divide, on the west by the Beaverhead and Bitterroot Mountains, on the east by Island Park, and on the south by lava fields. Elevation ranges from approximately 4,800 feet in the southern portion of the subbasin to approximately 8,500 feet in the northern portion. Surface waters in this subbasin sink into the Snake River Plain Aquifer. Temperature ranges on average from a minimum of 4° F in the winter to a maximum of 80º F in the summer. Annual precipitation varies longitudinally across the subbasin from approximately 10 to 20 inches per year. The hydrology of the subbasin is dominated by both natural and human caused flow alterations. These alterations contribute to limited beneficial use attainment of the §303(d) listed reaches in the subbasin. For more information regarding the climate, hydrology, soils, vegetation, and other subbasin characteristics; please consult the Beaver-Camas SBA and TMDL (IDEQ 2005).

COMMON RESOURCE AREAS

The subbasin is comprised of four Major Land Resource Areas (MLRAs): Snake River Plains, Lost River Valleys and Mountains, Eastern Idaho Plateaus, and Central Rocky Mountains (http://soils.usda.gov/survey/geography/mlra/). A more detailed description of the Common Resource Areas (CRA), subunits of MLRAs, of the Beaver Camas subbasin are found below (http://www.id.nrcs.usda.gov/technical/soils/common_res_areas.html).

Snake River Plains-Upper Snake River (CRA 11.3)

Most of the dominant natural vegetation consists of sagebrush and perennial bunchgrasses. Elevation ranges from 1,970 feet to 5,580 feet. There is little topographic relief. Average annual temperature is 41 ºF to 52 ºF. Soils have a mesic or frigid temperature regime. There is some pastureland and cropland in this unit. Irrigated crops include small grains, sugar beet, potatoes, and alfalfa. Irrigation diversions, dams, and nonpoint pollution has impacted waters in this unit.

Snake River Plains-Eastern Snake River Basalt Plains (CRA 11.4)

Rangeland is the dominant land use. Most of the dominant natural vegetation consists of sagebrush, perennial bunchgrasses, and forbs. Precipitation is 6 to 12", most of which falls in winter and early spring, outside the growing season. Frequent fires have eliminated large areas of sagebrush. Cheatgrass and other invaders are present and sometimes dominant. Average frost free days are 100 to 170 days. Elevations range from 1,970 feet to 5,580 feet. Soils are generally shallow and stony and unsuitable for cultivation. Soils have a mesic or frigid temperature regime. Some sprinkler irrigation does occur in this unit.

Lost River Valley/Mountains – Gneissic – Volcanic Hills (CRA 12.2)

Rangeland vegetation consists of sagebrush, perennial grass, and forbs. Precipitation is 6 to 16", most of which falls in winter and early spring, outside the growing season. Elevations range from 4,500 feet to over 10,000 feet. Topography varies from nearly level flats up to benches and rolling hills. Soils are loamy to gravelly. Average frost free days are 80 to 150 days.

Eastern Idaho Plateaus – Eastern Snake River Basalt Plains (CRA 13.2)

Rangeland vegetation consists of sagebrush, perennial grasses, and forbs. Precipitation ranges from 12 to 16", most of which falls in winter and early spring outside the growing season. Wildlife habitat for shrub-steppe wildlife species (e.g., sage grouse, sharp-tailed grouse, brewer's

and sage sparrows) has been in decline due to wildfires, invasion of noxious and invasive plants, overgrazing, and habitat fragmentation. Average frost free period ranges from 80 to 140 days. Elevations range from 3,500 to 6,000 feet. Sites occur on nearly level flats up to benches and rolling foothills. Soils are loamy to gravelly, usually shallow with some rock outcrops.

Central Rocky Mountains – High Mountains (CRA 43B.1)
Rangeland vegetation consists of sagebrush, perennial grasses, and forbs. Precipitation is 16" and greater, most of which falls as snow in winter and early spring outside the growing season. Elevations range from 4,500 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 100 days.

The Beaver-Camas 8-Digit Hydrologic Unit Code (HUC 17040214) subbasin is 643,100 acres. Eighty three percent of the subbasin is in Clark County. Thirteen percent of the subbasin is in Fremont County, with the remaining four percent in Jefferson County. Thirty-nine percent of the subbasin is privately owned and 61 percent is public land.

Conservation assistance is provided by three districts: Clark SCD (Clark County), Jefferson SCWD (Jefferson County) and Yellowstone SCD (Fremont County). The High Country Resource Conservation and Development office provides additional assistance.

WATERSHEDS

Figure 1 is a map of subbasin, showing the boundaries of the six watersheds. As stated in the Beaver-Camas SBA-TMDL, “the Beaver-Camas subbasin is divided into six fifth field watersheds. The Upper Beaver Creek and Spring Creek watersheds have the highest drainage densities supplying the vast majority of surface water to the lower sections of the subbasin. The Upper and Lower Beaver Creek watersheds make up the Beaver Creek drainage area. The Spring Creek, Camas Creek, and Camas Creek National Wildlife Refuge watersheds make up the Camas Creek drainage area. The Cottonwood Creek watershed is entirely closed system of streams located on the western edge of the subbasin.”

FIGURE 1. WATERSHEDS IN THE BEAVER-CAMAS SUBBASIN

LAND USE

The land use information found in Table 2 and Table 3 was derived from the Rapid Watershed Assessment (RWA) completed in 2007 (NRCS 2007). A large majority of the land, fifty eight percent, is shrubland or rangeland. Most of the rangeland is in the Lower Beaver Creek; Camas Creek; and Camas Creek, National Wildlife Refuge watersheds located in the central and southern portions of the subbasin. A series of canals known as Holly, Jacket, and Independent Ditch are used to irrigate land south of the National Wildlife Refuge. The next largest land use is grass, pasture or hayland at nineteen percent. Fifteen percent of the subbasin is forest land that exists in the northern portion of the subbasin and approximately six percent is cropland that exists in the southern portion of the subbasin. The remaining one percent is water, wetland, developed or barren. Figure 2 shows land use for the Beaver-Camas subbasin.

Interstate 51 runs north-south along Beaver Creek. Highways 22 and 33 intersect the southern portion of the subbasin. Other dirt roads are scattered throughout the subbasin.

TABLE 2. LAND USE IN THE BEAVER-CAMAS SUBBASIN

Land Use/Land Cover Category	Public Acres	Percent of Subbasin	Private Acres	Percent of Subbasin	Total Acres	Percent of Subbasin
Forest	97,200	15%	2,882	<1%	100,082	15%
Grain Crops	69	<1%	11,016	2%	11,085	2%
Conservation Reserve Program (CRP)	0	0%	3,147	<1%	3,147	<1%
Wetland Reserve Program (WRP)	0	0%	436	<1%	436	<1%
Grass/Pasture/Hay	58,011	9%	64,541	10%	122,552	19%
Row Crops	841	<1%	27,710	4%	28,551	4%
Shrub/Rangelands	239,250	37%	133,454	21%	372,704	58%
Water/Wetlands/Developed/Barren	5,353	<1%	3,493	<1%	8,846	1%
TOTAL	400,724	62%	246,679	38%	647,403	100%

TABLE 3. AGRICULTURAL IRRIGATED LANDS IN THE BEAVER-CAMAS SUBBASIN

Irrigated Lands Category	Acres	Percent of Irrigated Land	Percent of Subbasin
Cultivated Cropland	30,000	47%	5%
Non-Cultivated Cropland	4,800	8%	<1%
Pastureland	28,700	45%	4%
TOTAL	63,500	100%	10%

LAND OWNERSHIP

The land ownership information in Table 4 is also from the RWA completed in 2007 (NRCS 2007). As shown a majority of the land is public and managed by the Bureau of Land Management (BLM), United States Forest Service (USFS), or the National Wildlife Refuge (NWR). Figure 3 illustrates land ownership/management for the Beaver-Camas subbasin.

TABLE 4. LAND OWNERSHIP IN THE BEAVER-CAMAS SUBBASIN

Land Owner	Acres	Percent of Subbasin
Private	248,214	38%
Public	130,975	62%
TOTAL	643,043	100%

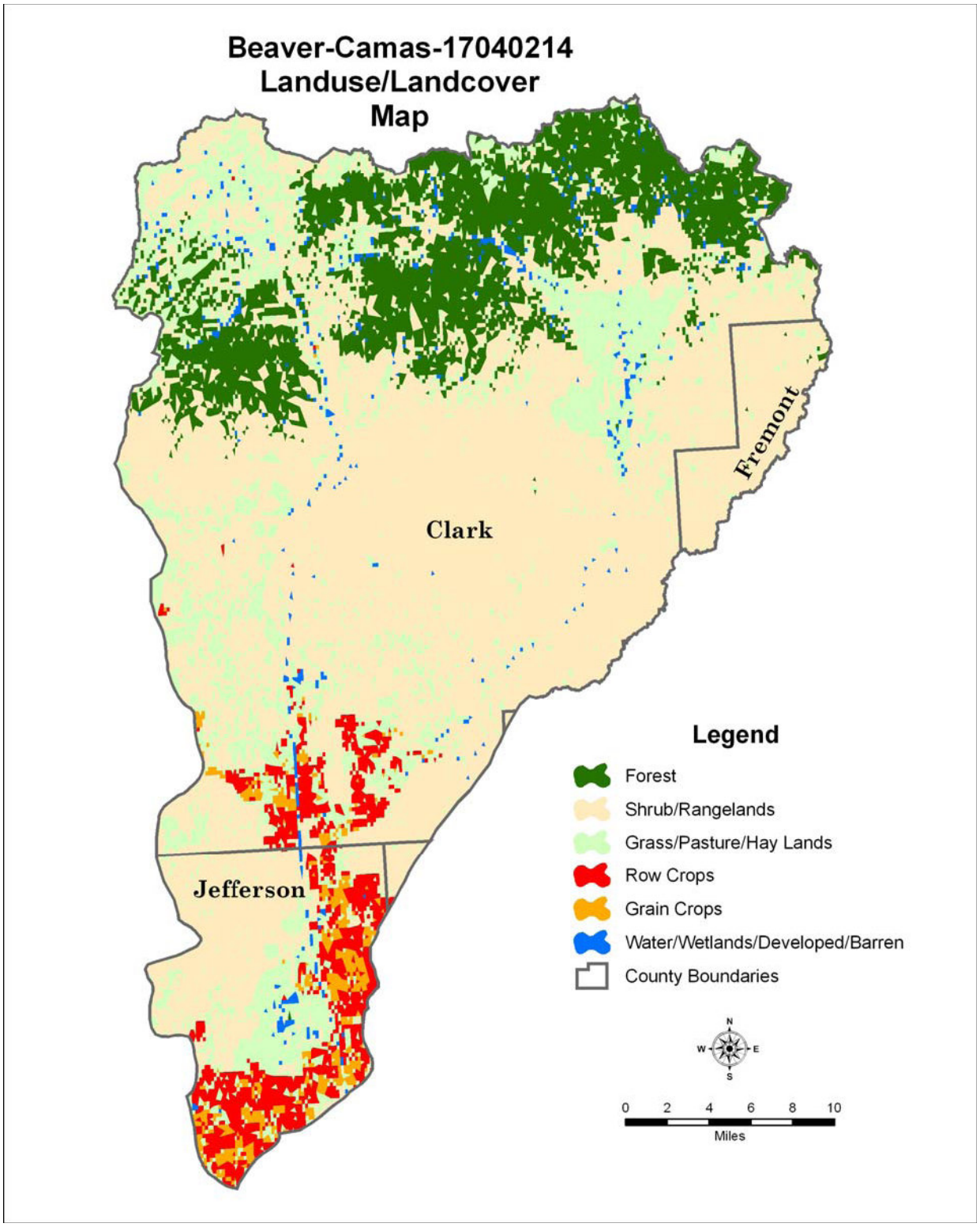

FIGURE 2. LAND USE FOR THE BEAVER-CAMAS SUBBASIN

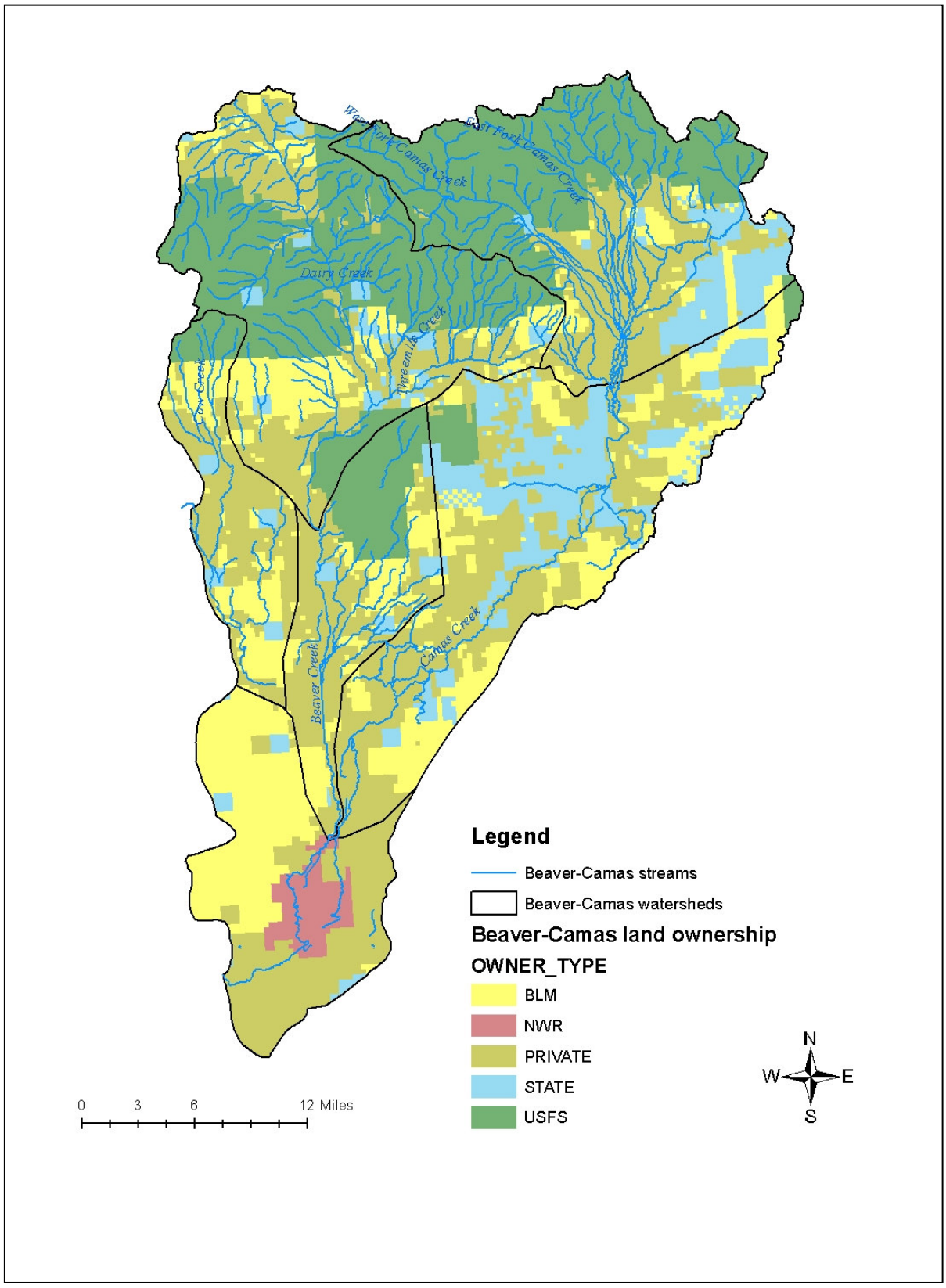

FIGURE 3. LAND OWNERSHIP/MANAGEMENT FOR THE BEAVER-CAMAS SUBBASIN

CONSERVATION ACCOMPLISHMENTS

Table 5 provides a summary of conservation accomplishments applied in federal fiscal years 2005 through 2010. These BMPs were installed with technical assistance from local soil conservation districts, the NRCS, the IASCD, and the SWC to reduce impacts to water quality from agricultural lands in the subbasin. They have been funded through federal programs, such as the Conservation Reserve Program (CRP), Environmental Quality Incentives Program (EQIP), and EQIP-Ground and Surface Water Conservation (GSWC).

BMPs applied were site specific and based on resource concerns for a particular land use. BMPs applied to cropland generally included conservation cover, conservation crop rotation, irrigation systems, irrigation water management, nutrient management, pest management, and use exclusion. BMPs applied to grazed rangeland included brush management, fence, pest management, pipeline, prescribed grazing, spring developments, use exclusion, and watering facilities. A majority of the BMPs applied to hay and pasture lands were management practices, such as irrigation water management, nutrient management, and pest management. Lands designated for wildlife use were treated with prescribed grazing, upland wildlife management, use exclusion, and windbreaks.

TABLE 5. FEDERAL BMPS COMPLETED IN THE BEAVER-CAMAS SUBBASIN

Practice Name	Practice Number	Unit	2005	2006	2007	2008	2009	2010	Total
Access Control	472	ac					182		182
Access Road	560	ft			1		50		51
Brush Management	314	ac		400	400	400			1,200
Comprehensive Nutrient Management Plan	100	no				1			1
Conservation Cover	327	ac		1			159		160
Conservation Crop Rotation	328	ac				246			246
Fence	382	ft	17,121	21,120	12,193	5,479		6,692	62,605
Irrigation System, Microirrigation	441	ac		1			2		2
Irrigation System, Sprinkler	442	ac		186	85		357		627
Irrigation Water Conveyance, Pipeline, High-Pressure, Underground, Plastic	430DD	ft			1,990	1,118	5,074		8,182
Irrigation Water Management	449	ac	215	1		246	543	825	1,830
Mulching	484	ac					2		2
Nutrient Management	590	ac	3	185	488	131	650	436	1,892
Pasture and Hayland Planting	512	ac	403						403
Pest Management	595	ac		150	727	347	182		1,406
Pipeline	516	ft	3,300		22,917	19,065	9,587		54,869
Prescribed Burning	338	ac	4,000						4,000
Prescribed Grazing	528	ac	140		8,871	1,619		1,776	12,405
Pumping Plant	533	no			1	1	3		5
Residue and Tillage Management, No Till	329	ac					139		139
Spring Development	574	no				1			1
Structure for Water Control	587	no					2		2
Upland Wildlife Habitat Management	645	ac		1	4	246	163	9	424
Use Exclusion	472	ac		1	298				299
Waste Storage Facility	313	no	1						1
Watering Facility	614	no	1	1	6	7	3		18
Water Well	642	no						1	1
Wetland Wildlife Habitat Management	644	ac			240				240
Windbreak/Shelterbelt Establishment	380	ft		800	4,130		812		5,742
									156,934

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. Additionally, all waters of the state are designated for agricultural and industrial water supplies, wildlife, and aesthetics. Designated beneficial uses for streams in the subbasin are listed below in Table 6 (IDEQ 2005). In order for beneficial uses to be supported, water quality criteria must not be exceeded. Some of these criteria are:

- Cold Water Aquatic Life=<22 ºC daily or <19 ºC maximum daily average
- Primary Contact Recreation (PCR)=< 126 *E.coli*/100 ml (geometric mean) or <406 *E.coli*/100 ml (instantaneous)
- Salmonid Spawning (SS)=<13 ºC daily maximum or <9 ºC daily average (during rainbow trout and bull trout spawning and incubation periods)
- Secondary Contact Recreation (SCR)= < mean 126 *E.coli*/100 ml or <576 *E.coli*/100 ml

TABLE 6. DESIGNATED BENEFICIAL USES FOR 1998 §303(D) LISTED STREAM SEGMENTS IN THE BEAVER-CAMAS SUBBASIN

Stream	Boundaries	Designated Uses
Camas Creek	Beaver Creek to Mud Lake	CWAL, SS, PCR
Camas Creek	Spring Creek to Beaver Creek	CWAL, SS, PCR
Camas Creek	Confluence of West and East Camas Creeks to Spring Creek	CWAL, SS, PCR
Beaver Creek	Canal (T09N, R36E) to mouth	CWAL, SS, PCR, DWS
Beaver Creek	Dry Creek to Canal (T09N, R36E)	CWAL, SS, PCR, DWS
Beaver Creek	Rattlesnake Creek to Dry Creek	CWAL, SS, PCR, DWS
Beaver Creek	Miners Creek to Rattlesnake Creek	CWAL, SS, PCR, DWS
Beaver Creek	Idaho Creek to Miners Creek	CWAL, SS, PCR, DWS
Beaver Creek	Source to Idaho Creek	CWAL, SS, PCR, DWS

CWAL – Cold Water Aquatic Life, SS – Salmonid Spawning, PCR – Primary Contact Recreation, SCR – Secondary Contact Recreation, AWS – Agricultural Water Supply, DWS – Domestic Water Supply

The designated uses, cold water aquatic life and salmonid spawning, are not fully supported for portions of Beaver and Camas Creeks. This is based on the assumption that dewatering of these streams does not support suitable habitat for healthy fish populations (IDEQ 2005).

In addition to flow alteration, agricultural activities affecting beneficial uses within the Beaver-Camas subbasin include the following: livestock access areas/crossings, farming operations adjacent to streambanks; improper grazing management/rotation in riparian areas; over application of fertilizer and pesticides on cropland, hayland, and/or pastureland; poor irrigation water management; and soil loss resulting in sediment transportation into surface waters.

POLLUTANTS

This section focuses on particular pollutants that result in streams failing to meet beneficial use(s). Beaver Creek, Camas Creek, and Cow Creek were originally listed on the 1998 §303 (d) list. By 2002, eight streams (Beaver Creek, Camas Creek, E. Fork Camas Creek, Crooked/Crab Creeks, Rattlesnake Creek, Threemile Creek, Warm Creek, and W. Fork Camas Creek) were listed as impaired by one or more pollutants. Ching Creek, W. Fork Camas Creek (TNF), Pleasant Valley Creek, and Idaho Creek support beneficial uses. Table 7 lists impaired waters for years 1998, 2002, and 2008 (IDEQ 1998, 2005, and 2008).

TABLE 7. POLLUTANTS FOR LISTED STREAM SEGMENTS IN THE BEAVER-CAMAS SUBBASIN (IDEQ 1998, 2005, 2008)

Waterbody	1998 §303(d) list	2002 Integrated Report	Assessment Unit Description	2008 Integrated Report
Beaver Creek (Spencer to Dubois)	Flow, Habitat, Nutrients, Sediment, Temperature	Flow, Habitat, Nutrients, Sediment, Temperature	(Miner Creek to Rattlesnake Creek) (Rattlesnake Creek To Dry Creek) Beaver Creek (Dry Creek to Canal)	-Temperature -Temperature, flow alteration, physical substrate habitat alterations -Temperature
Beaver Creek (Dubois to Camas Creek)	Flow, Habitat, Nutrients, Sediment, Temperature	Flow, Habitat, Nutrients, Sediment, Temperature	Beaver Creek (canal to mouth)	Flow alteration, physical substrate habitat alterations, sediment, temperature, unknown
Beaver Creek (Headwaters to Spencer)		Temperature	Beaver Creek (source to Idaho Creek) (Idaho Creek to Miners Creek) (Miner Creek to Rattlesnake Creek)	-Bacteria -Biota/habitat assessments, bacteria -Temperature
Camas Creek (Spring Creek to HWY 91)	Flow, Habitat, Nutrients, Sediment, Temperature	Flow, Habitat, Nutrients, Sediment, Temperature	Camas Creek (Spring Creek to Beaver Creek)	Flow alteration, physical substrate habitat alterations, sediment, temperature,
Camas Creek (HWY 91 to Mud Lake)	Nutrients, Sediment	Flow, Nutrients, Sediment	Camas Creek (Beaver Creek to Mud Lake)	Unknown
Cow Creek (Headwaters to Thunder Gulch)	Unknown	Unknown		
Dairy Creek (Headwaters to Mouth)		Temperature	Crooked/Crab Creek (source to mouth)	Biota/habitat assessments, bacteria
East Fork Camas Creek (Headwaters to Mouth)		Temperature	East Fork Camas Creek (source to Larkspur Creek)	Bacteria, temperature
Modoc Creek (Headwaters to Mouth)		Temperature	Rattlesnake Creek (source to mouth)	Biota/habitat assessments
Threemile Creek (Headwaters to Mouth)		Temperature	Threemile Creek (source to mouth)	Biota/habitat assessments, bacteria
			Warm Creek (Cottonwood Creek to mouth and E.Fork Camas Creek)	Biota/habitat assessments, bacteria
West Fork Camas Creek (Headwaters to Mouth)		Temperature	West Fork Camas Creek (source to Targhee N.F.)	Sediment, temperature

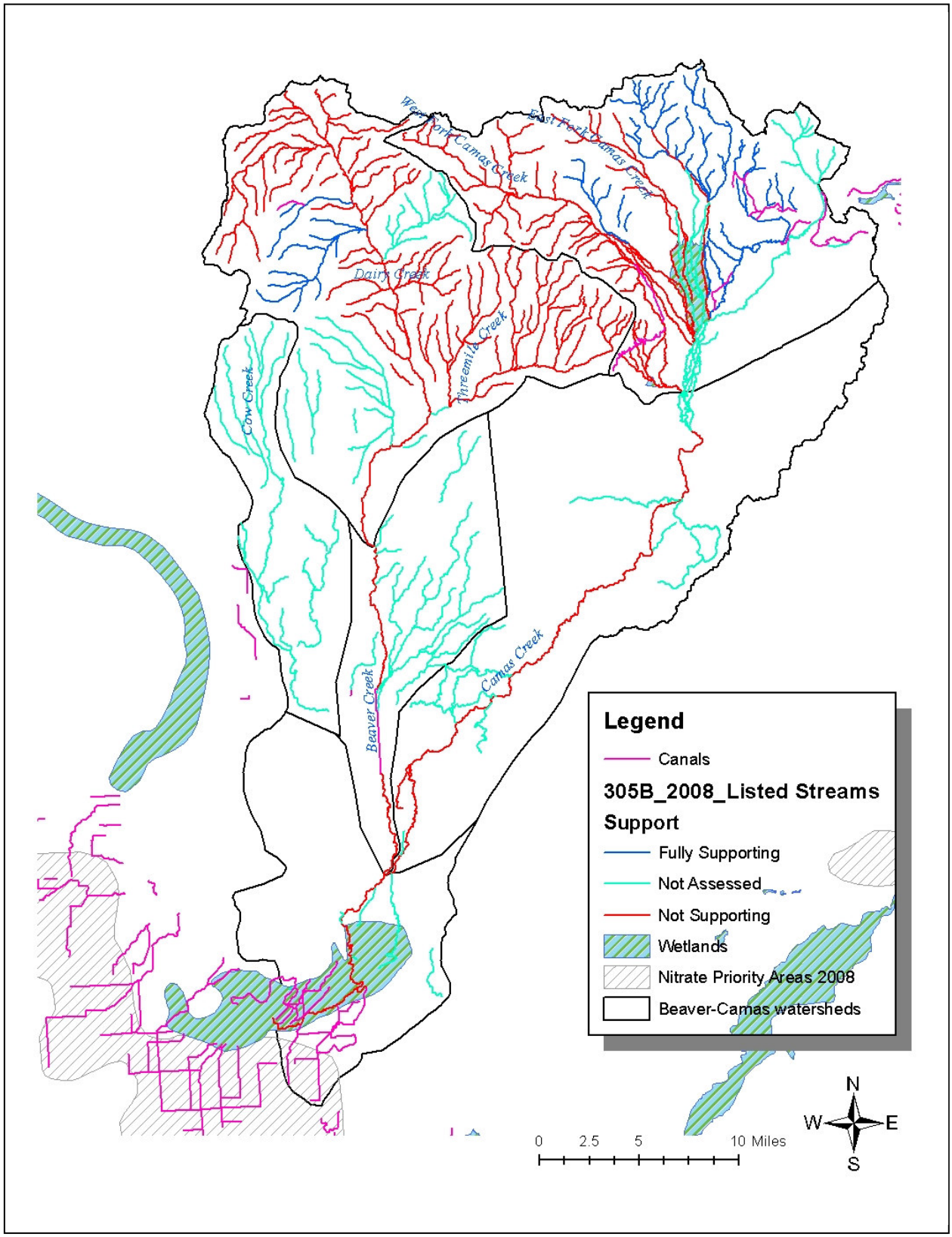

FIGURE 4. 2008 305 (B) IMPAIRED STREAMS AND NITRATE PRIORITY AREAS IN THE BEAVER-CAMAS SUBBASIN

Water Quality Monitoring

The Clark Soil Conservation District (Clark SCD) requested that water quality monitoring be performed by the Idaho Association of Soil Conservation Districts (IASCD). In May 2007, IASCD and ISDA began monitoring surface water quality on Camas, Spring, East and West Camas Creeks. IASCD sampled the streams twice a month from April to October, and then once a month from November to March. Samples were analyzed for suspended sediment, phosphorus, and nitrogen.

IASCD staff measured temperature and collected continuous temperature data biweekly at the Camas and West Camas sites. The data collected indicate that stream temperatures at the five sites exceed the temperature target for salmonid spawning periods (13˚C). During summer months the instantaneous measurements did not exceed the target for cold water aquatic life (22˚C), but the continuous monitoring indicated that these streams did exceed the target during July. *E. coli* concentrations at the five sites exceeded the water quality standard 14% to 71% of the time. Suspended sediment, nitrogen, and phosphorus concentrations were low throughout the year (Jenkins 2007).

In 1998, ISDA began groundwater quality monitoring for nitrates and pesticides (Carlson et al 2002). This study concluded that nitrates exceeded the target level every sample year; however pesticides were only detected in 1998 and not in subsequent years. The DEQ has designated nitrate priority areas- areas where nitrate levels exceed the allowable limits in groundwater well samples- throughout the state of Idaho. DEQ ranked the Mud Lake Nitrate Priority Area low on the priority list. It is located in the southern portion of the subbasin. There are no existing groundwater concern areas in the subbasin. Figure 4 shows the 2008 305 (b) impaired surface waters and 2008 nitrate priority areas. There has been relatively little change in percent nitrates in the area since the 2002 Final Nitrate Priority Area Ranking (http://www.deq.state.id.us/water/data_reports/ground_water/reports.cfm#recharge).

AGRICULTURAL WATER QUALITY INVENTORY AND EVALUATION

RIPARIAN

Riparian Inventory and Evaluation

DEQ (2005) stated that grazing is the principal land use around Camas Creek. Because stream characteristics of Beaver and Camas Creeks alternate between basalt canyons and depositional openings; the areas where the basalt canyons do not armor the banks have the highest grazing pressure and consequently more grazing impacts. Streambanks in these areas are eroding and depositing sediment into the stream.

Resource Setting

Riparian areas are found throughout the subbasin and in every CRA. A detailed description of Common Resource Areas was provided under the Project Setting portion of this plan. The Lower Beaver Creek watershed is in CRA 11.4 *Snake River Plains-Eastern Snake River Basalt Plains*. Upper Beaver Creek, from the US Sheep Experiment Station to Spencer is in CRA 13.2 *Eastern Idaho Plateaus – Eastern Snake River Basalt Plains*. From Spencer to Old Beaver, Beaver Creek is in CRA 12.2 *Lost River Valley/Mountains – Gneissic – Volcanic Hills*. Beaver Creek, North of Old Beaver to Humprey, is in CRA 43B.1 *Central Rocky Mountains – High Mountains.*

Riparian Assessment and Current Condition
SWC and IASCD staff used the Stream Visual Assessment Protocol (SVAP) and the Streambank Erosion Condition Inventory (SECI) to assess stream and riparian condition in the subbasin. SVAP is a qualitative assessment of the stream's health based on a score from 1 to 10 for most categories, with 1 being poor and 10 being good. Manure presence is scored from 1 to 5. SECI is a qualitative assessment of the potential for streambank erosion and deposition. 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. Higher scores indicate poorer ratings due to greater potential for soil loss.

Riparian conditions on Beaver Creek are overall in poor to good condition with slight erosion. Erosion was moderate on one reach of Beaver Creek. In 2006, SWC and IASCD staff assessed eight reaches (10.6 miles) of Beaver Creek (Tables 8 and 9). Seven of the assessed reaches had slight erosion. Other reaches were not assessed because permission was not granted.

Riparian conditions on Camas Creek are in fair to good condition with slight erosion. In 2007, SWC and IASCD staff assessed three reaches (1.6 miles) of Camas Creek (Tables 8 and 9). The assessed reaches represent one reach on Camas Creek, one reach on West Camas Creek and one reach on East Camas Creek. All of the assessed reaches had slight erosion. Other reaches were not assessed because permission was not granted.

Riparian conditions on Spring Creek are in fair to good condition with slight erosion. In 2007, SWC and IASCD assessed two reaches covering 0.8 miles of Spring Creek (Tables 8 and 9). All of the assessed reaches had slight erosion. Other reaches were not assessed because permission was not granted.

Suggested BMPs
Streambank stabilization and riparian vegetation is needed along portions of Beaver and Camas Creeks. Fencing, prescribed grazing, and use exclusion are practices that may be used to alleviate grazing pressure in riparian areas and to allow for revegetation of areas lacking canopy cover. Sage grouse are a wildlife species of concern which will have to be considered when applying any BMPs in the subbasin.

NRCS practices which are needed for riparian areas in this watershed are: Channel Bank Vegetation (372), Fence (382), Heavy Use Area Protection (561), Prescribed Grazing (528), Riparian Forest Buffer (391), Streambank and Shoreline Protection (580), Channel Stabilization (584), Tree/Shrub Establishment (612), and Use Exclusion (472).

TABLE 8. SECI RESULTS FOR STREAMS IN THE BEAVER-CAMAS SUBBASIN

Beaver-Camas Subbasin-Stream Erosion Condition Inventory (SECI)																
Reach	Length (ft)	Bank Height (ft)	Bulk Density (lbs/ft3)	Bank Erosion	Bank Stability	Bank Cover	Lateral Stability	Channel Bottom	Deposition	Erosion Severity	LRR Index Value	Slight Erosion Length	Moderate Erosion Length	Severe Erosion Length	Lateral Recession Rate (ft/yr)	Erosion Rate (tons/yr)
Camas 1	1,565	4.0	87.0	1	0.5	0	0	0	1	**Slight**	2.5	1,565	0	0	**0.03**	**8**
East Camas	2,884	4.0	87.0	1	0.5	0	0	0	0.5	**Slight**	2.0	2,884	0	0	**0.02**	**10**
West Camas	3,900	3.5	87.0	0.5	0	0	0	0	0.5	**Slight**	1.0	3,900	0	0	**0.01**	**3**
Spring 1	632	2.0	87.0	1	0.5	0	0	0.5	0.5	**Slight**	2.5	632	0	0	**0.03**	**2**
Spring 2	3,756	4.0	87.0	0	0	0	0	0	0.5	**Slight**	0.5	3,756	0	0	**0.00**	**1**
BC1	5,020	2.0	87.0	0	0	0	0	0	0	**Slight**	0.0	5,020	0	0	**0.00**	**0**
BC2	2,993	2.1	87.0	0.5	0.5	0	0.5	2	1	**Slight**	4.5	2,993	0	0	**0.08**	**23**
BC3	8,608	2.0	87.0	1	0.5	0	0.5	0.5	1	**Slight**	3.5	8,608	0	0	**0.05**	**39**
BC5	9,574	3.5	87.0	0	0	0	0	0	0.5	**Slight**	0.5	9,574	0	0	**0.00**	**2**
BC6	4,666	5.5	87.0	0	0	0	0	0	0.5	**Slight**	0.5	4,666	0	0	**0.00**	**2**
BC7	1,624	2.0	87.0	0.5	0.5	0.5	0	0	0.5	**Slight**	2.0	1,624	0	0	**0.02**	**3**
BC8	7,000	2.8	87.0	0.5	1	2	0.5	0	0	**Slight**	4.0	7,000	0	0	**0.07**	**57**
BC9	16,573	7.0	87.0	1	2	2	0	0	0.5	**Moderate**	5.5	0	16573	0	**0.12**	**602**
	13.0		**Percent of stream with a Slight Erosion Problem**						**76%**			**52222**	**16573**	**0**		**750**
			Percent of stream with a Moderate Erosion Problem						**24%**							
			Percent of stream with a Severe Erosion Problem						**0%**							
			Total Percent of Stream assessed						**100%**							

TABLE 9. SVAP RESULTS FOR STREAMS IN THE BEAVER-CAMAS SUBBASIN

Beaver-Camas Subbasin-Stream Visual Assessment Protocol (SVAP)																
Reach	Channel Length (ft)	Channel Condition	Hydrologic Alteration	Riparian Zone	Bank Stability	Water Appearance	Nutrient Enrichment	Fish Barriers	Instream Fish Cover	Pools	Invertebrate Habitat	Canopy Cover	Manure Presence	SVAP Rating	Total Score	Overall Score
Camas 1	1,565	7	8	7	8	10	9	4	10	8	10			**Good**	81.0	8.1
Spring 2	3,756	8	7	8	8	10	10	7	9	8	9		5	**Good**	89.0	8.1
BC5	9,574	10	10	8	10	9	8	10	5	9	7	5	5	**Good**	96.0	8.0
West Camas	3,900	8	8	8	7	10	10	8	8	8	8		5	**Good**	88.0	8.0
BC6	4,666	10	10	8	10	9	7	10	5	9	7	1	5	**Good**	91.0	7.6
BC3	8,608	5	7	9	8	8	9	10	8	8	7	6	4	**Good**	89.0	7.4
East Camas	2,884	8	6	6	6	9	9	7	8	8	8		5	**Fair**	80.0	7.3
BC2	2,993	9	10	9	8	10	9	5	8	3	10	2	3	**Fair**	86.0	7.2
Spring 1	632	6	6	6	6	10	10	3	8	7	10		5	**Fair**	77.0	7.0
BC7	1,624	9	10	2	8	6	7	10	3	3	10	1	5	**Fair**	74.0	6.2
BC1	5,020	6	8	9	10			5	3		3	1	4	**Poor**	49.0	5.4
BC8	7,000	5	2	3	6			1	5		7	2	5	**Poor**	36.0	4.0
BC9	16,573	1	2	1	2			7	2		5	1		**Poor**	21.0	2.6
	13.0	**Total Miles**			Percent of stream in Poor Condition				**42%**		**Average for all reaches**			**Fair**	**73.6**	**6.7**
					Percent of stream in Fair Condition				**12%**							
					Percent of stream in Good Condition				**47%**							
					Percent of stream in Excellent Condition				**0%**							
					Total Percent of Stream assessed				**100%**							

IRRIGATED CROPLAND (SPRINKLER AND SURFACE IRRIGATED)

Cropland Inventory and Evaluation

The subbasin consists of 38, 726 acres of cropland. Sprinkler and surface irrigated cropland exists mainly towards the southern portion of the Lower Beaver Creek and Camas Creek watersheds. A majority of the cropland is in the Camas Creek Wildlife Refuge watershed. Cropland occurs in CRA 11.3 *Snake River Plains-Upper Snake River* and CRA 11.4 *Snake River Plains-Eastern Snake River Basalt Plains*.

Resource Setting

Cultivated cropland is conventionally tilled with a potato/grain rotation. Other commonly raised crops include barley, dry peas, wheat, oats, alfalfa, grass hay, and nursery stock. Elevations are approximately 4,800 feet near the city of Hamer and the Camas National Wildlife Refuge. Most of the irrigated land is situated near the 5,200 foot level, except at Kilgore, which is approximately 6,200 feet. Annual precipitation ranges from 8 to 14 inches.

Cropland Assessment

Cropland assessments were not conducted by SWC for this subbasin.

Current Condition

A large majority of the cropland is located in the southern portion of the subbasin, near Hamer and the Camas National Wildlife Refuge. In the Camas National Wildlife Refuge, small grain crops are grown for wildlife and haying and prescribed fires are used for management purposes. The southern part of the subbasin consists of lava fields and lava flows of basalt covered by eolian sands and loess deposits. The subbasin soils are well-drained soils that formed in mixed alluvium on stream terraces. The soils are medium and coarse textured and usually effervescent with reaction to acid. Carbonates are present at the surface and extend through the subsoil. Soil series consist of Idmonton, Kilgore, Alex, Malm, Matheson, Hagenbarth, Crabcreek, and Richvale; ranging from 0 to 12 percent slopes.

It is very difficult to give a generalized estimate on erosion hazards. Soil ratings in this area may have slight to very severe erosion potential. Factors such as slope and depth to bedrock vary greatly with soils within these map units. The land capability classes of the dominant soils are 4c, 4e, 5w, and 6e. The available water holding capacity ranges from 0.03 to 0.21 inches of water per inch of soil for the major soil types in this area.

Suggested BMPs

NRCS practices which are needed for cropland areas in this watershed are Irrigation Water Management (449), Nutrient Management (590), Pest Management (595), Structure for Water Control (587), Surface Roughening (609), and Upland Wildlife Habitat Management (645).

RANGELAND

Rangeland Inventory and Evaluation

The subbasin contains 133,454 acres of private rangeland. Rangeland and adjacent riparian corridors are grazed predominantly by cattle and sheep. A significant portion of the Beaver Creek drainage near Dubois is owned and operated by the U.S. Sheep Experiment Station (USSES). Planned grazing systems commonly include rest and rotation, livestock water pipelines, and livestock watering tanks, and fencing. The area east of Dubois provides winter

habitat for migrating herds of antelope, deer, elk, and moose. Additionally, the area has one of the largest populations of sage grouse in the State of Idaho.

Resource Setting
Rangeland occurs throughout the subbasin. Elevations typically range from 5,000 to 7,200 feet, but livestock grazing does occur at lower elevations along stream corridors. Annual precipitation ranges from 12 to 24 inches. Most of the soils have 0 to12 % slopes. Soil rating in this area may be from slight to very severe erosion potential.

Rangeland Assessment
SWC and IASCD personnel utilized the Rangeland WQI, on about 25% or 30,000 acres of the total private rangeland in the subbasin. Rangeland Water Quality Indicators was 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.

Current Condition
Most of the rangeland is on public lands in the subbasin. Only one-fifth of the total rangeland is located on private land. Typically, these private rangelands are in fair to good condition. Some areas have sheet and rill erosion with gullies in fine, granular, potentially erodible soils. Runoff potential is moderate on slight to moderate sloping topography with normal snowmelt or intense rainfall events. Typically there is a 10 to 30 foot buffer of vegetation along the creek or water ways. There is about 60% to 80% cover with some bare areas, typically when animals exceed carrying capacity about a quarter of the grazing season. Some watering facilities are located away from creeks but watering sources are generally lacking throughout the private rangelands. Overgrazing tends to occur in proximity to watering sources which can indicate poor distribution of grazing animals. These rangelands are generally grazed in conjunction with public land allotments and lack adequate fencing.

Suggested BMPs
Livestock water is a major need throughout the subbasin on private rangeland. Along with planned grazing and facilitating practices including; fencing, stream crossings, range planting, brush and pest management. Sage grouse are a wildlife species of concern which will have to be considered when applying any rangeland or riparian BMPs in the subbasin.

NRCS practices which are needed on the rangeland in this watershed 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).

PASTURE AND HAYLAND

Pasture and Hayland Inventory and Evaluation
Pasture and hayland is scattered throughout the subbasin and in every CRA. The subbasin contains 64,541 acres of private pasture and hayland. Pasture and hayland is the second largest private land use in the subbasin with almost a one-tenth 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. Hayland plants consist of grain and alfalfa hay grown in rotation. Erosion potential varies from slight to severe. Slope and depth to bedrock vary greatly. Pasture and hayland occurs in the CRA 11.3 *Snake River Plains-Upper Snake River,* CRA 11.4 *Snake River Plains-Eastern Snake River Basalt Plains,* CRA 13.2 *Eastern Idaho Plateaus – Snake River Basalt Plains Common Resource Area,* CRA 12.2 *Lost River Valley/Mountains – Dry Gneissic – Volcanic Hills Common Resource Area,* and CRA 43B.1 *Central Rocky Mountains – High Mountains Common Resource Area*.

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. Most of the pasture and hayland occurs in the lower portion of the subbasin where annual precipitation ranges from 8 to 14 inches, and the growing season is relatively short, ranging from 50 to 100 days. Elevations range from 4,800 to 5,200 feet. Irrigation water is diverted from streams and distributed by ditches and then returns to the streams contributing to elevated stream temperatures. Soils vary from silty loams to gravelly sands, with 1% to 5% slopes. Non-irrigated pastures are managed for forage production and season long grazing. 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, orchardgrass, sanfoin, clovers, and alfalfa. Invasive weeds typically are a concern. Livestock water is generally inadequate and often includes free access to creeks or ditches.

Pasture and Hayland Assessment

SWC and IASCD field staff used the NRCS' Pasture Condition Scoresheet (NRCS, 2008 and NRCS, 2001) on about one-fifth or 4,000 acres of the private pasture and hayland in the Camas Creek watershed. 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 the 6 factors affecting plant vigor.

Current Condition

Pasture and haylands include non-irrigated and irrigated pastures and meadows located mainly in valley bottoms. Typically, these pasture and haylands are in fair to good condition. Some areas have slight sheet and rill erosion in fine, granular, potentially erodible soils. Runoff potential is slight on slight to moderate sloping topography with normal snowmelt, intense rainfall events, or flood irrigation. Typically there is a 10 to 30 foot buffer of vegetation along the creek and less than 10 foot buffer along irrigation ditches. There is about 70% to 90% cover with few bare areas and some weeds or undesirable species present. Typically, these lands are cut for meadow hay and grazed in the fall. Some non-irrigated pastures are used for summer grazing. Some watering facilities are located away from creeks but watering sources are generally lacking throughout the private rangelands. Overgrazing tends to occur at livestock water access areas along creeks and ditches. Pasture and hayland has the most impact on water quality because of its proximity to creeks, irrigation ditches, and irrigation water return flows.

Suggested BMPs on Pasture and Hayland

NRCS practices which are needed on pasture and hayland are: 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), Pipeline (516), Forage Harvest Management (511), Fence (382), Prescribed Grazing (528), Water Well (642), Pumping Plant (533), Pest Management (595), Heavy Use Area Protection (561), Nutrient Management (590), and Watering Facility (614).

ANIMAL FEEDING OPERATIONS (AFOS)

In 2000, the Idaho Legislature passed Idaho law, I.C. §22-4906, Title 22, Chapter 49, Beef Cattle Environmental Control Act. Beef cattle AFOs are required to submit a nutrient management plan to the Idaho State Department of Agriculture (ISDA) for approval no later than January 1, 2005 (http://www.agri.state.id.us/Categories/Animals/cattleFeedlots/indexcattlefeedlots.php.) For more information regarding dairy farm requirements, please refer to Title 25, Chapter 38, Idaho Code (http://www.agri.state.id.us/Categories/Animals/Dairy/indexdairyMain.php).

In 2006, ISDA and IASCD conducted an inventory of AFOs in the subbasin. Eleven animal feed operations and two dairies were found in the subbasin. Only one AFO needs to be addressed while the other ten are in compliance with ISDA regulations and have approved nutrient management plans.

INVASIVE SPECIES

Aquatic and terrestrial noxious weeds that may exist in Clark, Fremont, and Jefferson 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, Canada thistle, dalmatian toadflax, diffuse knapweed, dyer's woad, field bindweed, giant hogweed, houndstongue, johnsongrass, leafy spurge, musk thistle, oxeye daisy, pepperweed, sowthistle, poison hemlock, purple loosestrife, Russian knapweed, scotch thistle, spotted knapweed, whitetop, and yellow toadflax.

THREATENED AND ENDANGERED SPECIES

Threatened and endangered species that may be found in the subbasin are lynx, *Lynx canadensis*, and the bald eagle, *Haliaeetus leucocephalus* (http://fishandgame.idaho.gov/cdc/t&e.cfm). Threatened and endangered species will be considered during site-specific planning, during implementation of BMPs with individual landowners and operators, and in an effort to benefit species in a project area. Future projects will potentially be funded using Partners for Wildlife, Farm Bill, and state cost share programs. Technical assistance will be provided by the NRCS, SWC, IASCD, and ISDA.

Conservation planning will be coordinated with other species recovery and protection efforts in the subbasin to improve listed species' habitats and address any potential impacts from BMP implementation. Improvements in water quality, achieved from BMPs, are not expected to adversely affect these species and should improve or enhance their habitat. Any planned BMP that will affect these 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). There are several freshwater emergent wetlands at the northern end of the subbasin near the cities of Humphrey and Spencer. Freshwater forested/shrub wetlands occur along Pleasant Valley Creek. Other wetlands are likely to occur in the subbasin, but the data is not available online. The Camas Creek National Wildlife Refuge is a large wetland complex containing freshwater emergent wetlands surrounding lakes and ponds. It was established in 1937 as a national wildlife refuge and is administered by the U.S. Fish and Wildlife Service (http://www.fws.gov/wetlands/Data/Mapper.html, http://www.fws.gov/refuges).

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. The subbasin consists of approximately 248,214 acres of private land with the predominant private land uses being cropland (38,726 acres), grass/pasture/hay (64,541 acres), and rangeland (133,454 acres). Critical areas in this plan are cropland, pastureland, rangeland, and riparian areas adjacent to Beaver and Camas Creeks and their tributaries, which may serve as a direct pathway for nutrient, sediment, and temperature loading into these creeks. Because temperature TMDLs have been completed for Beaver, Camas, Dairy, East Fork Camas, Modoc, Threemile, and the West Fork Camas Creeks; BMPs applied to riparian areas will focus on decreasing temperature loading and increasing canopy cover.

TREATMENT UNITS (TU)

Treatment units for the subbasin are based on soil type, physical characteristics, stream assessments, existing irrigation practices, and water quality monitoring conducted by DEQ, IASCD, and ISDA (Table 10). The Beaver-Camas Creek subbasin can be broken into four treatment units: 1) Unstable and Erosive Streambanks/Riparian Areas, 2) Irrigated Cropland, 3) Grass/Pasture/Hayland, and 4) Rangeland. 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.

The riparian treatment unit was delineated as two times an average channel width (to approximate a buffer of one channel width on each side of the stream) based on the recommendation of SVAP protocol. The critical acres were calculated in ArcGIS by selecting water quality impaired streams from the DEQ stream layer and then adding a sixty foot buffer width around the listed streams.

The rangeland, grass/pasture/hayland, and cropland critical acres were calculated in ArcGIS by selecting only private lands and then removing lands that were treated with BMPs, such as pasture/hay lands enrolled in the NRCS's Conservation Security Program CRP program. These lands are known to be in good condition and were therefore excluded from the estimate of critical pasture/hay lands acres.

ArcView GIS 9.3 software, NAIP imagery, topographic maps, land use/land cover, land ownership, field investigations, previously treated areas, and cropland units were used to delineate treatment units and critical acres. The USDA Farm Service Agency's crop land unit (CLU) layer was used as a guide where appropriate.

RECOMMENDED BMPS AND ESTIMATED COSTS

There are several BMPs that may be applied to the above described treatment units to improve water quality. 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 estimate of quantities of each BMP recommended to install will be determined at the time of conservation planning for a particular landowner.

TABLE 10. TREATMENT UNITS IN THE BEAVER-CAMAS SUBBASIN

Treatment Unit # 1	Riparian Areas-0 to 20% slopes, 5,000 to 6,500 feet elevation 80 to 115 frost-free days		
Acres	Soils	Resource Problems	Critical Acres
13,769	Bank material comprised of silt, sand, or clay loam Deep to shallow soils Substrate of cobbles/boulders	high potential for soil erosion by wind unstable streambanks loss of riparian vegetation (native vegetation) inadequate habitat for fish and wildlife surface water pollutants (sediment and temperature)	1,197
Treatment Unit # 2	Irrigated Cropland-0 to 12% slopes, generally 5,000 feet elevation, daily maximum/minimum temp. 85-87/7-9°F, average precipitation from 10 to 30 inches, 120 to 160 frost-free days		
Acres	Soils	Resource Problems	Critical Acres
38,726	Sandy loam and/or clay loam Deep and well-drained soil, lake bed material	high potential for soil erosion by wind soil condition (depletion of organic matter) groundwater pollutants (nutrients and pesticides) aquifer overdraft inefficient use of irrigation water	38,041
Treatment Unit # 3	Grass, Pasture, and Hayland 0-5% slopes, 5,000 to 7,500 feet elevation, daily maximum/minimum temp. 79-85/3-7°F, average precipitation from 6 to >16 inches, 50 to 170 frost-free days		
Acres	Soils	Resource Problems	Critical Acres
64,541	Mostly >50% gravelly loam 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 plants not adapted or suited plant establishment and growth inadequate quantity/quality of feed/forage for domestic animals inadequate domestic stock water	62,384
Treatment Unit # 4	Rangeland 5-60% slopes, 6,500 to 7,500 feet elevation, daily maximum/minimum temp. 79-85/7°F average precipitation from 6 to >16 inches, 50 to 170 frost-free days		
Acres	Soils	Resource Problems	Critical Acres
133,454	Mostly >50% gravelly loam 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 plants not adapted or suited plant establishment and growth inadequate quantity/quality of feed/forage for domestic animals inadequate domestic stock water habitat fragmentation declining wildlife species inadequate wildlife cover, shelter, and water	123,625

TABLE 11. RECOMMENDED BMPS AND ESTIMATED COSTS

Treatment Unit	Practice Name	Unit	Cost	Amount	Cost	Cost-Share	TOTAL
Stream Channels & Riparian	Channel Vegetation	acre	$3,000	40	$90,000	$30,000	$120,000
	Fence, Jack	foot	$5.75	43,000	$185,438	$61,813	$247,250
	Fence, 4-wire	foot	$2.00	43,000	$64,500	$21,500	$86,000
	Heavy Use Area Protection	acre	$15,000	5	$56,250	$18,750	$75,000
	Prescribed Grazing	acre	$2.00	2,000	$3,000	$1,000	$4,000
	Riparian Forest Buffer	tree	$5.35	5,000	$20,063	$6,688	$26,750
	Stream Bank Protection	foot	$3.00	17,000	$38,250	$12,750	$51,000
	Stream Channel Stabilization	foot	$75	900	$50,625	$16,875	$67,500
	Tree/Shrub Establishment	acre	$290	40	$8,700	$2,900	$11,600
	Use Exclusion	acre	$35	200	$5,250	$1,750	$7,000
				Subtotal	$522,075	$174,025	$696,100
Grass, Pasture, and Hayland Irrigated	Irrigation System	acre	$700	5,200	$1,820,000	$1,820,000	$3,640,000
	Pest Management	acre	$30.00	10,400	$234,000	$78,000	$312,000
	Upland Wildlife Habitat Mgmt	acre	$5.00	500	$1,875	$625	$2,500
	Irrigation Water Management	acre	$5.00	5,200	$13,000	$13,000	$26,000
	Nutrient Management	acre	$2.50	1,000	$1,875	$625	$2,500
	Pasture & Hayland Planting	acre	$100	2,600	$130,000	$130,000	$260,000
	Structure for Water Control	each	$1,100	20	$11,000	$11,000	$22,000
	Prescribed Grazing	acre	$2.00	5,200	$7,800	$2,600	$10,400
				Subtotal	$2,219,550	$2,055,850	$4,275,400
Row Crop Grain Crop Sprinkler Irrigated	Structure for Water Control	each	$3,900	20	$58,500	$19,500	$78,000
	Irrigation Water Management	acre	$5.00	3,800	$9,500	$9,500	$19,000
	Nutrient Management	acre	$2.50	1,900	$3,563	$1,188	$4,750
	Pest Management	acre	$30.00	7,600	$171,000	$57,000	$228,000
	Residue Management	acre	$30.00	3,800	$114,000	$0	$114,000
	Surface Roughening	acre	$7.50	3,800	$28,500	$0	$28,500
	Upland Wildlife Habitat Mgmt	acre	$5.00	380	$1,425	$475	$1,900
				Subtotal	$354,088	$94,263	$448,350
Range Lands	Fence, 4-wire	foot	$2.00	450,000	$675,000	$225,000	$900,000
	Pipeline, PE 100 psi, 2.0"	foot	$2.59	482,000	$936,285	$312,095	$1,248,380
	Prescribed Grazing	acre	$2.00	13,300	$19,950	$6,650	$26,600
	Spring Development	each	$2,350	18	$31,725	$10,575	$42,300
	Watering Facility, Trough	each	$1,330	91	$90,773	$30,258	$121,030
	Brush Management	acre	$30.00	1330	$29,925	$9,975	$39,900
	Upland Wildlife Habitat Mgmt	acre	$5.00	6600	$24,750	$8,250	$33,000
	Water Well	feet	$40.00	2000	$60,000	$20,000	$80,000
				Subtotal	$1,868,408	$622,803	$2,491,210
AFOs	Corral Berm, Earthen Fill	yd^3	$10.00	4,100	$30,750	$10,250	$41,000
	Nutrient Management	acre	$2.50	125	$234	$78	$313
	Waste Storage Facility	yd^3	$400	150	$22,500	$7,500	$30,000
	Fence, Corral	foot	$15.00	3,000	$33,750	$11,250	$45,000
	Pipeline, PE 100 psi, 2.0"	foot	$2.59	1,100	$2,137	$712	$2,849
	Watering Facility, Trough	each	$1,800	4	$5,400	$1,800	$7,200
	Water Well	foot	$40.00	150	$4,500	$1,500	$6,000
				Subtotal	$106,771	$35,590	$142,362
				Total	$4,716,804	$2,888,268	$7,605,072

TREATMENT ALTERNATIVES

Implementation of BMPS will involve ongoing cooperation with the Clark SCD, Yellowstone SCD, and Jefferson SWCD to evaluate alternatives and carry out implementation. The chosen treatment alternative is alternative # 4.

Describe alternatives (examples):
1. no action
2. implement all recommended BMPs per Table 12.
3. implement BMPs for only one treatment unit
4. implement BMPs based on available funding and landowner interest

RECOMMENDED PRIORITIES FOR BMP IMPLEMENTATION

Table 12 lists the watersheds prioritized for treatment and the rationale for their prioritization. Watersheds in the Beaver-Camas Creek subbasin were ranked using TMDLs reductions, field evaluation and inventory, streambank stability, and water quality data. According to this ranking, Camas Creek and Beaver Creek are the highest priority watersheds for implementation of BMPs.

TABLE 12. PRIORITY FOR BMP IMPLEMENTATION

Priority Ranking	Watershed	TMDL Reduction Required	Rationale
1	Camas Creek	73% sediment 20% temperature	Sediment criteria exceeded; flow altered; impacts to riparian area from riparian pastureland, livestock grazing, and irrigated cropland adjacent to the stream; nitrate priority area near the mouth; predominantly private land
2	Beaver Creek	18% temperature	Topography of the canyon limits riparian corridor width, sediment and bacteria criteria exceeded; TMDL developed for temperature; flow altered; impacts to riparian area from riparian pastureland, livestock grazing, and irrigated cropland adjacent to the stream; predominantly private land
3	West Fork Camas Creek	35 % temperature	Sediment criteria exceeded, TMDL developed for temperature, federal and private land
4	East Fork Camas Creek	21% temperature	Bacteria criteria exceeded, TMDL developed for temperature, federal and private land
5	Threemile Creek	39 % temperature	Bacteria criteria exceeded, TMDL developed for temperature, predominant land use consists of rangeland (livestock impacts), federal and private land
6	Modoc Creek	44% temperature	Predominant land use consists of rangeland (livestock impacts), federal and private land
7	Dairy Creek	15% temperature	Bacteria criteria exceeded, predominant land use consists of rangeland (livestock impacts), federal land

FUNDING

Financial and technical assistance for installation of BMPs is needed to ensure success of this implementation plan. The Clark SCD, Yellowstone SCD, and Jefferson SWCD will actively pursue multiple potential funding sources to implement water quality improvements on private agricultural and grazing lands. Many of these programs can be used in combination with each other to implement BMPs. These sources include (but are not limited to):

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

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

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

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

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

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

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

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

Environmental Quality Incentives Program (EQIP): EQIP offers cost-share and incentive payments and technical help to assist eligible participants in installing or implementing structural

and management practices on eligible agricultural land.
http://www.nrcs.usda.gov/programs/eqip/

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

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

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

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

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

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

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

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

OUTREACH

Conservation partners in the Beaver Camas subbasin will use their combined resources to provide information about BMPs to improve water quality to agricultural landowners and operators within this 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.

MONITORING

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 SWC Field Guide for Evaluating BMP Effectiveness.

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

WATERSHED LEVEL

At the watershed level, there are many governmental and private groups involved with water quality monitoring. The Idaho Department of Environmental Quality uses the Beneficial Use Reconnaissance Protocol (BURP) to collect and measure key water quality variables that aid in determining the beneficial use support status of Idaho's water bodies. The determination will tell if a water body is in compliance with water quality standards and criteria. In addition, DEQ 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, SWC developed a software program to track the costs and other details of each BMP installed. This program can show what has been installed by project, by watershed level, by sub-basin level, and by state level. These project and program reviews will insure that TMDL implementation remains on schedule and on target. Monitoring BMPs and projects will be the key to a successful application of the adaptive watershed planning and implementation process.

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