Southern Middle Bear Subbasin
TMDL Implementation Plan for Agriculture

Developed for the
Idaho Department of Environmental Quality

Prepared by

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In Cooperation with the

Franklin Soil and Water Conservation District
Idaho Association of Soil Conservation Districts
USDA-Natural Resources Conservation Service

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INTRODUCTION

PURPOSE

The purpose of this plan is to recommend Best Management Practices (BMPs) that would improve or restore physical and biological functions of Bear River, and Weston, Deep, Battle, Strawberry, and Fivemile creeks (Figure 1).

This Total Maximum Daily Load (TMDL) Implementation Plan for Agriculture will build upon past conservation accomplishments made through the Franklin Soil and Water Conservation District (FSWCD). These past and future projects will help to restore beneficial uses in Bear River, and Weston, Deep, Battle, Strawberry, and Fivemile creeks. This plan outlines an adaptive management approach for developing site-specific conservation plans with individual farmers and ranchers in order to recommend BMPs which will help meet the TMDL targets. Each site-specific conservation plan will outline how and when to install each of the BMPs listed in the conservation plan. The adaptive management process will be guided by follow up evaluations and monitoring.

GOALS AND OBJECTIVES

The goal of this implementation plan is to restore beneficial uses on §303(d) listed segments of Bear River, and Weston, Deep, Battle, Strawberry, and Fivemile creeks. The objectives of this plan are to identify critical areas along the listed stream segments and to recommend BMPs for reducing sediment and nutrient loading into §303(d) listed water bodies.

BACKGROUND

PROJECT SETTING

This TMDL Implementation Plan for Agriculture in the Middle Bear subbasin, HUC 16010202, (Figure 2) has been divided into three sections due to local similarities. These are the Cub River, Northern Middle Bear, and Southern Middle Bear. The Cub River is shown on the map for location purposes only. The Cub River Implementation Plan, which includes the Cub River, Maple and Worm creeks was created (Smith, S., 2006) separately because it flows directly into Utah and has different loading requirements.

This implementation plan will cover the Southern Middle Bear subbasin for planning purposes only. This area includes the §303(d) streams that enter the Bear River downstream of the Cottonwood Creek and Bear River confluence and above the Utah state line. These streams include the Bear River, Weston, Fivemile, Deep, Strawberry, and Battle creeks (Table 1). These streams drain the northern portion of Cache Valley and then flow into the Bear River in Idaho.

These streams provide a great economic benefit to the people of Franklin County, by providing recreation, irrigation water and scenic beauty to the area. There is evidence that Native Americans may have used hot springs along the Bear River to establish winter camps allowing them to stay in the Cache Valley year round. This could have had an impact on the natural resources in the area. Then with the arrival of the early settlers around the 1850s and the establishment of local communities, humans have had an impact on the natural resources of the area for a long time. Some of the natural resource uses are culinary water, irrigation water, grazing, and logging (USU, 2000).

Table 1. §303(d) Listed Streams in the Southern Middle Bear Subbasin

Stream Name	Description	Listed Pollutants
Battle Creek	Headwaters to Bear River	Nutrients, Sediment
Bear River	Oneida Reservoir to Utah state line	Flow, Nutrients, Sediment
Fivemile Creek	Headwaters to Bear River	Unknown
Deep Creek	Oxford Slough to Bear River	Unknown
Strawberry Creek	Forest Service boundary to Mink Creek	Unknown
Weston Creek	Headwaters to Bear River	Flow, Nutrients, Sediment

WATERSHEDS

This TMDL Implementation Plan for Agriculture will be divided into six watersheds. These watersheds will be planned around each §303d listed stream segment. Thus, the watershed 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.

TOPOGRAPHY

The Bear River, and Weston, Deep, Battle, Strawberry, and Fivemile watersheds have a varied topography including: mountains, mountain valleys, foothills, stream terraces, alluvial fans, and valley plains. The northern part of the Cache Valley is surrounded by three mountain ranges. The Bear River range comprises the mountainous, eastern edge of the Cache Valley with most of its tributaries flowing west into the lower elevations of the basin within Cache Valley. The Portneuf Mountain Range lies to the north of the Cache valley with Bear River entering Cache Valley through a narrow canyon between the Portneuf Range and the Bear River Range.

Two major tributaries flow south out of this area and these are Battle and Deep creeks. They flow across or through the Bear River delta. The northwestern edge of the Cache Valley is bounded by the Bannock Range. There are many small streams that flow east from this mountain range. Most of the streams are intermittent as they go dry during the summer. Elevations in northern Cache Valley range from 9,328 to 4,434 feet where the Bear River enters Utah. The elevation difference, slope and southwest aspect allows the subbasin to have two runoff periods, a low valley runoff in April and May and a highland runoff in June and July (IDEQ, 2006).

CLIMATE

The watersheds are located in the intermountain region of the Rocky Mountains that is characterized by cold, snowy winters and hot, dry summers. Average annual precipitation, most of which accumulates as snow during the winter, ranges from about 10 inches in the valleys to over 30 inches in the mountains (Figure 3). The frost-free period varies from 120 to 140 days. The last frost in the spring can occur as late as May 20th and the first frost can be as early as September 20th. Temperatures range from minus 20°F in winter to 100°F in summer (ERI, 2000).

Figure 1. Southern Middle Bear Watersheds

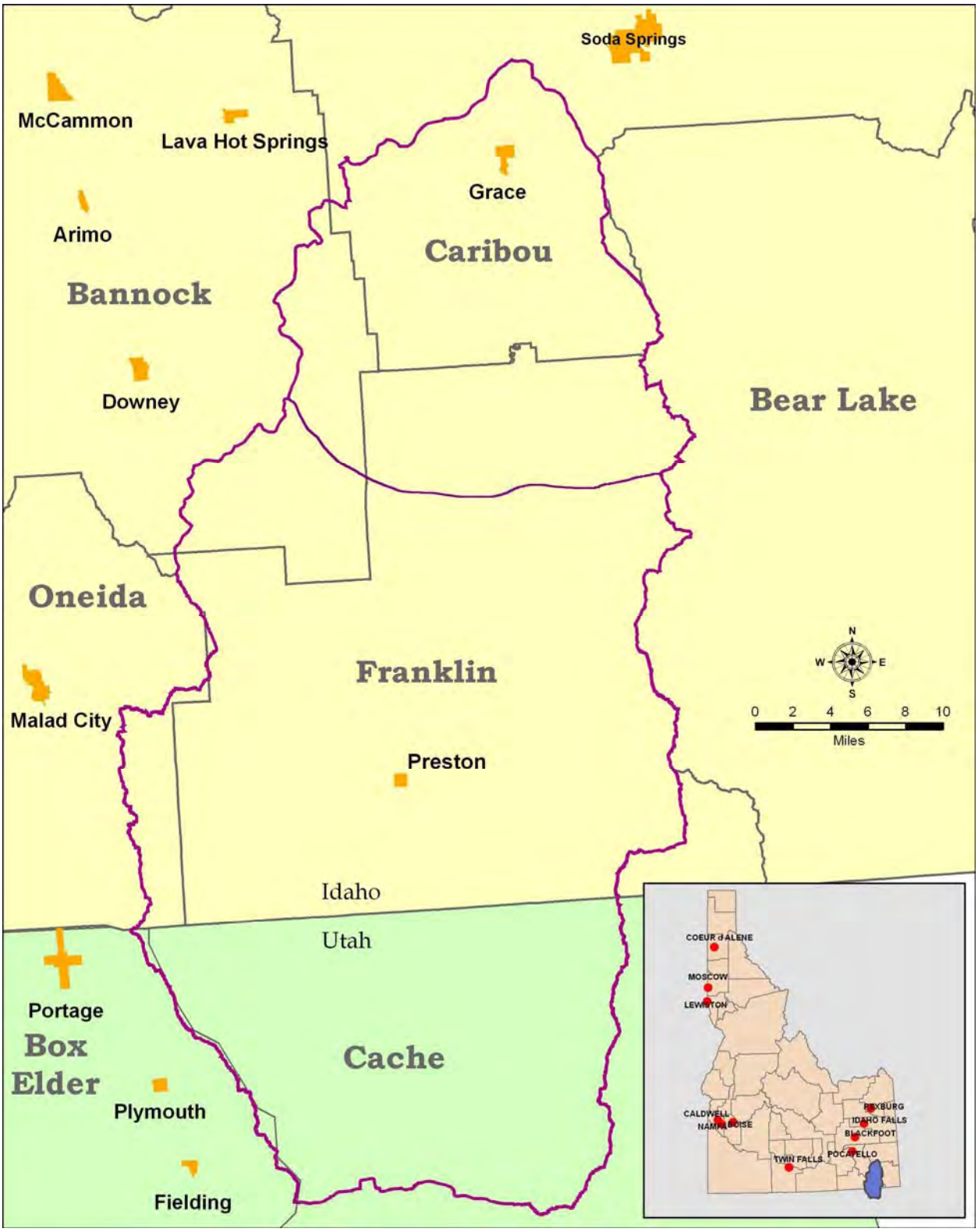

Figure 2. General Location of the Southern Middle Bear Subbasin

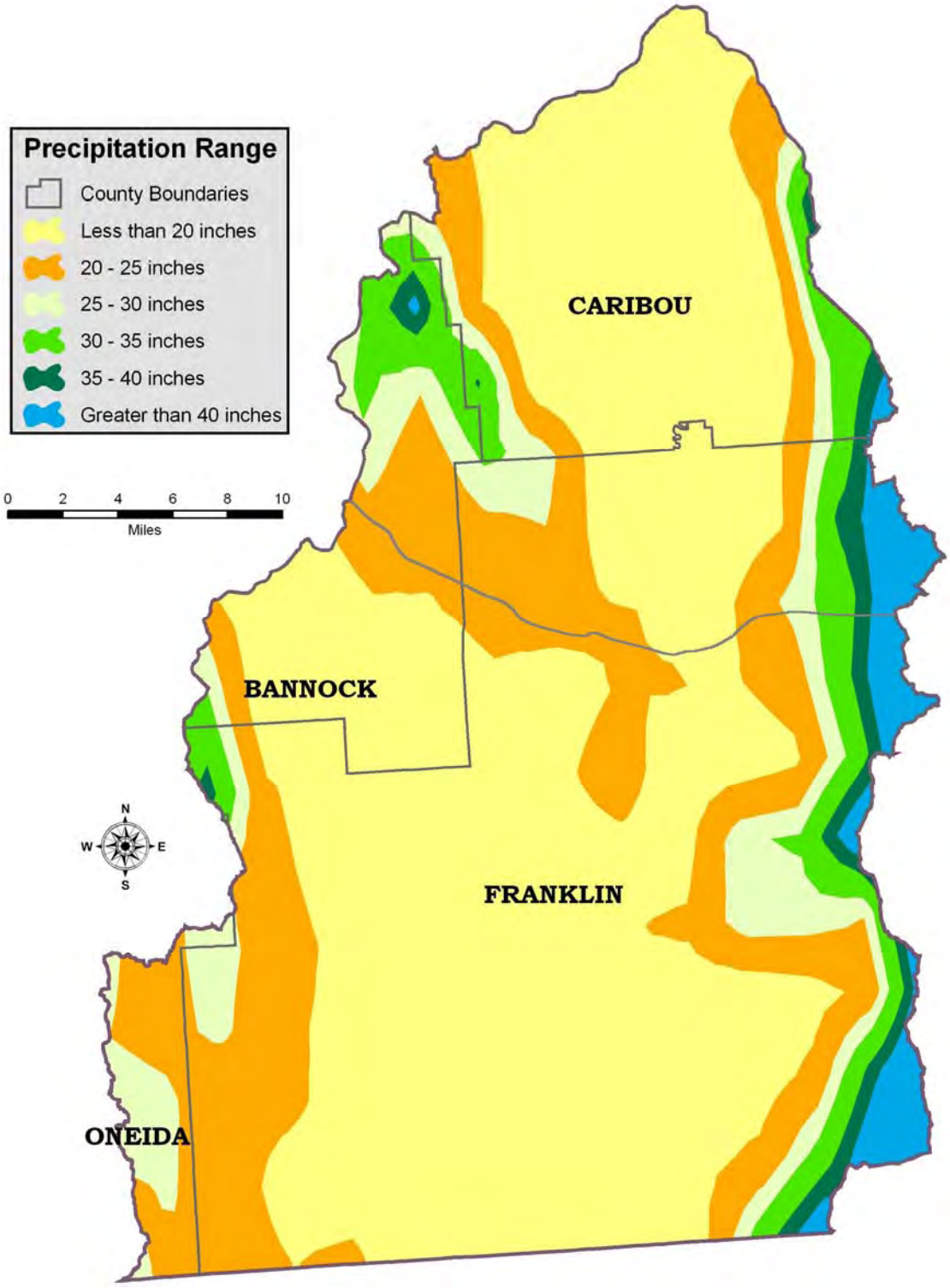

Figure 3. Precipitation in the Southern Middle Bear Subbasin

GEOLOGY

Ancient Lake Bonneville, of late Pleistocene times, was a large inland sea that covered much of Utah and the southeastern corner of Idaho, including much of the project area. The lake had two major stages, the Bonneville and Provo stage. The Bonneville was the earlier of the two, with an average elevation of 5,090 feet above sea level. During the last ice age, conditions were generally wetter and as the lake continued to fill, it eventually spilled over the hard rocks near Red Rock Pass.

Subsequently, it eroded through the rocks about 14,500 years ago, pouring a torrent of water three times the flow of the Amazon River through the pass north into the valley, then into the Snake River Plain. As the flood wore through the hard rocks of the pass and underlying soft rock, the lake restabilized at another accumulation of harder rock at the Provo level. During the life of this giant lake, thick accumulations of sediments were deposited in the lake basin as surrounding mountains eroded.

There are two kinds of mountain building processes that are common to the area surrounding the ancient lake and are part of the current Bear River Basin. To the east and north, sediments of the Bear River-Portneuf Mountain Ranges include quartzites and carbonates, such as limestone and dolomite (Precambrian and Paleozoic), which were folded and faulted during formation of the Rocky Mountains. To the west, the Bannock-Malad Mountain Ranges are composed of similar material.

Following the folding, faulting, and subsequent erosion of sediments, a younger series of mountain building has been super-imposed on the older ranges. As the continental plate moved slowly over the spreading ridge section that extends from Mexico to Idaho, the resulting stretching has created the basin and range block fault mountains. Tertiary rocks (volcanic tuffs, calcareous siltstone, claystone, and conglomerates) unconformably overlie the sediments and are exposed around the foothills of the old Lake Bonneville shoreline. Once the weight of the water was removed by the retreat of the Provo stage of the lake, soft lake bottom sediments rebounded as crustal layers of the earth isostatically adjusted (the sediments that were in the deeper parts of the lake are now bowed upward).

At the same time the lake was retreating, ancestral Bear River and its tributaries, issuing from the mountains, dropped their sediment load as the terrain flattened out in the more level basin. Huge deltas of interfingering deposits of clay, silt and sand cap the upper/outer edges of the old lake shoreline in the Riverdale and Preston area. As the lake retreated, Bear River and its tributaries began to cut valleys in the soft lake bottom sediments. Although the sediments have dried and hardened over the last 15,000 years, they are still easily eroded and prone to landsliding, especially when saturated, as the river cuts through the valley floor. While the current sliding and sediment loading in the lower part of Bear River is part of a natural process, the activities of man have accelerated the erosion process. (IDEQ, 2006)

LAND OWNERSHIP

There are approximately 218,944 acres of private land (Table 2) and 71,546 acres managed by the Idaho Department of Lands (IDL), Bureau Land Management (BLM), U.S. Fish and Wildlife Service (USFWS) and Caribou Targhee National Forest (CTNF) with 1,475 acres of open water in the subbasin (Figure 4).

Table 2. Land Ownership in the Southern Middle Bear Subbasin

Land Owners / Managers	Acres
Private Land	218,944
State of Idaho	9,949
Open water	1,475
B.L.M.	9,585
U.S. Fish & Wildlife	1,878
U.S. Forest Service	50,134
Total	291,965

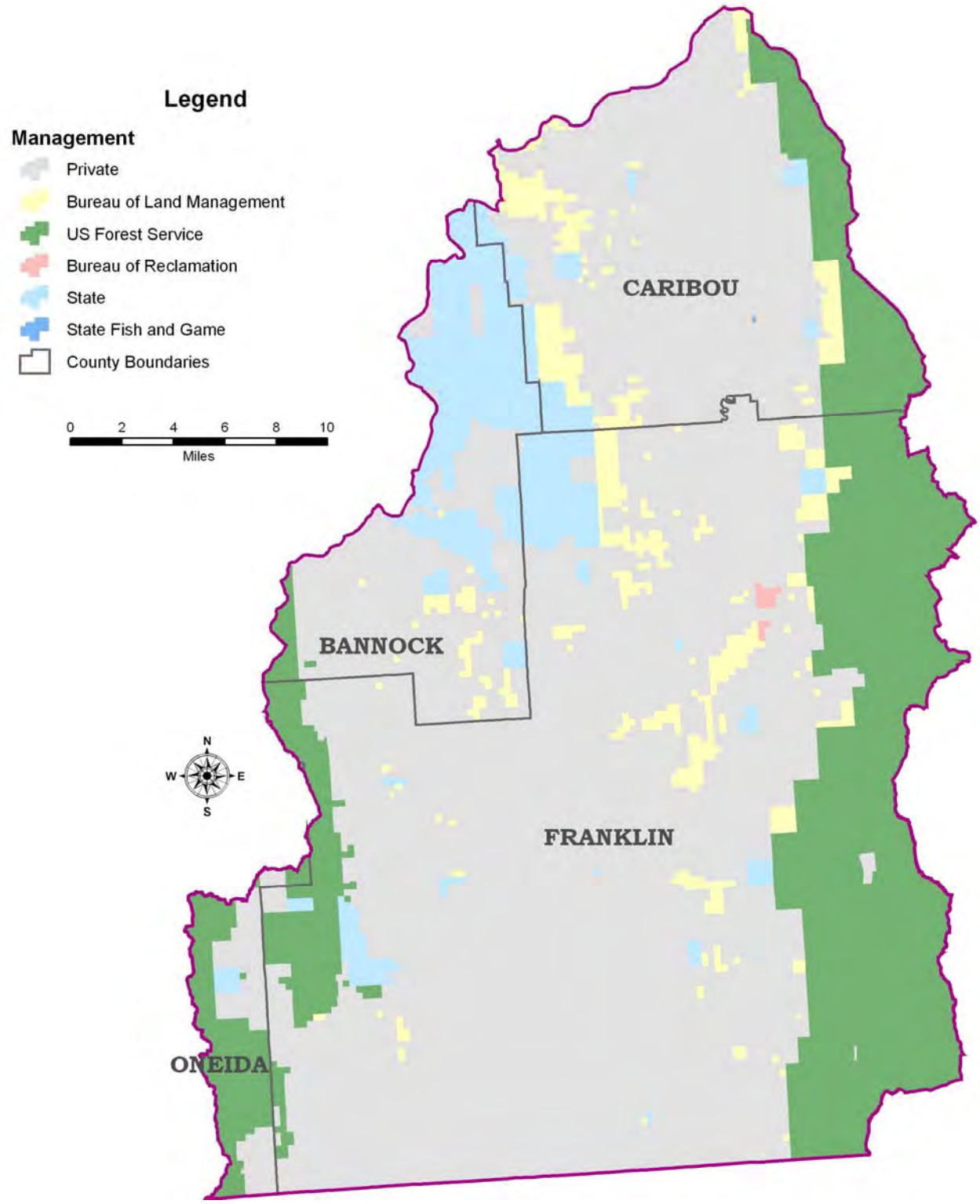

Figure 4. Land Ownership in the Southern Middle Bear Subbasin

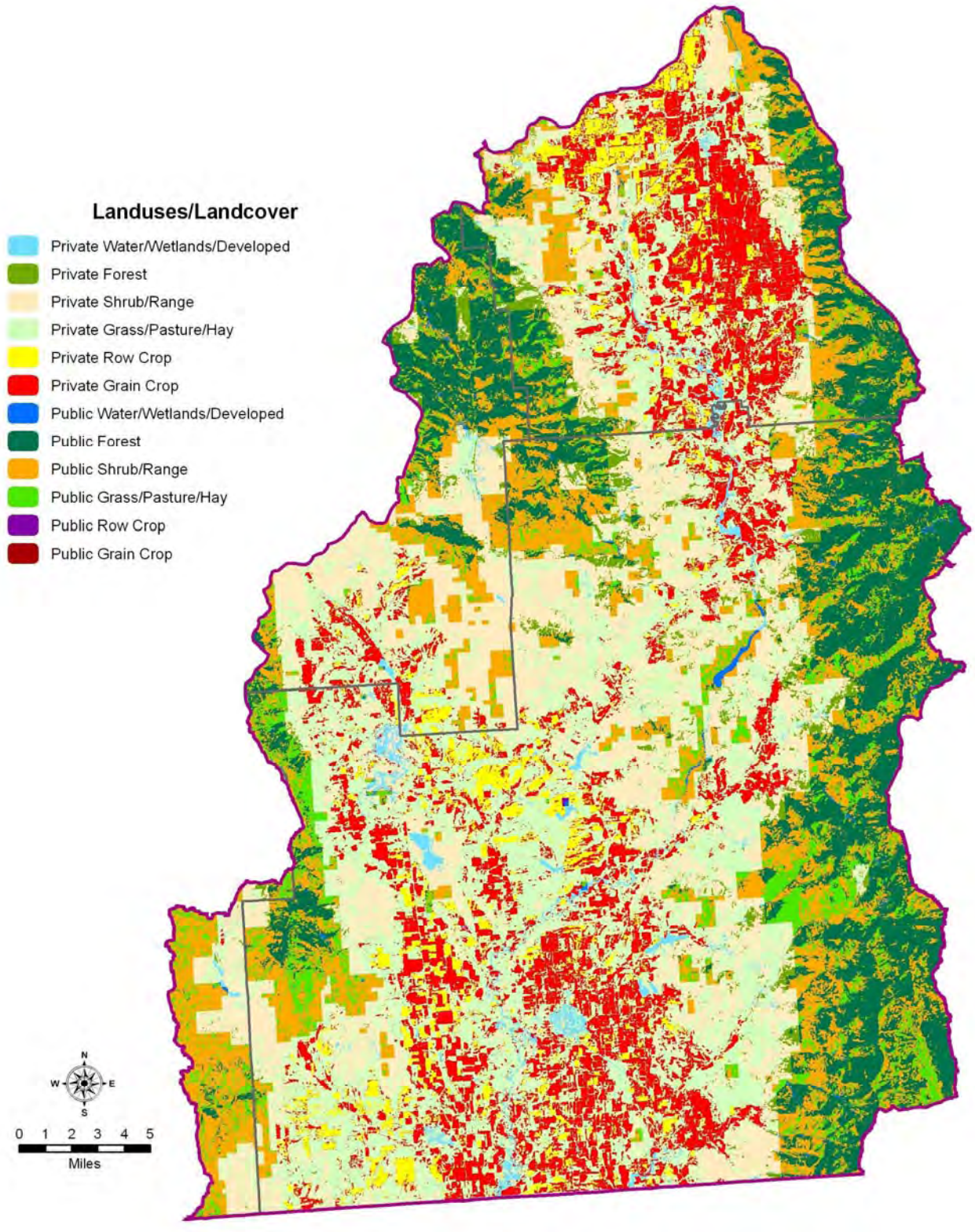

Figure 5. Land Use in the Southern Middle Bear Subbasin

LAND USE

Land use in the subbasin includes recreation, urban, rangeland, dry and irrigated cropland, irrigated pastures, and summer homes or ranchettes (Table 3). Recreation is centered on and around the reservoirs and streams and the adjacent mountain ranges. Ranchettes are becoming common along Weston, Deep, Battle, Strawberry, and Fivemile creeks, and also around the reservoirs. Dry cropland is located in the uplands above the irrigation canal systems with crops of hay and small grain. While the irrigated cropland is located between the canals and the streams, with hay, grain, corn, or pasture in the rotations (Figure 5).

Table 3. Private Land Uses in the Southern Middle Bear Subbasin

Land Use	Acres
Irrigated Cropland	66,544
Dry Cropland	51,534
Range Land	90,442
Open Water	1,475
Roads / Urban	6,052
Rivers & Creeks / Riparian	2,897
Total	218,944

URBANIZATION

As of the 2000 census there were 11,329 people residing in Franklin County. Figure 6 shows the population for Franklin County since 1920. In this area, the growth rate from 1990 to 2000 was 22.7 percent. Data points for 2010 and 2020 are projected (FCFD, 2004). Most of the growth is occurring around the towns and along the tributaries to the Bear River with lot sizes ranging between 1 to 15 acres. The Idaho and Utah Transportation Departments completed a four lane road between Logan, Utah and Preston, Idaho in the fall of 2006. This expansion has the potential to increase the growth rate of the county even higher. Many of the people moving in to the county work in Utah with commutes ranging from 30 minutes to 2 hours.

Since the early 1990's, there has been a lot of urbanization in the subbasin and a greater emphasis on water quality. Utah Division of Water Quality contracted with Ecosystem Research Institute (ERI) to develop the Lower Bear River Water Quality Management Plan (UDWQ, 1995), which was accepted as the TMDL plan for the Utah portion of the Bear River. This plan reported that high loads of sediment and nutrients are impairing the ability of the Bear River to support its beneficial uses.

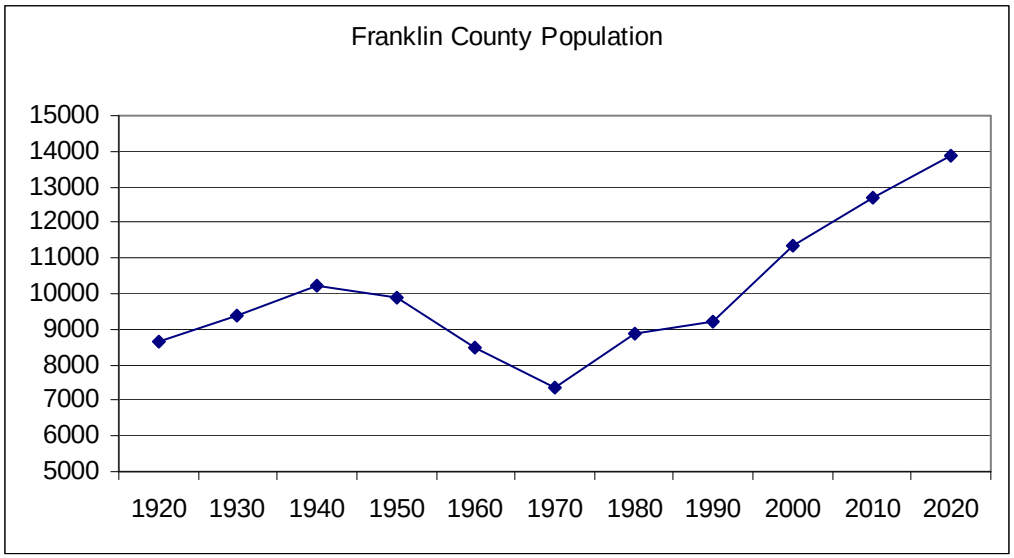

Figure 6. Franklin County, Idaho Census Data from 1920 to 2000

WATER USE

There are three major irrigation systems in the subbasin; Twin Lakes Irrigation serving about 12,500 acres, Weston Creek Irrigation serving about 6,000 acres, and Strong Arm Irrigation serving about 1,700 acres. Weston Creek Irrigation stores water in Weston Reservoir and operates a pipeline through Weston Canyon and serves irrigators from the canyon to the area around the city of Weston. This pipeline has saved a lot of water because the old canal ran across a gravelly area and lost valuable water. Lateral ditches are being converted to pipe which will increase efficiency and allow more storage in the reservoir.

The sources of water for Twin Lakes Irrigation are Mink and Deep creeks. They have three reservoirs, Winder, Condie and Twin Lakes. Their water is used in Riverdale, Winder, Clifton, Dayton and ends at Weston. The sources of water for Strong Arm Irrigation are Battle Creek and Cottonwood Creek. Water is stored in two reservoirs, Strong Arm and Treasureton for use throughout the Banida area.

ACCOMPLISHMENTS

The FSWCD is currently implementing two §319 grants. There is one in Deep Creek and one in Battle/Mink watersheds. They have also implemented a USFWS Partners grant along the Bear River. The District utilized ISCC program funds to implement range BMPs and improve irrigation systems. These practices, administered by the FSWCD, are summarized in Table 4. Also, NRCS has implemented several projects along Weston, Fivemile, Deep, and Battle creeks, and the Bear River, which are summarized in the *Rapid Watershed Assessment for the Middle Bear River Subbasin* (NRCS, 2007).

Table 4. Completed BMPs and Costs in the Southern Middle Bear Subbasin

Program	Practice	Amount	Cost Share	Land Owner	Total
§319	Fence (Corral)	570 feet	$5,130	$3,420	$8,550
§319	Fence (Barbed)	300 feet	$360	$240	$600
§319	Pipeline	4,680 feet	$5,616	$3,744	$9,360
§319	Pumping Plant	1 each	$4,094	$2,730	$6,824
§319	Watering facility (Troughs)	5 each	$3,000	$2,000	$5,000
§319	Watering facility (Storage)	3,840 gal	$2,023	$1,349	$3,372
§319	Spring Development	1 each	$1,380	$920	$2,300
NFWF	Streambank Protection	700 feet	$9,800	$9,800	$19,600
NFWF	Fence	2,500 feet	$2,250	$2,250	$4,500
NFWF	Pipeline	3,200 feet	$3,200	$3,200	$6,400
NFWF	Water Facility	2 each	$800	$800	$1,600
CIG	Spring Development	1 each	$400	$400	$800
CIG	Pipeline	5,000 feet	$5,625	$5,625	$11,250
CIG	Watering Facility	3 each	$1,600	$1,600	$3,200
CIG	Fence	4,000 feet	$4,000	$4,000	$8,000
RCRDP Loan	Irrigation System (Pivots)	4 each	$0.0	$212,000	$212,000
BOR, IDWR	Irrigation Delivery Pipeline	>31,000 feet	$307,000	$593,000	$900,000
RCRDP Grant	Irrigation Delivery Pipeline	>47,000 feet	$100,000	$150,150	$250,150
RCRDP Grant	Irrigation Delivery Pipeline	>13,000 feet	$30,000	$101,601	$131,601
		Total	$486,278	$1,098,829	$1,585,107

WATER QUALITY PROBLEMS

BENEFICIAL USE STATUS

The Idaho Department of Environmental Quality (IDEQ) designates beneficial uses on rivers, creeks, lakes, and reservoirs to meet the requirements of the Federal Clean Water Act. Bear River, and Weston, Deep, Battle, Strawberry, and Fivemile creeks (Table 5) are listed on the State of Idaho's §303(d) list of water quality impaired water bodies (IDEQ, 1998).

Table 5. Beneficial Use Status of 1998 §303(d) listed streams

	Beneficial Uses								
Stream	CWAL	SS	PCR	SCR	DWS	AWS	IWS	WH	AESTHETICS
Bear River	Impaired	Impaired	X	n/a	n/a	X	X	X	X
Battle Creek	Impaired	n/a	n/a	X	n/a	X	X	X	X
Deep Creek	Impaired	n/a	n/a	X	n/a	X	X	X	X
Fivemile Creek	Impaired	n/a	n/a	X	n/a	X	X	X	X
Strawberry Creek	Impaired	n/a	n/a	X	n/a	X	X	X	X
Weston Creek	Impaired	n/a	n/a	X	n/a	X	X	X	X

X = stream is meeting Beneficial uses, n/a = not a Beneficial use in that stream (IDEQ, 2006).

POLLUTANTS OF CONCERN

The assessment for the Bear River/Malad subbasin specified that streams listed for sediment and nutrients are Bear River, Weston and Battle creeks. Streams listed for flow alteration include Bear River and Weston Creek. Streams listed for unknown pollutants are Deep, Strawberry, and Fivemile creeks (IDEQ, 2006). Table 6 summarizes the streams and the required load reductions to meet the TMDL. These pollutants are degrading the water quality and the wildlife habitat in and along these §303(d) listed stream reaches. The excess sediment and nutrients added to the system along these streams is accelerating eutrophication of Cutler Reservoir and lowering the water quality in the streams.

Table 6. Identified Pollutants and Required Reductions for Impaired Streams

Water Body	§303(d) Listed Pollutants	Required Reduction to meet TMDL
Battle Creek	Nutrients Sediment	3,597 lbs TP per yr 2,999,744 lbs TSS per yr
Bear River	Nutrients Sediment	80,255 lbs TP per yr 0.0 lbs. TSS pr yr
Deep Creek	Unknown pollutants	6,492 lbs TP per yr 4,252,611 lbs TSS per yr
Fivemile Creek	Unknown pollutants	375 lbs TP per yr 0.0 lbs TSS per yr
Strawberry Creek	Unknown pollutants	No Load Reduction set
Weston Creek	Nutrients Sediment	1,545 lbs TP per yr 0.0 lbs TSS per yr

PAST WATER QUALITY MONITORING

IASCD and ISDA recently completed a water quality monitoring project on eight streams in the Middle Bear subbasin: Densmore, Whiskey, Williams, Cottonwood, Battle, Deep, Fivemile, and Weston creeks (Jenkins, 2007). The goal of the monitoring was to quantify pollutant concentrations in the streams to help the Franklin and Caribou SCDs prioritize areas for BMP implementation. Water quality samples were collected from 2005 to 2006 and were analyzed for suspended sediment, phosphorus, and nitrogen.

The results of the monitoring indicated that six of the eight streams experienced elevated pollutant levels, especially during spring runoff events. Fivemile and Battle creeks typically had the highest

pollutant concentrations, while Deep and Weston creeks had the highest pollutant loads. As a result, IASCD recommended that Fivemile, Battle, Deep, and Weston creeks be considered priority areas for implementation in the subbasin. IDEQ continues monitoring on a quarterly basis as part of a tri-state effort that will be conducted through 2011. A number of water quality studies were carried out in the subbasin by USU (Clyde 1953; Sorenson et al. 1984, 1986). These studies indicated that elevated sediment and nutrient loads in the Bear River below Oneida Narrows Reservoir were due to tributary inputs. Limited tributary data have been collected by ERI and IDEQ in the subbasin (Jenkins, 2007).

IDENTIFIED PROBLEMS

Based on all the available water quality monitoring data the FSWCD identified the following problems in the watersheds. These include stream bank modifications, confined animal feeding operations, over utilized pastures, freeze/thaw cycles of streambanks, sheet and rill erosion, classic and ephemeral gully erosion, irrigation induced erosion, and streambank erosion. Critical erosion periods are lower basin and upper basin spring runoff. These two runoff periods seem to have different sources of pollutants but produce similar loads (FSWCD, 1993).

AGRICULTURAL WATER QUALITY MONITORING AND EVALUATION

RIPARIAN

Due to rising concerns for the Bonneville cutthroat trout (BCT) and its habitat in the Bear River drainage, numerous efforts have been initiated to understand the fish movement and distribution. By knowing where the fish are throughout the year projects could be implemented to address specific types of habitat. An effort to evaluate agriculture impacts was a SAWQP planning study conducted from 1990 to 1993. This study looked at sediment sources on agricultural lands and streambanks. Level II field assessments were conducted by walking the streams to document characteristics such as geology, stream order, gradient, stream flow, and adjacent land use.

CURRENT CONDITION – The results of this study indicated that mass wasting in the deep narrow canyons was a major source of sediment to Battle, Deep, Fivemile, and Weston creeks. Severe streambank erosion from the Riverdale Bridge to the Utah State line was a constant source of sediment to the Bear River as well as sediment pulses from the above mentioned tributaries that enter into the Bear River.

The riparian assessment completed in 1992 used the stream condition inventory to assess the health of the streams and adjacent riparian areas. The assessment showed that 51% of the sediment loading was coming from streambanks of tributary streams through eroding banks and mass wasting of the steep canyon walls. Due to the terrain and physical features of the tributary canyons traditional streambank restoration would not be practical (Kidwell 1993, Franklin SWCD, 1993).

In the summer of 2007, ISCC revisited some of the sites that were evaluated in the previous 1993 study to compare the results and the condition of the stream. It was found that the streams were in about the same condition with channel bottom and bank channel shape the two factors that seemed to vary the most. It was determined that the deep narrow canyons were still a major source of sediment and that the conclusions from the previous reports could still be used to direct restoration efforts is these streams.

Also in 2007, ISCC and NRCS evaluated a portion of the main stem Bear River between Fivemile and Deep creeks. Many of the eroding banks identified in the 1992 were stabilized and not supplying the amount of sediment that was calculated in the earlier study. This may be from the requirements set by the Federal Energy Regulatory Commission in the relicense agreement for the power plants on the Bear River. This relicense agreement set requirements on the speed and amount of fluctuation that could occur below the dams on the Bear River. This has reduced the amount of water flowing out of the banks when the water was rapidly lowered reducing the susceptibility of the streambanks to erosion.

RESOURCE CONCERNS – Facilitating practices may be needed for riparian area improvement. These concerns include plant productivity, health and vigor; streambank erosion; noxious and invasive plants; plant establishment and growth; inadequate domestic stock water; and inadequate cover/shelter for wildlife. All resource concerns will be evaluated on a site-specific basis in accordance with NRCS' Conservation Planning Process.

CROP AND PASTURE LANDS

IRRIGATED CROPLAND – There are 66,544 acres of irrigated cropland and irrigated pasture. The irrigated crop and irrigated pasture were planned together because they have similar management. This management requires the addition of fertilizer and irrigation water to supplement the nutrient and water requirements of the crops. The addition of irrigation water can produce some problems by increasing sheet and rill erosion and causing deep percolation of nutrients into ground water. Part of the Bear River, Weston, Deep, Battle, and Fivemile watersheds are included in the Preston/Cache Valley nitrate priority area. Irrigation water management plans and nutrient management plans are practices that may be used to reduce the deep percolation of nutrients into groundwater. Crop rotations on irrigated lands include wheat, barley, oats, corn, alfalfa, and grass pasture.

DRY CROPLAND – There are 51,534 acres of dry cropland in this subbasin. This cropland is typically winter wheat or barley with some fallowed fields; annually cropped spring wheat or barley; and some dry land alfalfa. Some of the dryland fields with highly erodible soil have been enrolled in CRP which requires them to be planted to permanent cover, typically introduced grasses with legumes and shrubs. There has been a movement to plant native grasses, but they have been very difficult to get established.

RANGE LAND

Based on the NRCS Conservation System Guide (NRCS, 2008), the rangeland is in the subbasin covers five Common Resource Areas: the Great Salt Lake – Northern Agriculture Valleys (CRA 28A.5); the Eastern Idaho Plateaus – Sagebrush Steppe and Woodland Covered Hills (CRA 13.4); the Low Mountains & High Elevation Forests (CRA 13.5); the Shrublands & Sagebrush Steppe Valleys (CRA 13.6); and the Wasatch and Uinta Mountains – Semiarid foothills, Eastern Idaho (CRA 47.3)

RESOURCE SETTING – Rangeland vegetation consists of sagebrush and perennial grasses. Precipitation is 12 to 24 inches, most of which falls as snow in winter and early spring. Elevations are from 4,800 to 8,200 feet. Topography consists of steep slopes and high mountain valleys. Soils are loamy to gravelly. Frost free period ranges from 50 to 120 days. Fencing is generally an existing practice.

RANGELAND ASSESSMENT – Rangeland WQI worksheets were completed on multiple sites in each of the common resource areas in the subbasin. The Range WQI provides a way to evaluate and score the condition of eight factors on rangelands to determine water quality impacts and to rate the area in excellent, good, fair, or poor condition

CURRENT CONDITION – Approximately 73,856 acres of the private rangeland assessed in the Southern Middle Bear subbasin is in fair condition and has minimal impact on the water quality in Bear River, Weston, Deep, Battle, Strawberry, and Fivemile creeks. The remaining 18,464 acres are in poor condition and could have a negative impact on water quality. 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 to moderate in sagebrush steppe communities. Depending upon valley type and the location of the stream within that valley, natural vegetation buffers vary in width between 25 to 200 feet. Current grazing management results in 70 to 90 percent grass/shrub cover, with few bare areas. Grazing animals have unlimited access to creeks and springs with minimal sources of livestock watering facilities. Animal productivity and health has no apparent issues under current management schemes.

WATER QUALITY IMPACTS – The erosion potential is considerable with the moderately to steep slopes (8 to 35 percent), fine grained to gravelly texture, and erodible soils with rills and gullies from spring snowmelt and storm events. Additional water impacts may include sediment, nutrients, and bacteria from the unlimited access of livestock to creeks and to springs for livestock watering.

RESOURCE CONCERNS – Existing grazing management may not meet NRCS resource quality criteria or landowner objectives. 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.

SUGGESTED BMPS – 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 policy can create problems because additional private grazing must be secured or animals stay longer on private rangelands. Consequently, the following BMPs are needed for rangelands in the Southern Middle Bear 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).

ANIMAL FACILITY WASTE MANAGEMENT

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. In 2000, the Idaho Legislature passed Idaho law, I.C. §22-4906, Title 22, Chapter 49, Beef Cattle Environmental Control Act. Beef cattle animal feed operations are required to submit a nutrient management plan to ISDA for approval no later than January 1, 2005.

Field inventories identified 22 sites along the following streams which have a negative influence on the Bear River, and Weston, Deep, Battle, Strawberry, and Fivemile creeks or tributaries. Livestock at these animal facilities have direct access to the streams because they have no other water sources and insufficient waste storage structures to contain corral or site runoff.

THREATENED AND ENDANGERED SPECIES

The threatened and endangered species present in Franklin County include: Canada lynx (Lynx canadensis). Franklin County has one candidate species Yellow-billed cuckoo (Coccyzus americanus) and no proposed species and designated/proposed critical habitat (NRCS, 2008). There is one endemic aquatic species of concern the Bonneville cutthroat trout (Oncorhynchus clarki utah) that has received special attention by many different agencies within the Bear River basin.

TREATMENT

CRITICAL AREAS

Those areas having the most significant impact on the water quality of the receiving water body are critical areas. These critical areas include pollutant source and transport areas. The subbasin consists of approximately 218,944 acres of private land with the predominant private land uses being 118,078 acres of cropland and 90,442 acres of rangeland.

TREATMENT UNITS

The subbasin is divided into four treatment units that have similar land uses, soils, productivity, resource concerns and treatment needs. The six §303(d) listed streams in this plan will be targeted to receive project funds as they can be secured.

RIPARIAN

This treatment unit covers the land adjacent to streams that have riparian or aquatic plants as the primary plant life. This area is singled out because of its importance to stream health and its management needs.

CROPLAND

This treatment unit lies between the riparian and rangeland areas, ranging in elevation from 4,400 to 6,000 feet. This area has flat or rolling hills and has soil suitable for producing crops. This land varies from area to area in slope, elevation, soils, precipitation, management, and production. Major crops raised are alfalfa hay, barley, wheat, grass hay, grass pasture, and corn. Irrigated land generally lies on flat to gently rolling foothills, on lower Lake Bonneville terraces, or on the Bear River delta. Dry cropland generally occurs on the upper Lake Bonneville terraces and foothills with steeper slopes.

RANGELAND

Land in this treatment unit is characterized by the presence of native grasses, forbs, shrubs, and trees. The topography is flat to steep with slopes ranging from 0 to 60 percent.

ANIMAL FACILITY WASTE MANAGEMENT

Livestock production is a major industry in area; confined feeding operations exist throughout this subbasin. Most of the livestock sites are located on or adjacent to a natural or constructed drainage system. These represent all types of livestock operations at all levels of management and use. Dairies were not included in this treatment unit because they have already been required to contain any waste.

IMPLEMENTATION PRIORITY

IMPLEMENTATION ALTERNATIVES

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

1. NO ACTION
2. TREATMENT WITH NON-STRUCTURAL BMPS ON CROP AND RANGELANDS
3. TREATMENT WITH STRUCTURAL AND NON-STRUCTURAL BMPS ON CROP AND RANGELANDS
4. RIPARIAN AND STREAM CHANNEL RESTORATION
5. ANIMAL FACILITY WASTE MANAGEMENT

DESCRIPTION OF ALTERNATIVES

ALTERNATIVE 1 - NO ACTION

This alternative continues the existing conservation programs without additional project activities. The identified problems would continue to negatively impact beneficial uses in Bear River, and Weston, Deep, Battle, Strawberry, and Fivemile creeks.

ALTERNATIVE 2 - TREATMENT WITH NON-STRUCTURAL BMPS ON CROP & RANGE LANDS

This alternative would reduce accelerated sheet and rill, and gully erosion this will improve water quality in the subbasin and reduce pollutant loading to the Bear River, and Weston, Deep, Battle, Strawberry, and Fivemile creeks. Beneficial uses may be improved with implementation of this alternative. This alternative includes voluntary landowner participation.

ALTERNATIVE 3 - TREATMENT WITH STRUCTURAL & NON-STRUCTURAL BMPS ON CROP & RANGE LANDS

This alternative would reduce accelerated sheet and rill, and gully erosion to the tolerable soil loss (T). This will improve water quality and reduce pollutant loading to the Bear River, and Weston, Deep, Battle, Strawberry, and Fivemile creeks. Beneficial uses would be improved or achieved with implementation of this alternative. This alternative includes voluntary landowner 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 subbasin. Beneficial uses would be improved with this alternative. This alternative includes voluntary landowner participation.

ALTERNATIVE 5 – ANIMAL FACILITY WASTE MANAGEMENT

This alternative would reduce sediment and nutrient runoff from animal facilities. This would improve water quality by reducing pollutant loading to the Bear River, and Weston, Deep, Battle, Strawberry, and Fivemile creeks. This alternative includes voluntary and mandatory landowner participation.

ALTERNATIVE SELECTION

The FSWCD selected Alternatives 3, 4 and 5 for this subbasin. These three alternatives together meet the objectives set forth in the FSWCD Five-Year plan by improving water quality in the Bear River, and Weston, Deep, Battle, Strawberry, and Fivemile creeks (FSWCD, 2006). Table 7 is an outline of the implementation of alternatives from planning to effectiveness monitoring.

Table 7. Estimated Timeline for TMDL Agricultural Implementation

Task	Output	Milestone
Develop conservation plans and contracts	Completed contract agreements	2013
Finalize BMP designs	Completed BMP plans and designs	2016
Design and install approved BMPs	Certify BMP installations	2022
Track BMP installation	Implementation progress report	2023
Evaluate BMP & project effectiveness	Complete project effectiveness report	2025

ESTIMATED BMP IMPLEMENTATION COSTS

Conservation efforts to date 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 8 lists some of the BMPs, which may be used to treat the resource concerns with their unit amounts and costs. With implementation of these BMPs, beneficial uses in the subbasin may be obtained.

Table 8. Estimated BMP Installation Costs for the Southern Middle Bear Subbasin

Treatment Unit	Best Management Practice	Unit Type	Unit Cost	Unit Amount	Total Funds
TU1 Stream Channels & Riparian 853 acres	Channel Vegetation	acre	$2,100	65	$136,500
	Conservation Cover	acre	$60	185	$11,100
	Critical Area Planting	acre	$250	73	$18,250
	Fence, 4-wire	feet	$2	27,992	$55,984
	Heavy Use Area Protection	acre	$50	25	$1,250
	Pest Management	acre	$20	428	$8,560
	Prescribed Grazing	acre	$5	853	$4,265
	Riparian Forest Buffer	acre	$185	189	$34,965
	Stream Bank Protection	feet	$20	7,524	$150,480
	Stream Channel Stabilization	feet	$35	2,952	$103,320
	Tree/Shrub Establishment	acre	$290	89	$25,810
	Use Exclusion (Riparian)	acre	$100	192	$19,200
				Subtotal	$569,684
TU2 Crop Lands 57,788 acres	Contour Farming	acre	$3	41,721	$125,163
	Conservation Crop Rotation	acre	$2	43,341	$86,682
	Field Border	acre	$88	3,208	$282,304
	Critical Area Planting	acre	$200	1,913	$382,600
	Deep Tillage	acre	$16	33,158	$530,528
	Drip Irrigation	each	$2	47,520	$95,040
	Nutrient Management	acre	$3	57,788	$173,364
	Pasture & Hayland Planting	acre	$100	1,156	$115,600
	Pest Management	acre	$20	12,535	$250,700
	Residue Management	acre	$20	24,115	$482,300
	Water & Sediment Control Basin	each	$800	768	$614,400
	Windbreak/Shelterbelt	feet	$4	47,520	$190,080
				Subtotal	$3,328,761
TU3 Range Lands 37,092 acres	Brush Management	acre	$30	6,016	$180,480
	Fence, 4-wire	feet	$2	74,923	$149,846
	Pest Management	acre	$20	5,530	$110,600
	Pipeline, PE 100 psi, 2.0"	feet	$2	131,433	$262,866
	Prescribed Grazing	acre	$3	18,547	$55,641
	Pumping Plant for Water Control	each	$5,000	60	$300,000
	Range Planting	acre	$80	6,233	$498,640
	Spring Development	each	$2,400	45	$108,000
	Structure For Water Control	each	$3,000	33	$99,000
	Water Well	each	$8,250	47	$387,750
	Watering Facility	each	$1,150	267	$307,050
				Subtotal	$2,459,873
TU4 Animal Facility Waste Management 22 each	Corral Fence	feet	$15	33,000	$495,000
	Nutrient Management	acre	$3	440	$1,320
	Pipeline	feet	$2	22,000	$44,000
	Pumping Plant for Water Facility	each	$3,000	22	$66,000
	Watering Facility	each	$1,000	66	$66,000
	Water Well	each	$8,250	22	$181,500
	Waste Storage Facility	each	$20,000	22	$440,000
				Subtotal	$1,293,820
				Total	$7,652,138

FUNDING

Financial and technical assistance for installation of BMPs is needed to ensure success of this implementation plan. There are many potential sources for funding that will be actively pursued by the Franklin SWCD to implement water quality improvements on private agriculture and grazing lands.

(WQPA) The Water Quality Program for Agriculture; (RCRDP) The Resource Conservation and Rangeland Development Loan Program; (CIG) Conservation Improvement Grants; (SRF) State Revolving Loan Funds are all administered by the ISCC to implement agricultural BMPs or to purchase equipment to increase conservation. http://www.scc.state.id.us/programs.htm

(CWA) Clean Water Act §319 Subgrants are EPA funds that are allocated to the State of Idaho. The IDEQ administers the Clean Water Act §319 Nonpoint Source Management Program which focuses on projects to improve water quality as part of the TMDL process. http://www.deq.state.id.us/

(PL-566) The Watershed Protection and Flood Prevention Act (PL 83-566) authorized NRCS to cooperate with States and local agencies to carry out works of improvement for soil conservation and for other purposes including flood prevention; conservation, development, utilization and disposal of water; and conservation and proper utilization of land. http://www.nrcs.usda.gov/programs/watershed/

(CRP) Conservation Reserve Program is a voluntary program for agricultural landowners. Through CRP, you can receive annual rental payments and cost-share assistance to establish long-term, resource conserving covers on eligible farmland. http://www.fsa.usda.gov

(CTA) Conservation Technical Assistance provides technical help to farmers and ranchers to 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 as part of an active conservation plan. This is provided through your local Conservation District and NRCS. http://www.nrcs.usda.gov/programs/cta/

(CCPI) Cooperative Conservation Partnership Initiative is a voluntary program established to foster conservation partnerships that focus technical and financial resources on conservation priorities in watersheds and airsheds of special significance. http://www.nrcs.usda.gov/programs/ccpi/index.html

(EQIP) Environmental Quality Incentives Program 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/

(WRP) Wetlands Reserve Program 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/

(WHIP) Wildlife Habitat Incentives Program 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/

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

(GLCI) Grazing Land Conservation Initiative provides 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/

(CPGL) Conservation of Private Grazing Land initiative will ensure that technical, educational, and related assistance is provided to those who own private grazing lands.
http://www.nrcs.usda.gov/programs/cpgl/

OUTREACH

Conservation partners in the Southern Middle Bear subbasin will use their combined resources to provide information about BMPs to improve water quality to agricultural landowners and operators within the subbasin. Newspaper articles, tours, and one-on-one contact may be used as outreach tools.

MONITORING AND EVALUATION

FIELD LEVEL

At the field level annual contract 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 BMPs to determine adequacy of installation, consistency of operation and maintenance, and relative effectiveness of installed BMPs in reducing water quality impacts and the effectiveness of BMPs in controlling agriculture nonpoint source pollution. These BMP effectiveness evaluations will be conducted according to the protocols out lined in the Agriculture Pollution Abatement Plan and the ISCC Field Guide for Evaluating BMP Effectiveness.

RUSLE and SISL are models 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 measure sheet and rill, irrigation-induced and gully erosion. SVAP and SECI are stream evaluation protocols used to assess aquatic habitat and streambank erosion and lateral recession rates. Idaho OnePlan, 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 to subbasin level, there are many government and private groups involved with water quality monitoring. The IDEQ uses BURP is 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.

For funded projects annual project reviews will be conducted to insure the project is kept on schedule. With many projects being implemented across the state the ISCC developed a software program to the track costs and the amount of each BMP installed. This program can show what has been installed by project or the watershed level and as well as at the subbasin level and state level. These project and program reviews will insure that TMDL implementation is 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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ACRONYMS

§303(d)	Section in the Clean Water Act requiring states to list water quality limited waters
§319	Nonpoint Source Management Program
AFO	Animal Feeding Operation
BMP	Best Management Practice
BLM	Bureau of Land Management
BURP	Beneficial Use Reconnaissance Program
CAFO	Confined Animal Feeding Operation
CFS	Cubic Feet per Second
CRP	Conservation Reserve Program
CTNF	Caribou Targhee National Forest
FCFD	Franklin County Fire District
FSWCD	Franklin Soil and Water Conservation District
IASCD	Idaho Association of Soil Conservation Districts
IDEQ	Idaho Department of Environmental Quality
IDL	Idaho Department of Lands
ISCC	Idaho Soil Conservation Commission
ISDA	Idaho State Department of Agriculture
NRCS	Natural Resource Conservation Service
NFWF	National Fish and Wildlife foundation
RUSLE II	Revised Universal Soil Loss Equation
SAWQP	State Agriculture Water Quality Program
SECI	Stream Erosion Condition Inventory
SISL	Surface Irrigation Soil Loss
SVAP	Stream Visual Assessment Protocol
“T”	Tolerable Soil Loss Rate
TMDL	Total Maximum Daily Load
TSS	Total Suspended Sediment
TU	Treatment Unit
UACD	Utah Association of Conservation Districts
USGS	United States Geological Survey
USU	Utah State University