Bear Lake Subbasin

TMDL Implementation Plan

for Agriculture

Developed for the Idaho Department of Environmental Quality

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In Cooperation With: Bear Lake SWCD & Caribou SCD

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ACKNOWLEDGEMENTS

Writing a TMDL Implementation Plan requires the time and cooperation of many people working together and brainstorming ideas to make each individual plan become as effective as possible.

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INTRODUCTION

This TMDL Implementation plan was written for the Idaho Department of Environmental Quality (IDEQ), the Bear Lake Soil & Water Conservation District (BLSWCD), and the Caribou Soil Conservation District (CSCD). The Idaho Soil Conservation Commission (ISCC), along with Idaho Association of Soil Conservation Districts (IASCD), contacted different landowners as well as the Soil and Water Conservation District's to aid in the writing of the Bear Lake TMDL Implementation plan.

This agriculture implementation plan will provide guidance to the Bear Lake and Caribou Soil and Water Conservation Districts and agricultural producers in Bear Lake subbasin. It will also identify BMPs necessary to meet the requirements of the TMDLs on §303(d) listed streams.

PURPOSE

The Bear Lake Subbasin Total Maximum Daily Load (TMDL) Implementation Plan for Agriculture outlines an adaptive management approach for implementation of Best Management Practices (BMPs) and Resource Management Systems (RMS) on agricultural lands to meet the requirements of the Bear River TMDL. Implementation will be a phased approach due to the size and complexity of the subbasin. This plan recommends BMPs needed to meet TMDL targets in the Bear Lake subbasin, and suggests alternatives for reducing surface and groundwater quality problems from agricultural related activities.

GOALS AND OBJECTIVES

The goal of this plan is to provide a strategy for agriculture to assist and/or complement other watershed efforts in restoring beneficial uses for water quality impaired streams in the Bear Lake subbasin. These water quality impaired stream segments are identified in the Idaho Department of Environmental Quality 1998 §303(d) list for the Bear Lake subbasin. Table 1 gives a summary of the §303(d) listed streams. North Creek and St. Charles Creek were considered by Idaho Department of Environmental Quality after BURP assessment to meet beneficial uses. Therefore, this plan will not address implementation strategies concerning North Creek or St. Charles Creek. However, both streams will be included periodically in the document for information purposes. Figure 1 is a map indicating the location of §303(d) listed streams relative to the Bear Lake subbasin.

The objective of this plan is to reduce the amount of sediment, phosphorous, and nitrogen entering both surface and groundwater from agricultural-related practices. Agricultural pollutant reductions will be achieved by on-farm conservation planning with individual operators and application of BMPs in agricultural critical areas. The implementation of Resource Management Systems (RMS) will provide quality assurance for phased approaches of BMP implementation.

Table 1. 1998 §303(d) Listed Stream Segments in the Bear Lake Subbasin

Subbasin	Stream Name	Listed Pollutants
16010201	Alexander Reservoir	Sediment
16010201	Bear River	Sediment & Nutrients
16010201	Co-Op Creek	Sediment & Nutrients
16010201	Ovid Creek	Sediment
16010201	Pearl Creek	Sediment & Nutrients
16010201	Saint Charles Creek	Sediment & Nutrients

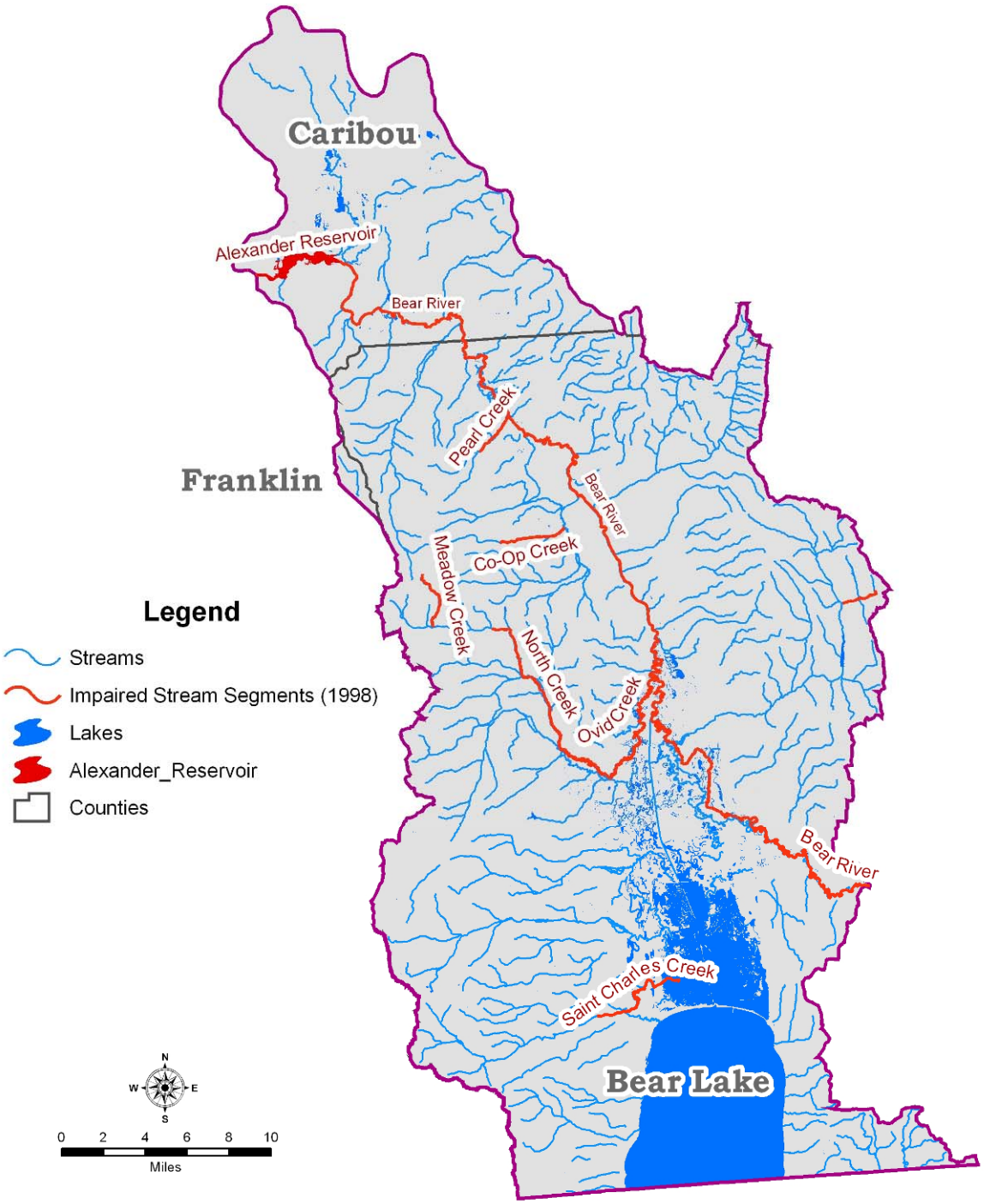

Figure 1. Impaired Streams in the Bear Lake Subbasin.

BACKGROUND

PROJECT SETTING

The Bear Lake subbasin is located in the south east corner of the state of Idaho (Figure 2). It is bounded on the north and west by Alexander Reservoir and the Bear River Range. The subbasin is bounded on the east by two different ranges, the Aspen Range (setting to the northeast) and the Preuss Range and the Bear Lake Plateau (located along the southeast). The southern boundary of the Idaho portion of the Bear Lake subbasin is the Utah border.

The Bear Lake subbasin encompasses 642,359 acres. Elevations stretch from 5,720 ft at Alexander Dam to 9,682 ft at Sherman Peak. The climate in the subbasin usually consists of long cold winters and hot dry summers. The subbasin receives approximately 23 inches of precipitation in the higher elevations. In the lower elevations precipitation is 12 inches or less, with most of the precipitation occurring during the winter months in the form of snow followed by summer thunderstorms. The growing season in the subbasin is generally 80 to 120 days with the possibility of periodic frost in between. Typical soils in the area consist of silt-loam. Many different types of wildlife can be found in the area consisting of deer, elk, and moose. The area is rich with various types of waterfowl as well.

The common ecosystems in the subbasin consist of native species such as bluebunch wheatgrass, Idaho fescue, and native shrubs and trees which are commonly found at higher elevations along mountain sides. Timothy, smooth brome, reed canarygrass, creeping meadow foxtail, orchardgrass, clover, sedges, rushes and a variety of other herbaceous and woody species are typically found at lower elevations.

SUBWATERSHEDS

This agriculture TMDL implementation plan for the Bear Lake Subbasin will be divided into 6 subwatersheds. Each of these subwatersheds will be planned around each 303d listed stream segment. Thus the subwatershed and the stream have the same name; this will simplify the planning for each stream. It will also allow for planning and implementation to be documented and associated with a particular stream.

Figure 2. Bear Lake Subbasin

GROUND WATER AND SURFACE PROTECTION AREA

Figure 3 shows the ground and surface water protection areas. All of the streams that fall into the impaired category are outlined in red to show their location in the subbasin. The map also shows a nitrate priority area stretching through the Northern Middle Bear subbasin. Finally, the map also indicates a groundwater management area.

LAND OWNERSHIP

The Bear Lake subbasin covers approximately 642,359 acres. Alfalfa and wild meadow hay (meadow hay generally cut for first crop hay, and then grazed after it has the opportunity to re-establish itself), account for the majority of crops grown on private land in the subbasin.

Private land accounts for 55% of the total acres or approximately 354,612 acres in the Bear Lake subbasin. The second largest land manager, accounting for 35% of the subbasin, is the Caribou Targhee National Forrest (CTNF). 5% of the land in the subbasin is controlled by the Bureau of Land Management (BLM). Finally, the remaining 5% of land is broken out into two parts with 3% being controlled by the United States Fish and Wildlife Services (USFWS) and the remaining 2% being controlled by the State of Idaho (Table 2). Figure 4 is a map indicating land ownership within the subbasin.

Table 2. Land Ownership in the Bear Lake Subbasin

Land Owner	Acres	% of Subbasin
Private	354,612	55%
BLM	32,649	5%
USFWS	16,932	3%
USFS	223,564	35%
State	14,602	2%
TOTAL	642,359	100%

LAND USE

There are five major land uses within the Bear Lake subbasin. The land uses in the Bear Lake subbasin are cropland, rangeland, reservoirs, urban/roads, and streams (Figure 5). Table 3 shows a breakdown of each land use and the percentage of the subbasin which each use occupies.

Table 3. Private Land Use in the Bear Lake Subbasin

Land Use Category	Acres	% of Subbasin
Cropland (Row Crop, Grain Crop, Grass/Pasture/Hay)	183,275	27 %
Rangeland (Shrub/Range, Forest)	144,061	21 %
Reservoirs (Water/Wetlands/Developed/Barren)	36,064	5 %
Streams (Water/Wetlands/Developed/Barren)	3,195	1 %
Urban/Roads (Water/Wetlands/Developed/Barren)	22,408	3 %
TOTAL:	389,003	57 %

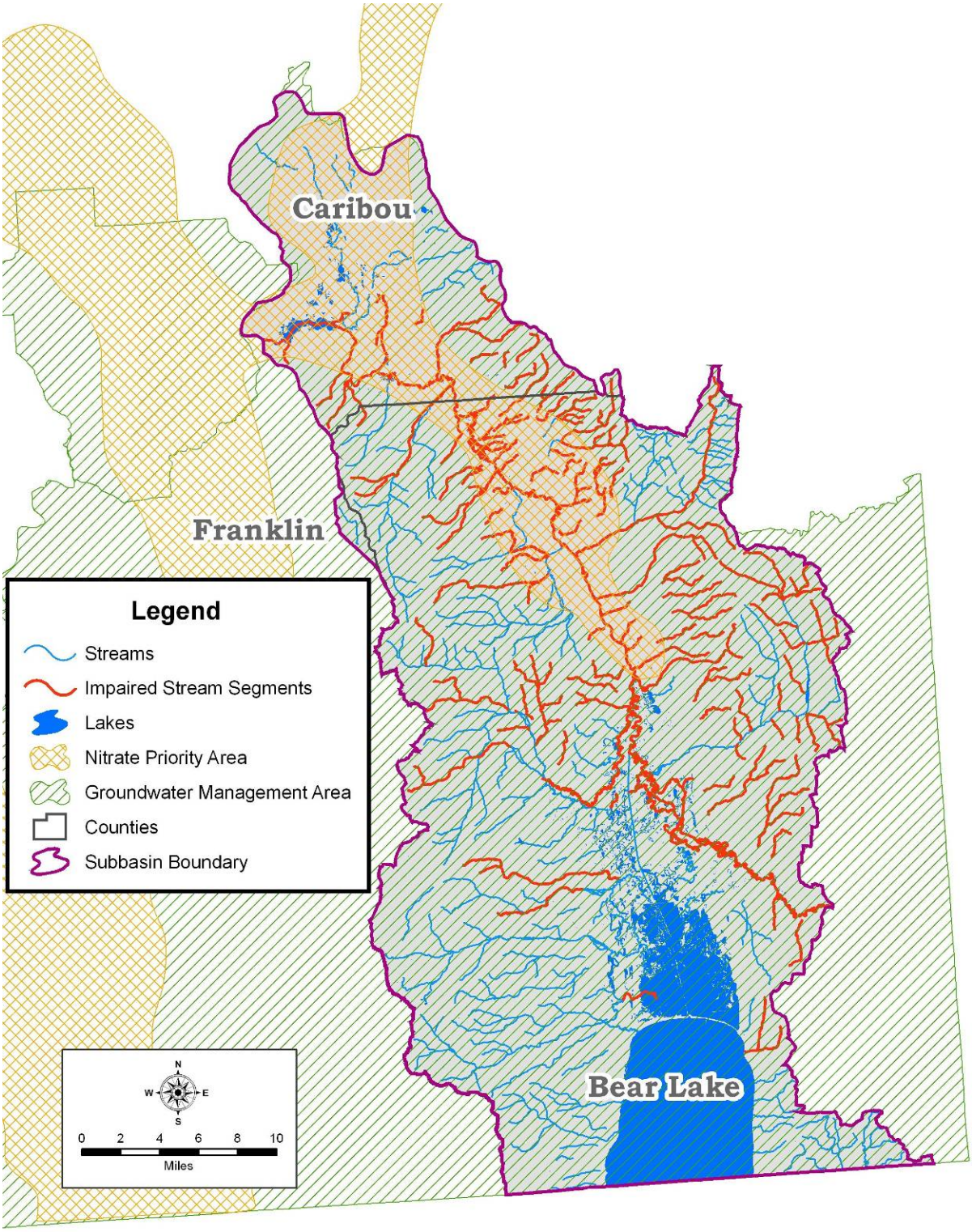

Figure 3. Bear Lake Subbasin Surface and Groundwater Protection Areas

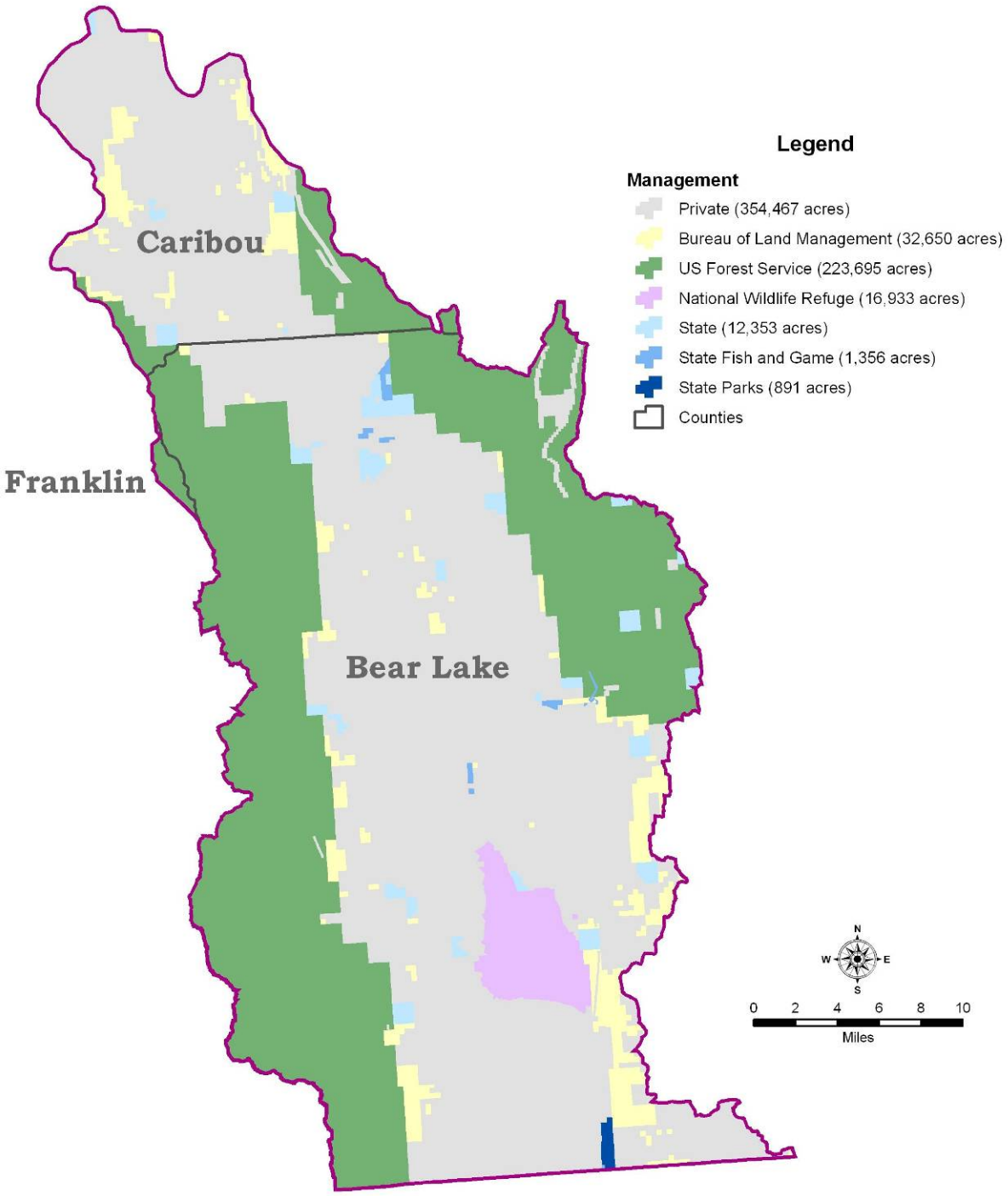

Figure 4. Land Ownership in the Bear Lake Subbasin.

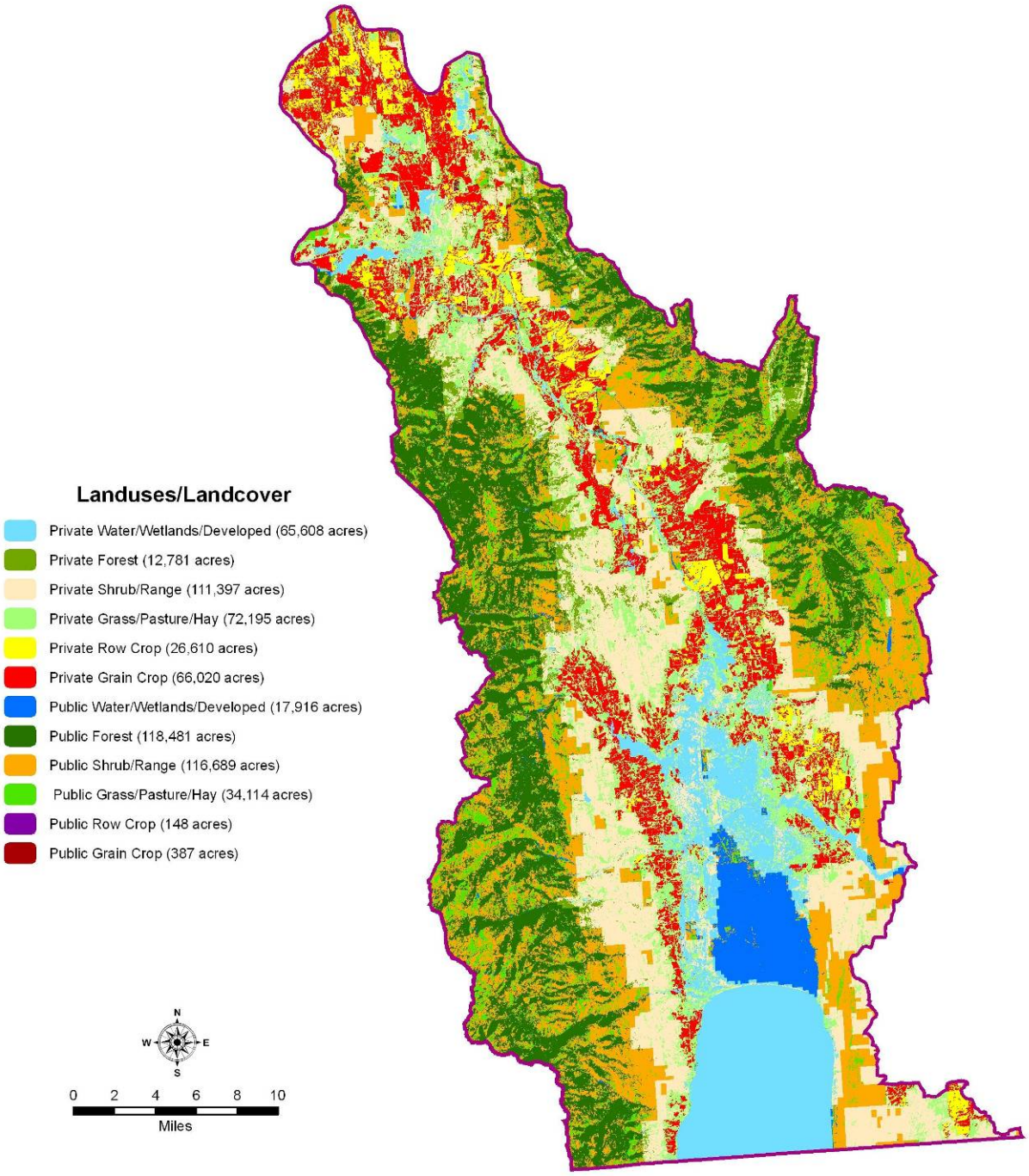

Figure 5. Land Use in the Bear River Subbasin

ACCOMPLISHMENTS

Table 4 summarizes the practices completed to date to reduce impacts to water quality from agricultural lands in the subbasin. Past implementation efforts or BMPs installed are described below.

Table 4. Completed Agricultural Conservation Practices in the Bear Lake Subbasin.

Program	BMP	Amount	Units	Cost
EQIP	Brush Management	465	Ac.	$4,065
EQIP	Conservation Cover	14894	Ac.	$848,958
EQIP	Fence	55652	Ft	$96,277
EQIP/WHIP	Forage Harvest Management	1497	Ac.	
EQIP	Irrigation Regulation Reservoir	1	Ea	
EQIP	Irrigation System Sprinkler	947	Ac	$217,810
EQIP	Irrigation water Conveyance	40352	Ft	$56,493
EQIP	Irrigation Water Management	569	Ac	$2,845
EQIP	Nutrient Management	1800	Ac	$9,000
EQIP	Pasture and Hay Planting	75	Ac	$9,150
EQIP	Pest Management	8944	Ac	$268,320
EQIP	Pipeline	43262	Ft	$81,333
EQIP	Prescribed Grazing	9921	Ac	$49,605
EQIP	Pumping Plant	6	Ea	$720
EQIP/WHIP	Spring Development	11	Ea	$19,800
EQIP	Structure for Water Control	16	Ft	$1,040
WHIP	Upland Wildlife Habitat Management	12175	Ac	$121,750
EQIPWHIP	Use Exclusion	3811	Ac	$129,574
EQIP	Water Well	2	Ea	$18,000
EQIP	Watering Facility	44	Ea	$42,020
EQIP/WHIP	Windbreak/Shelterbelt	2385	Ft	$1,789

OVID FISH STRUCTURE

Reestablishing connectivity in the Bear Lake subbasin has become a major focus of stream restoration efforts and is especially important for migratory populations in which individuals require different habitats at different life stages. Adult feeding and over wintering habitats in the Bear River are many miles from spawning, and juvenile rearing habitats in headwater tributaries. Large main stem fish contribute much of the reproduction throughout the system.

Historically, those fish spawned in upper Ovid Creek. A few large migratory fish continue to show up in Ovid Creek especially during good water years. However, those fish face a gauntlet of diversion dams and irrigation canals when they turn around and try to return to the Bear River. In fact, some studies indicate that up to 30% of post-spawn adults in Bear River tributaries are ultimately trapped and killed in irrigation canals as they attempt to return to main stem habitats.

The Ovid Irrigation Diversion on North Creek in Bear Lake County, Idaho appeared to have a significant negative impact on BCT populations in Ovid Creek. Local landowners and irrigators witnessed large numbers of fish trapped in the irrigation canal, and, on one occasion, a large fish actually managed to block a pipe and interfere with irrigation water delivery. All project partners recognized the benefits to be gained from the Ovid project and decided to move forward with screening the ditch and improving the diversion structure (IDFG, 2007).

BEAR LAKE SWCD 319

The setting of this project is located on the main stem of the Bear River in the Bear Lake subbasin. The project involved streambank stabilization, and covered an area of approximately 1000 ft. The top of the bank was pulled back and the steep banks were sloped at 2 to 1. The bank was then planted with willows and covered with rock rip rap to prevent further erosion and to reestablish the riparian section on this stretch of the river. Along with the rip rap and the willow plantings on this reach, four barbs were installed to help direct and focus the energy of Bear River back to the center rather than punishing the bank. The Bear Lake Commission also participated in a stream bank stabilization project upstream about a ¼ mile. The project was very similar to the Bear Lake SWCD 319 project, and it entailed planting willows on 2 to 1 sloped banks, and then placing rocks on top of the willows and the bank to prevent further erosion and to provide an opportunity for the willows and the riparian area to reestablish.

DINGLE ANIMAL FEED OPERATION 319

The Dingle AFO project involves two landowners who have committed to restrict livestock access to impaired streams in the Bear Lake subbasin. The project requires both landowners to install off-site watering systems for cattle and includes fencing the livestock off the streams. The ranches are also removing old corrals and barns from off the edge of the stream to allow riparian areas to reestablish and to limit erosion of stream banks. The Dingle AFO project is currently being implemented and is planned for completion in summer of 2008.

Conservation Reserve Program (CRP)

CRP accounts for 16,010 acres in the Bear Lake subbasin. Throughout the ten year life of CRP contracts approximately $9,077,670 is issued to landowners in the subbasin for CRP. CRP land serves as habitat for wildlife and many different species of birds. CRP also offers a constant ground cover, therefore reducing the amount of soil that is lost to erosion. CRP has proven throughout the years to be one of the best and most effective BMPs.

WATER QUALITY PROBLEMS

BENEFITIAL USE STATUS

Table 5 is a list of the impaired streams in the Bear Lake subbasin and their beneficial uses.

Table 5. Beneficial uses for 303(d) listed stream segments in the Subbasin.

Water Body	Boundaries	WQLS #	Beneficial Uses
Alexander Reservoir	No Designated Boundaries	2252	CWAL, SS, PCR, AWS, IWS, WH, A
Bear River	Wardboro to Alexander Reservoir	2253	CWAL, SS, PCR, AWS, IWS, WH, A
Co-op Creek	Forest Service Boundary to Stauffer Creek	2259	CWAL, SS, SCR, AWS, IWS, WH, A
St. Charles Creek	IDL boundary to Refuge	2268	CWAL, SS, SCR, AWS, IWS, WH, A
North Creek	3.2 km below Mill Hollow to Ovid Creek	5251	CWAL, SCR, AWS, IWS, WH, A
Ovid Creek	Confluence of North and Mill Creeks to the Bear River	2261	CWAL, SCR, AWS, IWS, WH, A
Pearl Creek	North Fork Pearl Creek to Bear River	2257	CWAL, SS, SCR, AWS, IWS, WH, A

CWAL-Cold Water Aquatic Life, SS-Salmonid Spawning, PCR-Primary Contact Recreation, SCR-Secondary Contact recreation, DWS-Domestic Water Supply, AWS-Agricultural Water Supply, IWS-Industrial Water Supply, WH-Wildlife habitat, A-Aesthetics

POLLUTANTS

The Bear River and its tributaries is a major aquatic resource for southeast Idaho. An analysis of water quality limited segments in this watershed indicated that for certain river segments and tributaries; temperature and dissolved oxygen were, at times, impacting the coldwater aquatic life beneficial use designation. However, excess suspended sediment and nutrients, primarily phosphorus, are the major pollutants impacting the beneficial use status of the Bear River. The identified pollutants affecting water bodies in the Bear Lake subbasin are listed in Table 6.

Table 6. Identified Pollutants and Required Reductions (IDEQ 2007).

Water Body	Pollutants	TMDL Required Reductions
Alexander Reservoir	Sediment	Reductions applied to tributary streams only
Co-Op Creek	Sediment & Nutrient	Insufficient Data: TMDL extended to 2006
Bear River (Main Stem)	Sediment & Nutrient	46.3 lbs TP Winter Base Flow 703.3 lbs TP Upper Basin Runoff 5070.6 lbs TSS Upper Basin Runoff 61509 lbs TSS Summer Base Flow
Old Bear River Channel	Sediment & Nutrient	3719.2 lbs TP 258,035.7 TSS
North Creek	Unknown	No TMDL written
Ovid Creek	Sediment	1391.1 lbs TP 230,312.6 lbs TSS.
Pearl Creek	Sediment & Nutrients	610.7 lbs TP 1,953,430.5 lbs TSS
St. Charles Creek	Sediment & Nutrients	No TMDL written

WATER QUALITY MONITORING

Extensive water quality monitoring of the main stem Bear River has been conducted by the Idaho Department of Environmental Quality (IDEQ), Ecosystems Research Institute (ERI), and Utah State University (USU). Prior to writing the Bear Basin TMDL, ERI collected data at nine river sites in the Bear Lake subbasin. IDEQ has continued to monitor six of the sites on a quarterly basis as part of a tri-state effort that will be conducted through 2011. In addition, USU has conducted water quality monitoring of the Bear Lake Outlet on the Bear Lake National Refuge. Limited tributary data have been collected by ERI and IDEQ in the Bear Lake subbasin.

To quantify water quality for the tributaries to Bear River, IASCD and ISDA will begin monitoring seven streams in the Bear Lake subbasin in 2008. Sites will be located on Eightmile, Pearl, Skinner, Co-op, Georgetown, Mill, and Ovid creeks. Monitoring will occur twice a month through the growing season (April to October) and monthly through the rest of the year (November to March). Water quality samples will be collected as grab samples within the mixed portion of the stream. Samples will be analyzed for suspended sediment, total phosphorus, orthophosphorus, and nitrate + nitrite, and *Escherichia coli*. At each site stream discharge, temperature, dissolved oxygen, specific conductance, total dissolved solids, and pH will be measured.

The data collected in these studies can be compared to past and future data collected in the Bear Lake subbasin. Monitoring will also be conducted as best management practices are completed to track changes in water quality of the Bear River and its tributaries (Jenkins, 2007).

Riparian

Stream Visual Assessment Protocol (SVAP)
The Stream Visual Assessment Protocol requires field staff to assess and document the amount of eroding banks, stream cover, fish habitat, diversions or obstructions to fish passage, and measurements of depth, width, and flow. A rating system ranging from poor condition to excellent condition is used to ultimately describe the condition of each assessed stream. The information is obtained and through numerical value, which is found on the SVAP worksheets, a rating of excellent, good, fair, or poor is then given to each individual stream that is assessed. These ratings are used to determine the need for BMPs and funding of those BMPs. For more information regarding the Stream Visual Assessment Protocol visit http://www.nrcs.usda.gov/technical/ECS/aquatic/svapfnl.pdf.

ISCC and IASCD personnel in cooperation with employees from the NRCS, were able to assess three §303(d) listed streams in the subbasin. The three streams that were assessed were Co-op Creek, North Creek and Ovid Creek. Both Co-op and North Creeks were considered to be in good condition; therefore we will focus more attention toward Ovid Creek.

Based on stream surveys, Ovid Creek is the most impacted stream in the subbasin. Ovid Creek travels through the bottom lands of the Bear Lake valley before it eventually joins the Bear River southeast of Bern. The creek passes through two AFO's and several winter feed areas. Streambank and in stream condition of Ovid Creek were in poor to fair condition from the town of Ovid to the point where Ovid Creek enters into the Bear River.

The sections of Ovid Creek above the town of Ovid are covered with willows and abundant riparian vegetation. However, in most places below the town of Ovid, the stream flows through open areas where there is evidence of livestock and wildlife overuse. In these exposed areas the banks of the creek are noticeably eroding and BMP's would help to restore the condition of the stream to meet its beneficial uses.

ISCC and IASCD personnel were unable to perform SVAP on Pearl Creek as we were unable to obtain permission from landowners.

The main stem of the Bear River is the main source of water in the Bear Lake subbasin. All of the before mentioned creeks are tributaries to the Bear River. The river travels from Wardboro to Alexander Reservoir in the Bear Lake subbasin, which is approximately 30 miles in length. The Bear River offers a variety of different extremes when it comes to channel conditions and riparian vegetation. In some areas along the river there is an abundance of willow communities and stable banks. However, in other locations throughout the subbasin the river is in poor condition. There is a lack of vegetative cover and severe eroding banks. ISCC and IASCD personnel have determined that with the installation of certain BMP's, sediment and nutrient loading in the river would be reduced.

Similar to the condition of the channels in the subbasin, the riparian communities vary according to the location of the stream in the watershed. North Creek and Co-Op Creek were both assessed by ISCC and IASCD and the riparian communities of both streams were observed to be dense and diverse. The plants consist of native and non-native grasses with various varieties of willows and trees growing along the banks of both creeks. The banks on both creeks have enough vegetative cover to consider future Streambank erosion to be minimal.

It is important to note the Co-Op Creek becomes intermittent at the bottom of its watershed due to irrigation withdrawls and natural seepage. At one point along the creek bed the entire stream disappears and goes underground.

Ovid Creek has a tremendous plant community along its banks above the town of Ovid, but after the creek flows through Ovid it enters the Bear Lake bottoms and meanders through several meadows on its journey to the Bear River. Because livestock and wildlife have direct access to the stream and because there is a lack of willow, tree, and other vegetative communities the stream experiences severe erosion. Erosion problems occur virtually in every reach from the town of Ovid to its entrance into the Bear River. Ovid Creek might be the epitome of a story line titled "The Tale of Two Creeks", even though it is the same creek from top to bottom and the land uses are similar both above and below Ovid. The reason for the difference is that the willows were either removed below the town, or they have died out and now the exposed and eroding banks are all that remain.

ISCC and IASCD were unable to access Pearl Creek in its entirety as they were unable to obtain permission from landowners. However, in observations from road crossings it was observed that Pearl Creek has an amazing willow community, which appears to extend along the entire path that the stream follows. Also, in observation from road crossings it appears even on dry years that the grasses and various other plant communities are abundant and thriving.

As the Bear River covers nearly 30 miles of land on it way through the Bear Lake subbasin it experiences a variety of different plant ecosystems and communities. In places the Bear River is abundantly covered with willows and vegetation and the banks appear to be stable and supported. However, within almost every reach there are severe eroding banks. ISCC and IASCD personnel determined that implementation of BMP's would help the river meet the requirements to support its beneficial uses. The Bear River is a large water body and it is going to take several years and agencies working together to work towards meeting its beneficial uses again.

Cropland

After a tour of the watershed conducted by the ISCC and IASCD, it was determined that dry cropland made up the majority of critical acres. During the tour several landowners were contacted from different areas in the subbasin, things that were discussed with the landowners consisted of: types of tillage practices, current erosion problems, as well as current rotation trends within their immediate areas. Another topic that was discussed was the amount of interest there would be in BMP implementation. Also, different BMPs were discussed that the land owners would suggest and feel comfortable with in their areas. One of the major BMPs that seemed to be consistent throughout the subbasin was the implementation of water & sediment basins in highly erodible areas, dealing with gully erosion (NRCS, 2007).

Dry Cropland

Elevations containing dry cropland range from 5,700 to 6,500 feet above sea level. Dry cropland concerns addressed include tillage practices, current erosion problems, current rotation trends, and landowner interest in BMP implementation. Conservation crop rotation is an existing practice with approximately 6 years of alfalfa hay or legumes followed by 2 years of small grains (wheat, barley, or oats). Some dry cropland has been converted to permanent vegetative cover, such as CRP (NRCS, 2007). One of the major BMPs that seemed to be consistent throughout the subbasin was the implementation of water & sediment basins in highly erodible areas to prevent gully erosion (NRCS, 2007).

Irrigated Cropland

Irrigated crop land has a typical crop rotation with 6 years of alfalfa or legumes and 2 years of small grains (wheat, barley, or oats). Irrigated cropland can be found on slopes ranging from 0 to 3%. Irrigation water is normally plentiful. The growing season ranges from 80 to 120 days, with occasional periods of frost in between. Precipitation is 12 inches or less with most of the precipitation coming in the form of snowfall during winter moths. Winter months are long and cold and are generally followed by dry summers receiving moisture from thunderstorms. Sprinkler irrigation is a common practice as well as flood irrigation along the lowlands. Conservation crop rotation is an existing practice (NRCS, 2007).

Rangeland Inventory and Evaluation

Central Rocky Mountains Semiarid Bear Hills & Partly Forested Mountains Common Resource Areas (CRA 43B.11 & 43B.12)

Resource Setting – Rangeland vegetation consists of sagebrush and perennial grasses. Precipitation is 16" and greater, most of which falls as snow in winter and early spring. Elevations are from 4,500 to 7,500 feet. Topography consists of steep slopes and high mountain valleys. Soils are loamy to gravelly. Frost free period ranges from 50 to 100 days. Fencing is generally an existing practice.

Rangeland Assessment – We utilized Rangeland WQI worksheets on four common resource areas in the Central Rocky, Wasatch, and Uinta Mountains. These rangeland assessments cover four resource types; Partly Forested Mountains, Semi-arid Bear Hills, High Mountains, and Semi-arid Foothills on about 144,061 acres of private rangeland in the Bear Lake subbasin. Rangeland Water Quality Indicators were derived from the Water Quality Indicators Guide (WQIG) and allowed us to evaluate and score the condition of 8 factors on rangelands to determine water quality impacts and to rate the area in excellent, good, fair, or poor condition.

Current Condition –Approximately 35% of the private rangeland assessed in the Bear Lake subbasin is in fair condition and has minimal impact on the water quality in the Bear River, Ovid Creek, Pearl Creek, and Co-op Creek. According to the results of the WQI, some sheet and rill erosion and classic gullies are evident on gravelly loam soils. Runoff potential is high on moderate to steep terrain on south facing slopes. North facing slopes have a lower runoff potential. Depending upon valley type and the location of the stream within that valley, natural vegetation buffers vary in width between 50 and 200 feet. Current grazing management results in 70 to 90% grass/shrub cover, creates few bare areas, and on dry years may exceed carrying capacity at different times of the year. Grazing animals have unlimited access to creeks and springs with minimal sources of livestock watering facilities. Animal productivity and health has no appear ant issues under current management schemes.

Water Quality Impacts –The erosion potential is considerable because of the moderate to steep sloping gravelly loam soils, with rills and gullies during early summer. The majority of this sediment loss is associated with rill and gully erosion. Additional water quality impacts include sediment, nutrients, and bacteria from the unlimited access of livestock to creeks and to springs for livestock watering.

Resource Concerns – Facilitation practices may be needed for range improvement and livestock distribution. These concerns include plant productivity, health and vigor; noxious and invasive plants; plant establishment and growth; inadequate domestic stock water; inadequate quantity/quality of feed and forage for domestic animals; and inadequate cover/shelter for wildlife. All resource concerns will be

evaluated on a site-specific basis in accordance with NRCS' Conservation Planning Process. The following are suggested BMPs for rangelands in the Bear Lake Subbasin.

The most common rangeland problem is the lack of proper distribution of livestock grazing. The second most prolific problem is the lack of livestock watering facilities, which worsens the distribution problem. Drought periods and wildfires can cause problems with resulting forage shortages. Moreover, federal grazing allotment policy can create problems because additional private grazing must be secured or animals must stay longer on private rangelands. Consequently, the following BMPs are needed for rangelands in the Bear Lake subbasin: Prescribed Grazing (528A); 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

Most irrigated pastures in this subbasin are flood irrigated, with farmers backing up irrigation waters during or shortly after spring runoff events. Elevations where these irrigated pastures can be found range from 5,700 to 6,500 feet above sea level. Irrigation water is diverted from perennial streams and transferred to irrigated pastures through earthen ditches. In some cases tail water from flood irrigated fields may be reused or returned back into perennial streams or rivers. The average rotation for irrigated pastures in the watershed is 10 years of pasture and 2 years of small grains (wheat, barley, and oats), or alfalfa. Conventional tillage is the typical method used when rotating crops.

Dry pastures are typically used for grazing livestock in the spring and fall months with a rest period during the summer months when the livestock are taken to higher elevations. These pastures are generally managed for forage production and high intensity grazing. Dry pastures consist of wheat grasses, fescues, brome, orchard grass, sanfoin, clovers, and alfalfa used for forage (NRCS, 2007).

Animal Feed Operations & Dairies

The Idaho Legislature enacted Idaho law, *I.C. §37-401, Title 37, Chapter 4, Sanitary Inspections of Dairy Products* which requires sanitary inspections and nutrient management plans for all dairy farms. Existing dairy farms were required to submit a nutrient management plan for approval to ISDA on or before July 1, 2001. Any new dairy farms are required to have an approved nutrient management plan before issuance of a milk permit. ISDA promulgated rules (IDAPA 02.04.14.000 et seq.) for dairy waste and they were adopted in 1997. There are currently 15 dairies in the subbasin. These range in size from 25 to 100 cows, (see Table 7) (ISDA, 2007). All 15 of these dairies have submitted their nutrient management plans to ISDA.

Table 7. Animal Feed Operations

Operation Type	Number of Facilities	Number of Head
Dairy	15	25 to 100
Feedlots	35	25 to 300

The Idaho Legislature passed Idaho law, *I.C. §22-4906, Title 22, Chapter 49, Beef Cattle Environmental Control Ac,* in 2000. ISDA promulgated rules (IDAPA 02.04.15.000 et seq.) which became effective in September 2000. Beef cattle animal feed operations are required to submit a nutrient management plan to ISDA for approval no later than January 1, 2005. ISDA, ISCC, and IASCD conducted a preliminary inventory and identified approximately 35 potential sites with animal feed operations, corrals or pens within the subbasin.

THREATENED AND ENDANGERED SPECIES

The threatened and endangered species present in the Bear Lake subbasin are the Canada lynx (*Lynx canadensis*), gray wolf (*Canis lupus*), and whooping crane (*Grus americana*). The Bear River Basin contains no candidate or proposed species. The US Fish and Wildlife Service is concerned about the population status and long-term viability of certain plants and animals in the Bear Lake subbasin. The species of concern include: pygmy rabbit (*Brachylagus idahoensis*), wolverine (*Gulo gulo luscus*), black tern (*Chlidonias niger*), white-faced ibis (*Plegadis chihi*), northern goshawk (*Accipiter gentiles*), columbian sharp-tailed grouse (*Tympanchus phasianellus columbianus*), trumpeter swan (*Cygnus buccinator*), and leatherside chub (*Gila copei*) (NRCS, 2001).

BONNEVILLE CUTTHROAT TROUT

The Bonneville cutthroat trout, *Oncorhynchus clarkii utah*, is a subspecies of cutthroat trout native to the Bonneville Basin of Utah, Nevada, Idaho, and Wyoming. The desiccation of ancient Lake Bonneville restricted Bonneville cutthroat trout to headwater streams and lakes within the subbasin. Human activities such as water development, agricultural development, energy development, mining, timber harvesting, grazing, over fishing, and the introduction of nonnative species have impacted Bonneville cutthroat trout populations. The tenuous status of the remaining populations and the habitat has led to conservation efforts at the Federal, State, and local level (IDFG, 2007). The Bear River, a §303d listed water body, is home to BCT. Figure 6 is a map indicating the streams in the Bear Lake subbasin which contain BCT. These trout migrate from the Bear River up into tributary streams to spawn in the early spring. Several different agencies including, Idaho Department of Fish and Game (IDFG) and Environmental Coordinating Committee (ECC) have donated monies and time to implement BMP's (Best Management Practices) to improve stream channel conditions and stabilize shorelines, and to provide better habitat for these fish, which are considered a species of concern. Trout Unlimited (TU), a non government organization (NGO), also contributed monies toward BMP's in the Bear Lake subbasin. Small tributaries connected to one of the streams listed below or to the main stem of the Bear River are thought to be, and are treated as streams containing BCT (IDFG, 2007). Below is a list of streams that are known to have BCT.

8-mile Creek: Considered a high priority stream.
90% of trout between Alexander Reservoir and Bear Lake spawn in this creek.

Pearl Creek: Listed as a §303d listed stream.

Skinner Creek:

Co-Op Creek: Listed as a §303d listed stream

Stauffer Creek: Listed as a §303d listed stream 2002 list

Bear River: Listed as a §303d listed stream

Liberty Creek:

North Creek: Listed as a §303d listed stream

Paris Creek:

Saint Charles Creek: Listed as a §303d listed stream

Ovid Creek: Listed as a §303d listed stream

Beaver Creek:

Georgetown Creek: IDFG have found fish running up the creek but there are no recorded spawners.

Montpelier Creek and tributaries

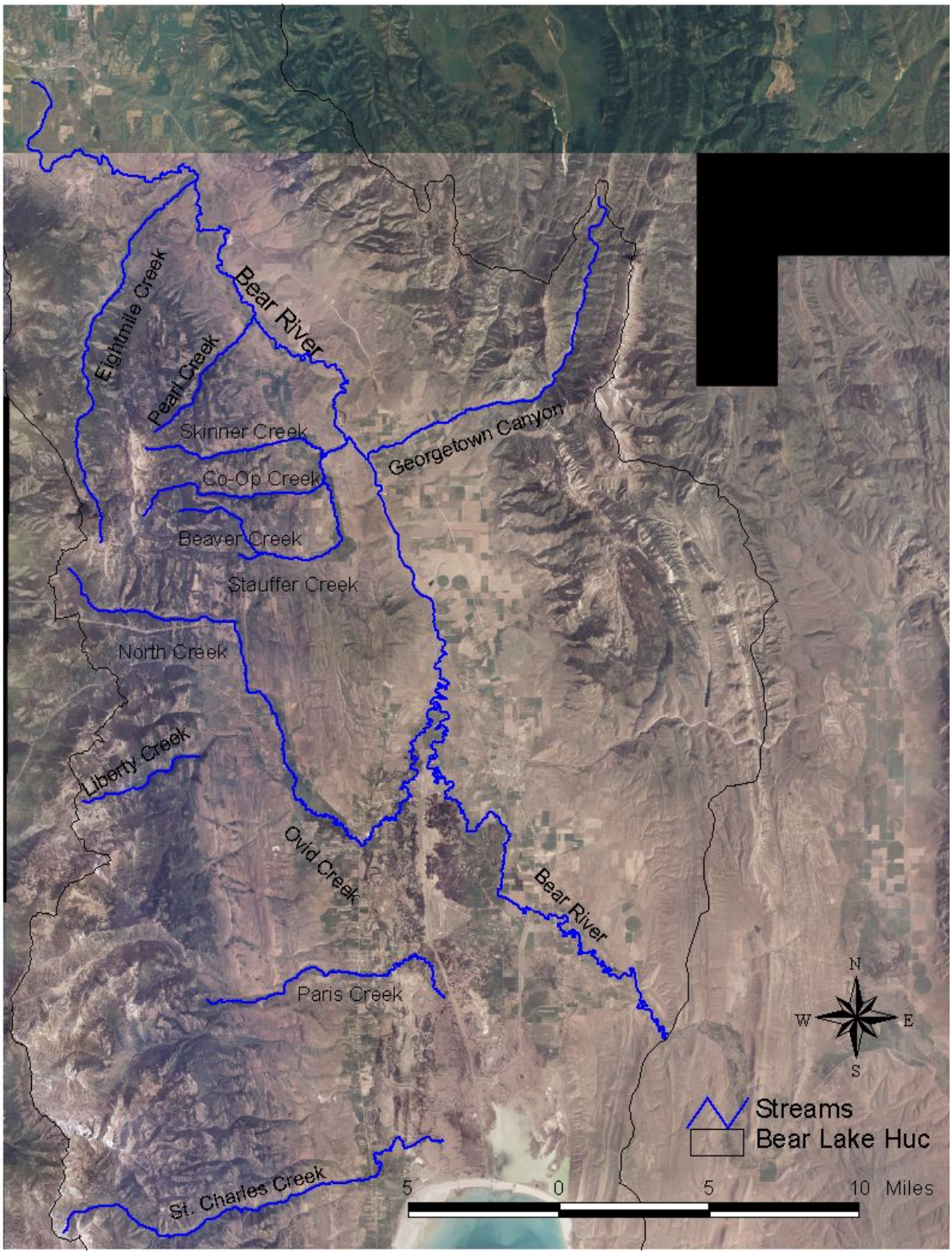

Figure 6. Location of BCT in the Bear Lake Subbasin.

TREATMENT

CRITICAL AREAS

ISCC and IASCD personnel, spent time assessing lands and speaking with land owners in the Bear Lake subbasin to determine areas of agricultural lands which contribute excessive amounts of pollutants to water bodies defined as “critical areas”. These critical areas are used to provide the best solutions for possible BMP implementation. Critical areas are prioritized for treatment based on their location to a water body of concern and the potential for pollutant transport and delivery to the receiving water body. Critical areas are those areas in which treatment is considered necessary to address resource concerns affecting water quality.

Non critical areas are areas in which BMP implementation or treatment was not considered necessary. In discussion with land owners it was determined the rotation of crops has changed dramatically in the past 15 to 20 years. The rotation consisted of small grains (barley, wheat oats, etc), the rotation followed a grain to fallow back to grain cycle. The cycle now consists of 6 to 7 years of alfalfa or legumes followed by 2 to 3 years of small grain crops. By changing the previous crop rotation cycle from one in which the ground lays fallow for long periods of time, to a rotation where the ground is covered with permanent vegetative cover has shown a reduction in the amount of soil lost to erosion.

PROPOSED TREATMENT (TUS)

The subbasin is divided into four treatment units that have similar land uses, soils, productivity, resource concerns and treatment needs. Each subwatershed is itemized below in Table 8. These three subwatersheds will be targeted to receive project funds as they can be secured.

The following TUs describe critical areas with similar land uses, productivity, resource concerns, and treatment needs in the Bear Lake subbasin. 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 problems.

Table 8. Treatment Units in the Bear Lake Subbasin

	TU 1	TU 2	TU 3	TU 4
Watershed	Riparian Acres	Cropland Acres	Rangeland Acres	Animal Facilities
Ovid Creek	107	10,549	18,498	2
Co-Op Creek	18	260	1,501	0
Pearl Creek	16	130	990	0
Bear River	5,503	92,829	224,938	13
Total	5,644	103,768	235,271	15

RECOMMENDED BMPS AND ESTIMATED COSTS

Conservation efforts in the subbasin have demonstrated that landowners will install BMPs when technical and financial assistance is available. The proposed treatment for pollutant reduction will be to implement BMPs through conservation plans. Table 9 lists some of the BMPs with their unit amounts and costs, which may be used to treat the resource concerns. With implementation of these BMPs, beneficial uses in the watershed will be obtained.

Table 9. Recommended BMPs and Estimated Costs for the Bear Lake Subbasin

Treatment Unit	Best Management Practice	Unit Type	Unit Cost	Unit Amount	Total Funds
TU1 Stream Channels & Riparian	Channel Vegetation	acre	$2,100.00	23.80	$49,986
	Conservation Cover	acre	$60.00	26.20	$1,572
	Critical Area Planting	acre	$250.00	102.95	$25,738
	Fence, 4-wire	ft.	$2.00	83240.25	$166,481
	Heavy Use Area Protection	acre	$50.00	10.19	$510
	Pest Management	acre	$20.00	623.50	$12,470
	Prescribed Grazing	acre	$5.00	5650.00	$28,250
	Riparian Forest Buffer	acre	$185.00	586.75	$108,549
	Stream Bank Protection	ft.	$20.00	10838.34	$216,767
	Stream Channel Stabilization	ft.	$35.00	7370.20	$257,957
	Tree/Shrub Establishment	acre	$1,611.00	1133.20	$360,332
	Use Exclusion (Riparian)	acre	$100.00	43.00	$4,300
				Subtotal	$1,232,911
TU2 Crop Lands	Contour Farming	acre	$3.00	1034.17	$3,103
	Conservation Crop Rotation	acre	$2.00	1034.17	$2,068
	Field Border	acre	$88.00	598.77	$52,692
	Critical Area Planting	acre	$200.00	526.87	$105,374
	Deep Tillage	acre	$16.00	1034.17	$16,547
	Drip Irrigation	ft.	$2.00	102960.00	$205,920
	Irrigation Water Management	acre	$1.00	39.00	$39
	Nutrient Management	acre	$3.00	25246.00	$75,738
	Pasture & Hayland Planting	acre	$100.00	517.96	$51,796
	Pest Management	acre	$20.00	426.46	$8,529
	Residue Management	acre	$20.00	607.71	$12,154
	Water & Sediment Control Basin	No.	$800.00	243.00	$194,400
	Windbreak/Shelterbelt	ft.	$2.00	102960.00	$205,920
				Subtotal	$934,280

Treatment Unit	Best Management Practice	Unit Type	Unit Cost	Unit Amount	Total Funds
TU3 Range Lands	Brush Management	acre	$30.00	13829.90	$414,897
	Fence, 4-wire	ft.	$2.00	106654.54	$213,309
	Pest Management	acre	$20.00	23634.00	$472,680
	Pipeline, PE 100 psi, 2.0"	ft.	$2.00	95631.00	$191,262
	Prescribed Grazing	acre	$3.00	37786.20	$113,359
	Pumping plant for water control	No.	$5,000.00	20.00	$100,000
	Range Planting	acre	$80.00	12892.90	$1,031,432
	Spring Development	No.	$2,400.00	53.00	$127,200
	Structure For Water Control	No.	$3,000.00	33.00	$99,000
	Water Well	No.	$8,250.00	53.00	$437,250
	Watering Facility	No.	$1,150.00	268.00	$308,200
				Subtotal	$3,508,589
TU4 Animal Facility	Corral Fence	Ft.	$15.00	22500.00	$64,500
	Nutrient Management	acre	$3.00	300.00	$380
	Pipeline	Ft.	$2.00	15000.00	$17,000
	Pumping Plant for water Facility	No.	$3,000.00	15.00	$9,013
	Water Well	No.	$8,250.00	15.00	$24,763
	Waste Storage Facility	No.	$20,000.00	15.00	$60,013
				Subtotal	$175,669
				Total	$5,851,449

IMPLEMENTATION PRIORITY

IMPLEMENTATION ALTERNATIVES

Implementation alternatives were developed that focused on the identified treatment units. The following alternatives were developed for consideration:

No action
Land treatment with non-structural BMPs on crop and rangelands
Land treatment with structural and non-structural BMPs on crop and rangelands
Riparian and stream channel restoration
Animal facility waste management

Description of Alternatives

Alternative 1 – No action This alternative continues the existing conservation programs without additional project activities. The problems would continue to negatively impact beneficial uses.

Alternative 2 – Land treatment with non-structural BMPs on crop and rangelands
This alternative would reduce accelerated sheet and rill, and gully erosion. This alternative will improve water quality and reduce pollutant loading to the §303(d) stream segments in the Bear Lake subbasin. Beneficial uses may be improved with this alternative which includes voluntary participation.

Alternative 3 – Land treatment with structural and non-structural BMPs on crop and rangelands. This alternative would reduce accelerated sheet and rill, and gully erosion. It is anticipated that this alternative will reduce soil erosion. This treatment will improve water quality in the watershed and reduce pollutant loading to the §303(d) stream segments in Bear Lake subbasin. Beneficial uses would be improved or achieved with implementation of this alternative. This alternative includes voluntary participation.

Alternative 4 – Riparian and stream channel restoration
This alternative would reduce accelerated stream bank and bed erosion. This alternative would improve water quality, riparian vegetation, aquatic habitat, and fish passage in the watershed. Beneficial uses would be improved with implementation of this alternative. This alternative includes voluntary participation.

Alternative 5 – Animal facilities
This alternative would reduce sediment and nutrient runoff from animal facilities. This will improve water quality in the watershed and reduce pollutant loading to §303d listed streams. This alternative includes voluntary and mandatory landowner participation.

IMPLEMENTATION PRIORITY

The Bear Lake SWCD's primary focus will be on improving rangelands. The Caribou SCD's primary focus will be on improving dry cropland. Each district has a five year plan which describes their priorities for addressing resource concerns and implementing BMPs within the areas that they oversee. Each district reviewed the above alternatives and picked the ones that matched the goals outlined in their five year plan. Each District's implementation priority is explained below.

ALTERNATIVE SELECTION

Bear Lake Soil and Water Conservation District
The Bear Lake Soil and Water Conservation District's Board of Supervisors determined a ranking priority for BMP alternatives using the information discussed above. The board came to a unanimous decision that they would focus on the alternatives in the following order: 1st priority is Alternative 3, (with an emphasis on improving rangelands), 2nd priority is alternative 5, 3rd priority is alternative 4, 4th priority is alternative 2, and the board chose to rule out alternative 1, which calls for no action to be taken in regards to implementing BMPs and conserving natural resources. The Bear Lake District wants to take an active role in conserving natural resources and helping land owners to conserve the land.

Caribou Soil Conservation District
The Caribou Soil Conservation District Board of Supervisors determined a ranking priority for BMP alternatives. The board came to a unanimous decision that they would focus on the alternatives in the following order: 1st priority is alternative 4, 2nd priority is alternative 3, 3rd priority is alternative 2, 4th priority is alternative 5, and they chose to rule out alternative 1, which calls for no action to be taken in regards to implementing BMPs and conserving natural resources. The Caribou District wants to take an active role in conserving natural resources and helping land owners to conserve the land.

Table 10 is a list of anticipated deadlines for the development of conservation plans and contacts, BMP designs, installation of BMPs, administration, and maintenance of BMPs, as well as final reports installed and completed projects.

Table 10. Estimated Timeline for TMDL Agricultural Implementation

Task	Output	Milestone
Develop conservation plans and contracts	Completed contract agreements	2010
Finalize BMP designs	Completed BMP plans and designs	2015
Design and install approved BMPs	Certify BMP installations	2018
Track BMP installation	Implementation progress report	2022
Evaluate BMP & project effectiveness	Complete project effectiveness report	2025

Funding

Financial and technical assistance for installation of BMPs is needed to ensure success of this implementation plan. The four Idaho Soil and Water Conservation Districts will actively pursue multiple potential funding sources to implement water quality improvements on private agricultural and grazing lands. These sources include (but are not limited to): CWA 319 projects refer to section 319 of the Clean Water Act. These are Environmental Protection Agency funds that are allocated to the Nez Perce Tribe and to Idaho State. The Idaho Department of Environmental Quality has primacy to administer 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.
Source: Idaho Department of Environmental Quality

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

The RCRDP program is the Resource Conservation and Rangeland Development Program administered by the Idaho Soil Conservation Commission. This is a grant/loan program for implementation of agricultural and rangeland best management practices or loans to purchase equipment to increase conservation. Source: Idaho Soil Conservation Commission. *http://www.scc.state.id.us/programs.htm*

Conservation Improvement Grants are administered by the Idaho Soil Conservation Commission. *http://www.scc.state.id.us/programs.htm*

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

Agricultural Management Assistance (AMA): 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): 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): 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. This is provided through your local Conservation District and NRCS. *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): 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/*

SRF State Revolving Loan Funds are administered through the Idaho Soil Conservation commission. *http://www.scc.state.id.us/programs.htm*

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

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

GLCI Grazing Land Conservation Initiative 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/*

Many of these programs can be used in combination with each other to implement BMPs.

Outreach

The conservation partnership (Bear Lake SWCD, Caribou SCD, ISCC, USDA/NRCS, FSA, U of I, ISDA Extension Service, and County Officials) will use their combined resources to provide information to agricultural landowners and operators within the Bear Lake subbasin. A local outreach plan can be developed by the conservation partnership. Newspaper articles, district newsletters, watershed and project tours, landowner meetings and one-on-one personal contact would be used as outreach tools. Outreach efforts will:

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

Monitoring and Evaluation

Bear Lake SWCD and Caribou SCD will monitor and track projects to ensure that they are maintained and properly cared for, for the expected life span of each project installed.

FIELD LEVEL

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

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

SUBBASIN LEVEL

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

Annual reviews for funded projects will be conducted to insure the project is kept on schedule. With many projects being implemented across the state, ISCC developed a software program to track the costs and other details of each BMP installed. This program can show what has been installed by project, by 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 subbasin planning and implementation process.

Acronyms

AFO	Animal Feed Operation
§303(d)	Section in the Clean Water Act requiring States to list water quality limited waters
§319	Nonpoint Source Management Program
BLSWCD	Bear Lake Soil and Water Conservation District
BURP	Beneficial Use Reconnaissance Program
BMP	Best Management Practice
BLM	Bureau of Land Management
CAFO	Confined Animal Feed Operation
CSCD	Caribou Soil Conservation District
CTNF	Caribou Targhee National Forest
CRP	Conservation Reserve Program
FSA	Farm Service Agency
GRP	Grassland Reserve Program
IASCD	Idaho Association of Soil Conservation Districts
IDL	Idaho Department of Lands
IDEQ	Idaho Department of Environmental Quality
IDWR	Idaho department of Water Resources
ISDA	Idaho State Department of Agriculture
ISCC	Idaho Soil Conservation Commission
NRCS	Natural Resource Conservation Service
RUSLE	Revised Universal Soil Loss Equation
SAWQP	State Agriculture Water Quality Program
SISL	Surface Irrigation Soil Loss Equation
SVAP	Stream Visual Assessment Protocol
TMDL	Total Maximum Daily Load
TU	Treatment Unit
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WHIP	Wildlife Habitat Incentives Program
WRP	Wetland Reserves Program

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