Cub River Watershed
Agricultural TMDL Implementation Plan

Developed for the

Idaho Department of Environmental Quality

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In Cooperation with the

Idaho Association of Soil Conservation Districts

Franklin Soil and Water Conservation District

USDA-Natural Resources Conservation Service

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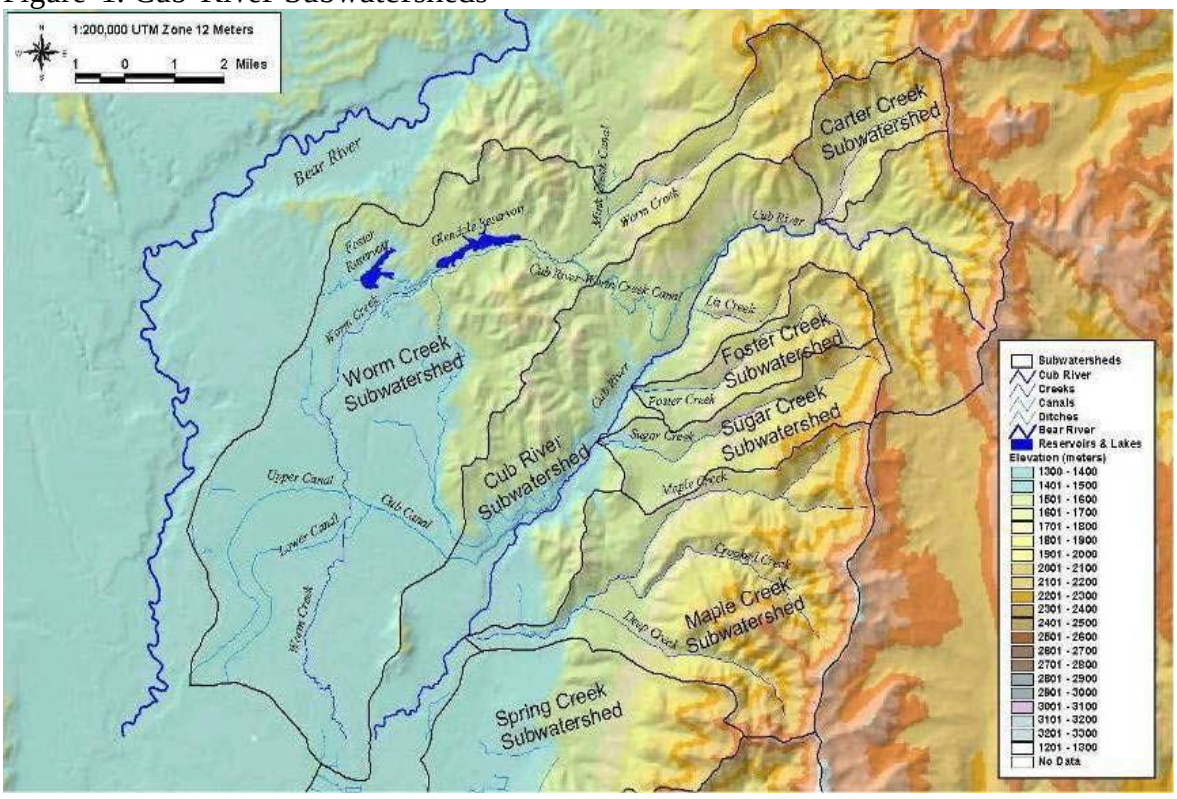
Introduction

Purpose

The purpose of this plan is to recommend Best Management Practices (BMPs) that would improve or restore physical and biological functions of Cub River, Worm Creek and Maple Creek (Figure 1). This Agricultural Total Maximum Daily Load (TMDL) Implementation Plan will build upon past conservation accomplishments made through the Cub River Steering Committee and Franklin Soil and Water Conservation District (FSWCD). These past projects and future projects will help to restore beneficial uses in Cub River, Worm Creek and Maple Creek. This plan outlines an adaptive management approach for developing site-specific conservation plans with indivial farmers and ranchers that will recommend BMP's 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. An adaptive management process will be guided by follow up evaluations and monitoring.

Figure 1. Cub River Subwatersheds



Goals and Objectives

The goal of this implementation plan is to restore beneficial uses on §303(d) listed stream segments of Cub River, Worm Creek and Maple Creek. The objectives of this plan are to identify critical areas along the listed stream segments and to recommend BMPs for reducing sediment, nutrient and bacteria loading to §303(d) listed water bodies.

Background

Project Setting

The Cub River watershed located in southeastern Franklin County, Idaho and northern Cache County, Utah and covers an area of approximately 153,000 acres or 239 square miles (Figure 2) with 82,367 acres in Idaho. The Cub River flows southwesterly from its headwaters in the Bear River Range to its confluence with the Bear River west of Richmond, Utah (UACD 2002). Native Americans used the Cub River and Cache Valley area for summer hunting. They also established trade routes through the tops of the Bear River Range. One of these trade routes used part of the Cub River drainage for access into Bear Lake Valley; this route has continued to be used and is now called the German Dug way. Some of these early inhabitants may have also used some hot springs just out side the Cub River Watershed to establish winter camps allowing them to stay in the Cache Valley year round. With the arrival of the early settlers around the 1850s and the establishment of Franklin in 1860 the Cub River watershed has been used extensively for culinary water, irrigation, grazing and logging (USU, 2000).

Since the early 1990's there has been a lot of urbanization occurring in the Cub River watershed. With this urbanization there has been a greater emphasis on water quality. Utah contracted Ecosystem Research Institute (ERI) to develop The Lower Bear River Water Quality Management Plan (ERI 1995), which was accepted as Utah s TMDL plan for the Utah portion of the Bear River and several of its tributaries including the Cub River and Worm Creek. This plan reported that high loads of sediment, bacteria and nutrients are impairing the ability of the Cub River, Maple Creek and Worm Creek to support their beneficial uses.

The Lower Bear River Water Quality Management Plan ranks impact reduction from the Cub River watershed as the second priority for improvement actions. The plan also recommends working with Idaho to help reduce incoming sediment load. The plan also estimated that a high level of remediation effort would be required to reduce the loads to below the enforceable and nonenforceable standards in Lower Bear River Water Quality Management Plan for sediment, nutrients and bacteria. With the approval of Utah's Lower Bear River Water Quality Management Plan, the Cub River must meet a total phosphorus target of 0.05 mg/L and a total suspended solids target of 90 mg/L. Worm Creek, which also crosses the state line, must not exceed a TSS target of 35 mg/L or total phosphorus target of 0.05 mg/L as out lined in this plan.

Figure 2. Cub River Watershed

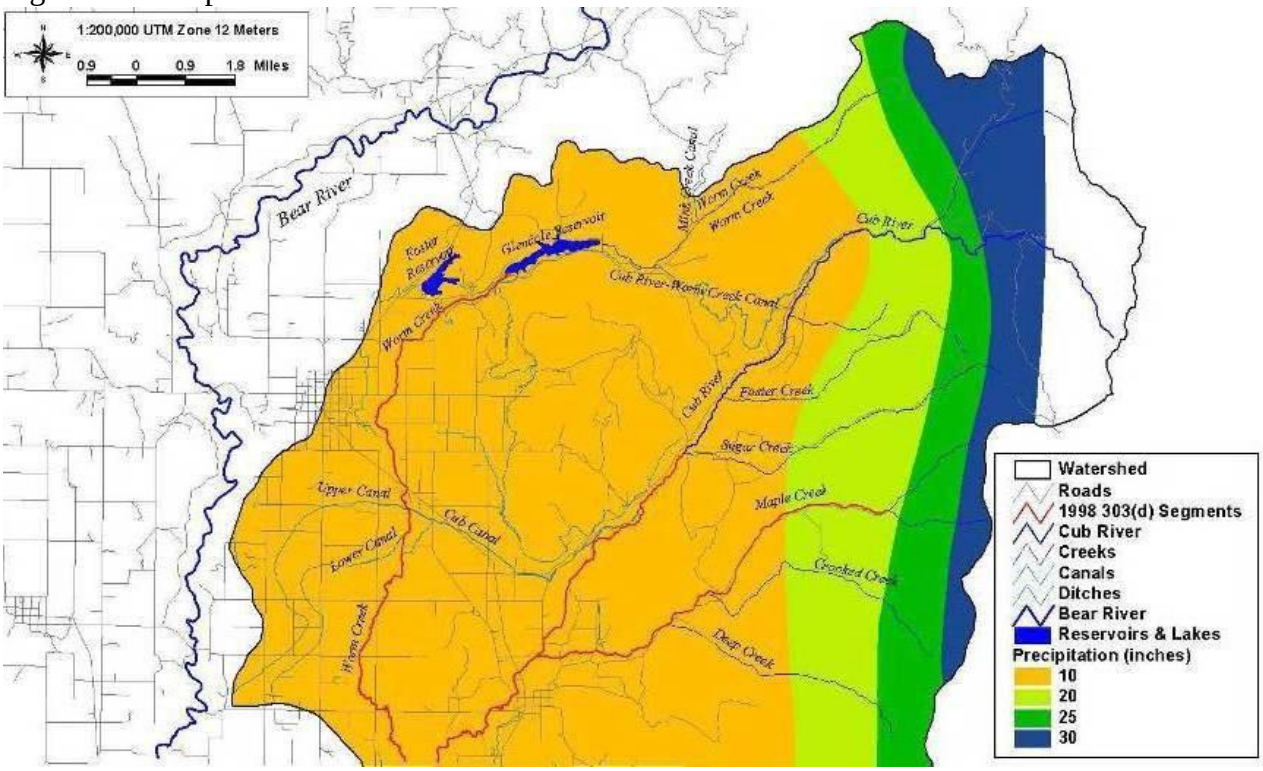
Topography

The Cub River basin has a varied topography of mountains, mountain valleys, foothills, stream terraces, alluvial fans and valley plains. The Bear River range comprises the mountainous, eastern edge of the Cub River watershed with most of its tributaries flowing west into the lower elevations of the basin within Cache Valley. Elevations in the watershed range from 9,300 feet in adjacent mountains to 4,451 feet at the basin floor. With this difference in elevations and slopes and a southwest aspect it allows the watershed to have two runoff periods, a low valley runoff in April and May and a highland runoff in June and July (ERI, 1999).

Climate

The watershed is in the intermountain region 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 western portions of the drainage to over 30 inches in the mountains to the east (Figure 3). The frost-free period varies from 120 to 140 days. The last frost in 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 3. Precipitation



Geology

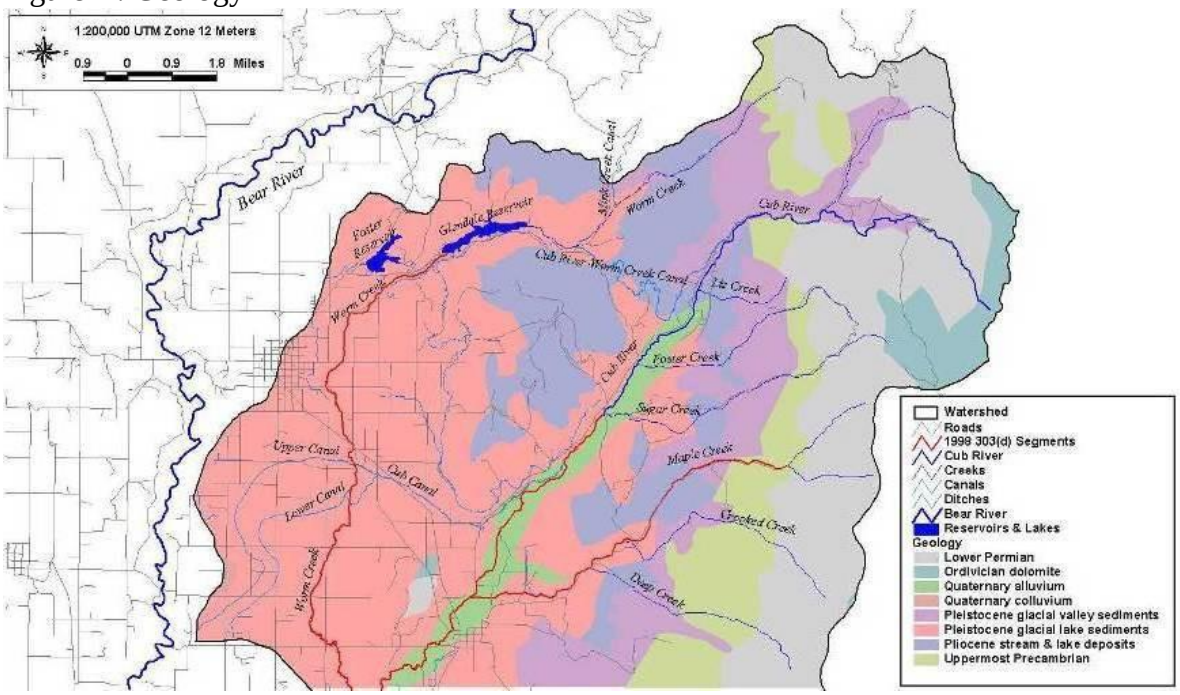
The watershed encompasses two geologic districts, which are areas of similar rock type or parent material. The mountainous eastern portion of the watershed is sedimentary. The parent rock includes limestone and dolomite of Paleozoic age, with Tertiary stream and lake deposits and smaller areas of Precambrian quartzite and marine deposits. Relatively thin deposits of alpine glacial till occur, as well as alluvium along stream courses.

The western, lower gradient part of the watershed is unconsolidated, comprised primarily of alluvium and Pleistocene lake deposits (White Horse, 2000). There are eight geologic formations in the watershed listed below in Table 1.

Table 1. Cub River Watershed Geology

Formation	Description
Paleozoic (C)	Lower Permian to Lower Pennsylvanian (Carboniferous) shallow-water detritus
Paleozoic (O)	Ordovician marine dolomite, quartzite and limestone
Cenozoic (Qa)	Quaternary alluvium; may contain some glacial deposits and colluvium in uplands
Cenozoic (Qg)	Quaternary colluvium, fanglomerate and talus plus some glacial debris in upland valleys
Cenozoic (Qpc)	Pleistocene upland valley deposits; commonly derived from alpine glaciation.
Cenozoic (Qpd)	Pleistocene glacial lake, ponded water and shoreline sediments
Cenozoic (Tpd)	Pliocene stream and lake deposits; may be due to volcanic and block faulting events
Precambrian (Z2s)	Uppermost Precambrian massive quartzite with carbonate beds overlying

Figure 4. Geology



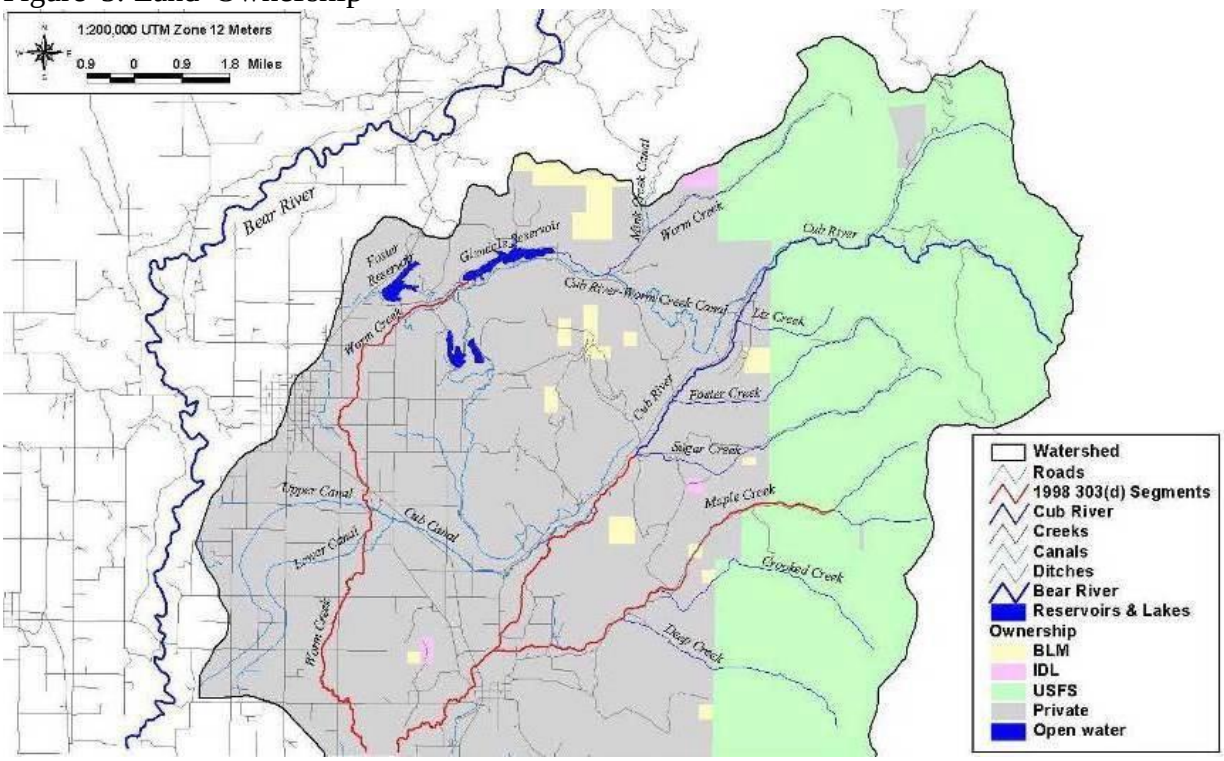
Land Ownership

There are approximately 46,294 acres of private land (Table 2) and 35,610 acres managed by Idaho Department of Lands (IDL), Bureau Land Management (BLM) and Caribou Targhee National Forest (CTNF) in the Cub River watershed (Figure 5).

Table 2. Cub River Watershed Land Ownership

Land Ownership	Acres
State of Idaho	223
Open water	462
B.L.M.	1,508
U.S. Forest Service	33,879
Private	46,294

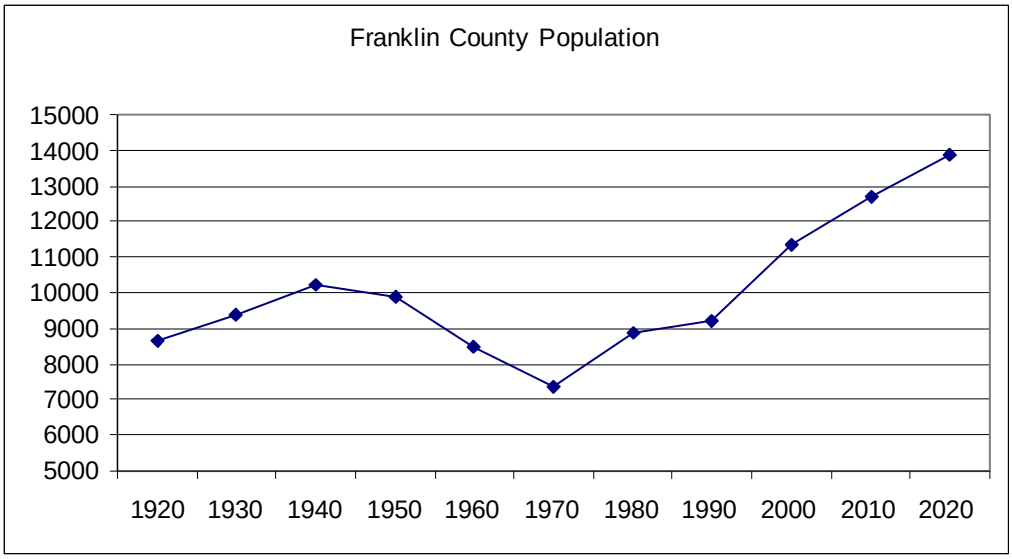
Figure 5. Land Ownership



Urbanization

As of the 2000 census there were 11,329 people residing in Franklin County. The growth rate from 1990 to 2000 was 22.7% (Figure 6) this is the highest growth rate Franklin County has had in a long time. Most of this growth is occurring around the urban areas and along the tributaries to the Bear River with lot sizes ranging between 1 to 15 acres. The Idaho and Utah Transportation Departments will complete a four-lane road between Logan Utah and Preston Idaho in the fall of 2006. This has the potential of increasing the growth rate of the county higher than 22.7% as from 1990 to 2000. Many of the people moving in to the county work in Utah with commutes ranging from 30 minutes to 2 hours.

Figure 6. Census 1920-2000



*2010 and 2020 are projected

Private Land Use

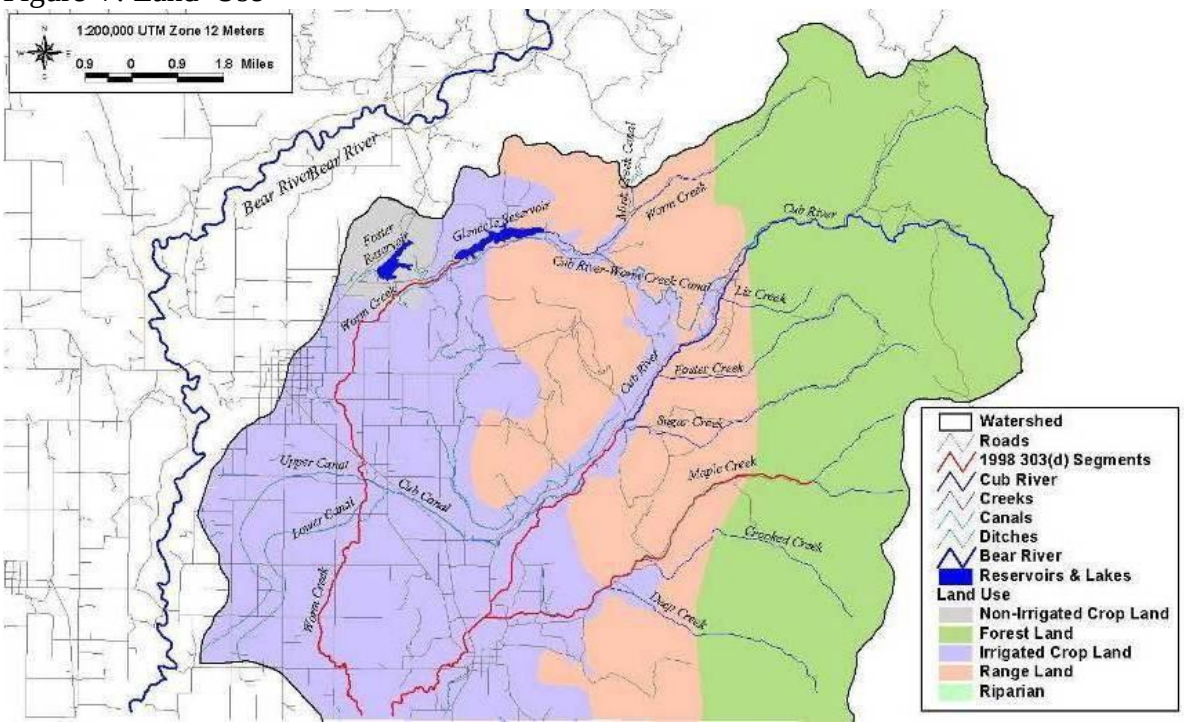
Land use in the watershed is widely varied from recreation, urban, rangeland, dry and irrigated cropland, irrigated pastures and summer homes or ranchettes (table 3). Recreation is centered around the reservoirs and streams and the Bear River Mountain Range. Ranchettes are becoming very common along the Cub River and Worm Creek and around the reservoirs. Preston and Franklin have municipal sewer systems but all of the outlying communities have individual septic systems.

Dry cropland is located in the uplands above the irrigation canal systems with typical crops of hay and small grain. The irrigated cropland is found between the irrigation canals and the streams and are typically flat areas that have hay, grain, corn or grass pasture in the rotations (Figure 7). There were a lot of row crops grown in the area but with the loss of the processing plants most of these crops have become unprofitable to grow. With the higher fuel costs many of the landowners are planting pasture. The Boy Scouts of America operate a Scout camp on about 380 acres in the upper Cub River watershed. 4,500 kids with adult leaders primarily use it in the summer for eight to ten weeks and then on the weekends through the winter for cross-country skiing trips.

Table 3. Private Land Uses in the Cub River Watershed

Land Use	Acres
Crop Land	23,704
Range Land	19,440
Open Water	462
Roads	1,437
Rivers & Creeks	1,251
Total	46,294

Figure 7. Land Use



Water Use

The Cub River is a fourth order stream, with nine third order tributaries. Eight of these drain the eastern part of the watershed while Worm Creek drains the northwestern part of the watershed. The watershed contains approximately 92 miles of perennial streams, 267 miles of intermittent streams (White Horse 2000) and 138 miles of canals. Peak flows occur in March and June when the snow melts. Base flows occur during the remainder of the year and are fed by subsurface returns and by springs and tend to be low and constant. Cub River flows at the USFS boundary from 1944 to 1953 averaged 88 cfs, with a low of 14 cfs and a spring peak flow of 691 cfs. Over the same period, discharge at a site above Maple Creek near Franklin, Idaho averaged 95 cfs, ranging between 19 cfs to 396 cfs (UACD 2002).

Irrigation water is diverted from the Cub River at three major locations and at several other smaller diversions. The lower two diversions distribute water to the lower watershed. The diversion highest in the watershed moves water to into Worm Creek and stores it in Glendale Reservoir. Mink Creek water is also transported into Worm Creek through the station creek tunnel and stored in Glendale Reservoir (UACD 2002). Glendale, Foster, Lamont and Johnson are the small irrigation reservoirs, which store water for the summer irrigation season. Cub River irrigation, Preston Whitney irrigation, Preston Whitney Reservoir co and Cub River Pumping Group are the major canal companies that serve the irrigated cropland in the watershed. There are about 15,000 irrigated acres in the watershed and about 5,000 out side the watershed that are irrigated with Cub River or Worm Creek water (Figure 8). About 5% of the irrigated land is surface irrigated. The remainder is sprinkled and two of the canals have engineer designs to pipe the canal which would further reduce the surface irrigated land even more. Another interesting thing in the watershed is that the irrigation type varies with the type of crop produced. When the field is in corn they use gated pipe and when it is in small grain or alfalfa they use wheel line or hand line sprinklers unless they have installed a pivot on the field.

Figure 8 redacted to comply with Section 1619 of the 2008 Farm Bill.

Accomplishments

The FSWCD in an attempt to show local landowners the benefits of having functioning riparian areas along the Cub River have worked with area landowners to install a bioengineering demonstration project on the Cub River. This demonstration project showed area landowners how to do minor stream bank restoration. In addition to this demonstration project the FSWCD is implementing a §319 grant restoring eroding banks on the Cub River also the Natural Resource Conservation Service (NRCS) has implemented EQIP and other projects along Cub River, Maple Creek and Worm Creek. These projects are summarized in Table 4.

Table 4. Completed BMP Costs in the Cub River Watershed

Program	Practice	amount	Cost Share	Land Owner	Total
319	Stream bank protection	2006 ft	$24,732.00	$16,548.00	$41,280.00
CRP	CRP	1566 ac	$50,126.00	$19,575.00	$69,701.00
EQIP	Grazing	339 ac	$22,827.00	$17,120.00	$39,947.00
EQIP	Irrigation system	11 ea	$185,340.00	$139,005.00	$324,345.00
EQIP	Irrigation water management	445 ac	$1,782.00	$1,336.00	$3,118.00
EQIP	Nutrient management	393 ac	$3,140.00	$2,355.00	$5,495.00
EQIP	Pest management	60 ac	$1,323.00	$992.00	$2,315.00
EQIP	Stream bank protection	3806 ft	$50,996.00	$38,247.00	$89,243.00
EQIP	Waste storage	21 ea	$397,447.00	$323,085.00	$720,532.00
	Total		$737,713.00	$558,263.00	$1,295,976.00

Soil Erosion Reductions

Implementation of BMPs on the Cub River has obtained 128 tons per year of soil savings or a 6% reduction in average annual soil erosion as shown in Table 5. The soil savings was calculated using the information gathered from the stream bank inventory in 2002. Stream Erosion Condition Inventory (SECI) estimates long-term stream erosion rates. This method produces an index by ranking six factors; bank stability, bank condition, bank cover, channel shape, channel bottom and deposition. The teams used SECI to estimate erosion on the entire reach. Eroding sections, not similar to the entire reach s erosion condition, were measured and ranked separately from the rest of the reach. Stream erosion rates are estimated by applying lateral recession rates (LRR) to bank height and bank length measurements. SECI was used for comparison rather than absolute erosion rates in a sediment budget (NRCS 2000).

Table 5. Soil Erosion Reductions from BMPs installed in the Cub River Watershed

Stream Reach	Reach Length	Estimated Erosion Rate (tons/year)	BMP Treatment	Treated	Estimated Soil Savings (tons/year)
CR1	2,858	3	Watering Facility	1 ea	
CR5	2,673	18	Stream bank Protection	900 ft	3
CR6	3,623	31	Stream bank Protection	900 ft	4
CR7b	2,771	3	Channel Vegetation	899 ft	2
CR12	4,174	327	Stream bank Protection	3,086 ft	119
CR14	6,411	26	Waste Mgt system	1 ea	
	Totals				128
	Annual Soil Erosion Savings in Cub River = 128 tons/year				

Problem Statement

Beneficial Use Status

The Idaho Department of Environmental Quality (IDEQ) designated beneficial uses on rivers, creeks, lakes and reservoirs (Table 6) to meet the requirements of the Federal Clean Water Act. Cub River, Maple Creek and Worm Creek are listed on the state of Idaho s §303(d) list of water quality impaired water bodies (IDEQ, 1998).

Table 6. Beneficial use status

	Beneficial Uses								
Stream	CWAL	SS	AWS	PCR	SCR	DWS	IWS	WH	AESTHETICS
Cub River	Impaired	Impaired	X	X	X	X	X	X	X
Maple Creek	X	X	X	n/a	Impaired	n/a	X	X	X
Worm Creek	Impaired	X	X	n/a	X	n/a	X	X	X

(IDEQ, 2002).

Pollutants of Concern

The Subbasin Assessment for the Idaho Bear River Basin specified that sediment and nutrients were pollutants of concern for Cub River, Worm Creek and bacteria is the pollutant of concern for Maple Creek (IDEQ, 2005). These pollutants are degrading the water quality and the wildlife habitat in and along these 303d listed stream reaches. The excess sediment and nutrients which, are added to the system along these streams, is accelerating eutrophication of Cutler Reservoir and lowering the water quality in the streams.

Past Water Quality Monitoring

Our goal is to evaluate the impact of crop, pasture and range lands on the Cub River. Water quality and discharge measurements collected are used to identify stream reaches exceeding standards and to determine areas that contribute to pollutant loading. This information was used to locate areas where BMPs should be implemented to reduce sediment and nutrient loads.
A number of water quality studies have been conducted in the Cub River watershed in Idaho. Most recently, Ecosystems Research Institute (ERI) published water quality monitoring data for three locations on the Cub River (ERI 1995, ERI 1998). Samples were collected from the Cub River at the Idaho-Utah state line from October 1992 to September 1993 and at Mapleton and the Forest Service boundary from April 1994 to September 1996. Sampling occurred throughout the year at each site.

Water quality samples were collected as grab samples within the mixed portion of the stream. Samples were analyzed for suspended solids, total phosphorus, ortho phosphorus, nitrate+nitrite, ammonia and coliform bacteria. At each site stream discharge, temperature, dissolved oxygen, specific conductance, total dissolved solids and pH were measured.

The data collected in these studies can be compared to future data collected in the Cub River watershed. Monitoring will be conducted after BMP implementation projects are completed to track changes in water quality of the Cub River and its tributaries. Monitoring will occur at the previously sampled sites for direct comparison of results over time.

Identified Problems

Based on all the available water quality monitoring data the Cub River Steering Committee and FSWCD identified the following problems in the watershed. These include stream bank

modifications, confined animal feeding operations, over utilized pastures, freeze thawing of stream banks, sheet and rill erosion, classic and ephemeral gully erosion, irrigation induced erosion and stream bank erosion. Critical erosion periods are lower basin and upper basin spring runoff. These two runoff periods seem to have different sources of pollutants (ERI, 1999).

Threatened and Endangered Species

The threatened and endangered species present in Franklin County include: Gray wolf (Canis lupus), Bald eagle (Haliaeetus lucocephalus), Whooping crane (Grus americanis), Canada lynx (Lynx canadensis) and Ute Ladies'-tresses (Spiranthes diluvialis). Franklin County contains no candidate or proposed species (NRCS, 1999). There is one endemic aquatic species of concern the Bonneville cutthroat trout (Oncorhynchus clarki utah) that has received special attention by many different agencies with in the Bear River basin.

Riparian

Because of the increasing urbanization in the watershed and the concern for the Bonneville Cutthroat trout and its habitat, numerous efforts were initiated to understand the Cub River better. In 1998, the Franklin SWCD (FSWCD) in cooperation with the Cub River Idaho Steering Committee, Bear River RC&D, and the North Cache SWCD, landowners, residents and several local, state and federal agencies initiated a project to inventory resources, to develop alternatives, and to implement conservation in the Cub River Watershed.

From 1996 to 2005, IDEQ conducted BURP assessments on the Cub River and its tributaries. In 2000, Whitehorse and Associates (2000) classified the ecological types along the Cub River to identify and document resource conditions. In 2001, Franklin SWCD, NRCS, ISCC, and IASCD staff assessed 19 reaches on 12 miles of the river. In 2005, Franklin SWCD, NRCS, ISCC, IDEQ, UACD, USU, and IASCD staff assessed 6 reaches on 15 miles of Worm Creek (Figure 9). The purpose of these inventories was to guide BMP implementation in Idaho s portion of the watershed. From 2001 to 2005, 25 reaches were assessed on 27 miles of the Cub River and Worm Creek. Those results are summarized in Tables 7 and 10, which show the results from the assessments.

Figure 9. Worm Creek and Cub River SVAP Reaches

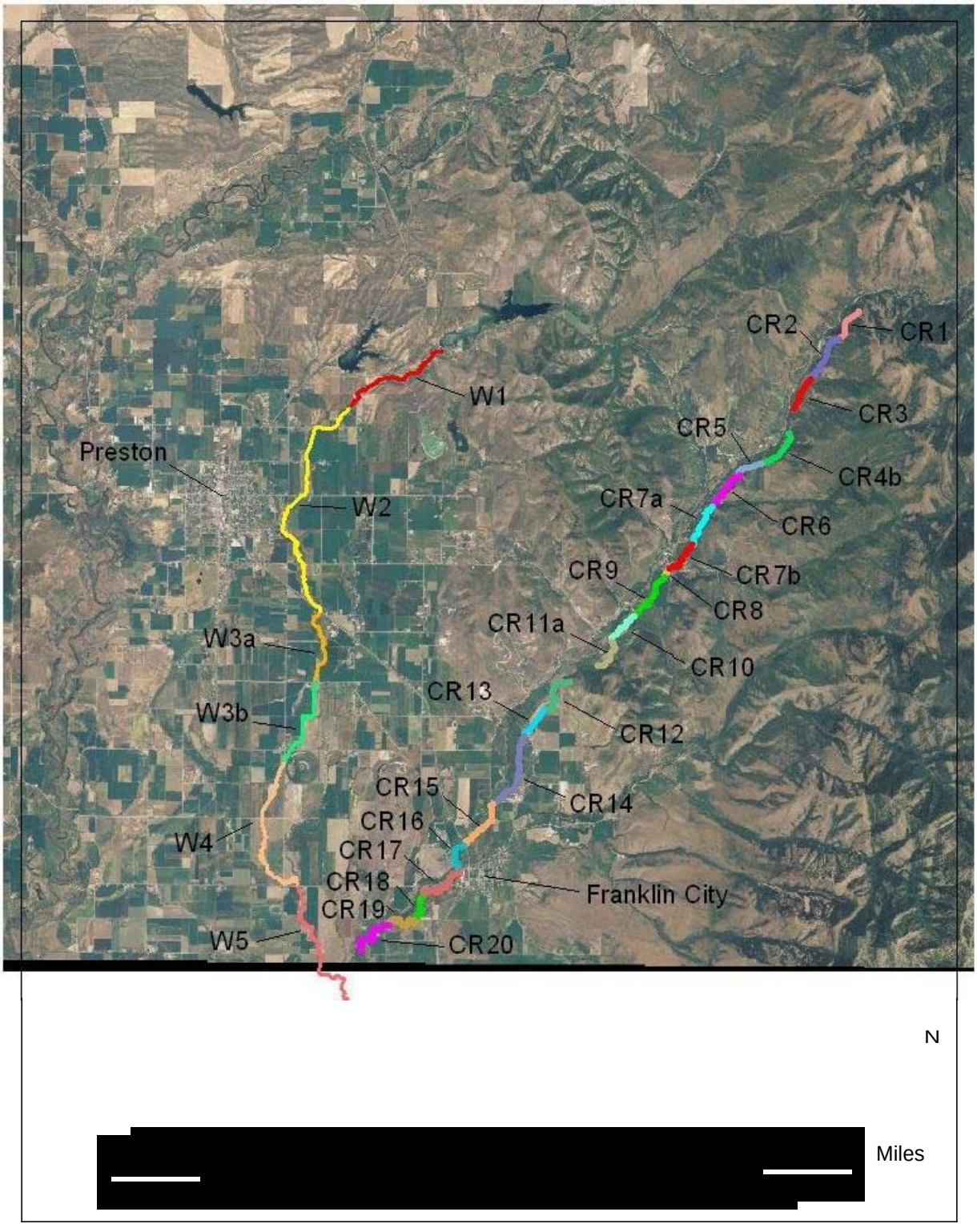


Table 7. Riparian Assessment Results on the Cub River

Stream Visual Assessment	← 9% or 1.1 miles were in good condition ← 45% or 5.4 miles were in fair condition ← 46% or 5.5 miles were in poor condition
Streambank Stability	← 90% or 10.8 miles with streambank stability ε 80% TMDL target ← 10% or 1.2 miles with streambank stability < 80% TMDL target
Streambank Erosion Condition	← 67% or 8 miles had slight erosion ← 33% or 4miles had moderate erosion ← 0% or 0 miles had severe erosion

Table 8. Cub River Identified Problems

Description	CR 1	CR 3	CR 4b	CR 5	CR 6	CR 7a	CR 7b	CR 9	CR 10	CR 11a	CR 12	CR 13	CR 14	CR 15	CR 16	CR 17	CR 18	CR 19	CR 20
Channel Condition	+	+	+	+	+	+	+						+					+	
Hydraulic Alteration	+	+	+	+	+	+		+	+					+					
Riparian Zone	+		+					+	+	+			+				+	+	
Bank Stability	+	+	+	+	+	+	+	+	+				+				+		
Fish Barriers																			
Manure Presence																			

- \- Indicates a score of 7 or below on SVAP form
- \+ Indicates a score of 8 or above on SVAP form

Table 9. Riparian Assessment Results on Worm Creek

Stream Visual Assessment	← 0% or 0 miles were in good condition ← 0% or 0 miles were in fair condition ← 100% or 14.5 miles were in poor condition
Streambank Stability	← 82% or 12 miles with streambank stability ε 80% TMDL target ← 18% or 2.5 miles with streambank stability < 80% TMDL target
Streambank Erosion Condition	← 0% or 0 miles had slight erosion ← 100% or 14.5 miles had moderate erosion ← 0% or 0 miles had severe erosion

Table 10. Worm Creek Identified Problems

Description	Worm Creek Assessed Reaches					
	W 1	W 2	W 3a	W 3b	W 4	W 5
Channel Condition						
Hydraulic Alteration						
Riparian Zone						
Bank Stability						
Fish Barriers						
Manure Presence						

- - Indicates a score of 7 or below on SVAP form

Riparian Summary

Cub River has a SVAP aquatic habitat score of fair to poor, with good stream bank stability and slight stream bank erosion. It appears that the irrigation structures are affecting the streams ability to transport the sediment load resulting in some of the reaches stream banks to supply the sediment to the stream. The lack of riparian vegetation is also a factor in the poor habitat score because the upland vegetation can't hold the banks together to have overhanging banks and provide large and small woody debris to the stream for fish and invertebrates habitat.

Worm Creek on the other hand has a very poor SVAP habitat score, with great stream bank stability and moderate erosion. The high stream bank stability score on Worm Creek is from the constant flows, which cause the steam to develop a homogeneous substrate. Glendale Reservoir acts like a sediment trap, which starves the steam below the reservoir of sediment this restricts the streams ability to develop point bars which is an indicator of good stream health. Reed Canary grass due to its rooting structure has become dense enough to reduce the percentage of bare banks lowering the erosion in some reaches.

Maple Creek was not assessed using SVAP because it is listed for bacteria only and on the USGS 7 Y minute topographic map the stream is listed as intermittent. When the Cub River was assessed it was indicated that there was no noticeable negative impact to the Cub River from Maple Creek. In an initial inventory it there were some animal feeding areas with animal access to maple creek and ISDA is working with them to bring their facility into compliance with the Idaho Beef Cattle Environmental Control Act.

Crop and Pasture Lands

There are 23,704 acres (51% of the subbasin) of non-irrigated (dry land) and irrigated crop and irrigated pasture. The non-irrigated is typically winter wheat or barley with some fallowed fields, spring wheat or barley annually cropped and some dry land alfalfa. Some of the non-irrigated fields with highly erodible soil has been enrolled in CRP which requires the field to be planted to permanent cover typically introduced grass with some type of legume and shrub, there has been a movement to plant native grasses which have been very difficult to get established. The irrigated crop and irrigated pasture were planned together because they have similar management. This management is the addition of fertilizer and irrigation water to supplement the nutrient and water requirements of the crop. The addition of irrigation water can produce some problems by increasing sheet and rill erosion and causing deep percolation of nutrients into the ground water. Part of the Cub River watershed is included in the Preston/Cache Valley Nitrate Priority Area. Irrigation water management plans and nutrient management plans could be good practices to reduce the deep

percolation of nutrients into the groundwater. Crop rotations on irrigated lands include wheat, barley, oats, corn, alfalfa, and grass pasture.

Range Land

Most of the private rangeland is the low rolling hills above the irrigated and non-irrigated cropland in areas that are too steep to farm. Most of the private rangeland area is located in a 10-18 inch precipitation zone with Bluebunch wheatgrass, Big basin sagebrush, and Antelope bitterbrush are the dominant species with some invasion of cheatgrass. Most of this rangeland is good for early and late season grazing and produces 300 to 800 lbs/ac. In the Cub River watershed, Big tooth maple has expanded into very thick dense patches, which have very little vegetation in the understory reducing the grazing potential in these areas.

Animal Facilities

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 24 sites, which have a negative influence to the Cub River, Worm Creek and Maple Creek or tributaries. These facilities livestock have access to the streams with insufficient waste structures to contain corral or site runoff and no off stream water source.

Implementation Priority

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 watershed consists of approximately 82,367 acres with private agriculture land accounting for 43,144 acres. The predominant private land uses are 23,704 acres of cropland and 19,440 acres of rangeland.

Implementation Tiers

Critical areas adjacent to Cub River, Maple Creek and Worm Creek in Tier 1 are considered high priority for implementation due to the increased potential to directly impact surface water quality. There are three tiers delineated within the subwatershed. These tiers were determined by the proximity of the critical areas to the §303(d) listed stream segments.

Tier 1 Unstable and erosive stream channels and riparian areas or adjacent fields and facilities that have a direct and substantial negative influence on the stream

Tier 2 Fields or facilities with an indirect, yet substantial negative influence on the stream

Tier 3 Upland areas or facilities that indirectly influence the stream

Treatment

Treatment Units

The watershed 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 11. These three subwatersheds will be targeted to receive project funds as they can be secured.

Table 11. Treatment Units in the Cub River Watershed

	Land Use	Cub River	Maple Creek	Worm Creek	Total
Tier 1	Riparian	3,865	1,289	2,752	7,906
	Cropland	4,408	1,483	3,191	9,082
	Rangeland	3,712	1,241	2,591	7,544
Tier 2	Cropland	3,428	1,143	2,101	6,672
	Rangeland	3,327	1,136	2,017	6,480
Tier 3	Cropland	2,564	639	1,218	4,421
	Rangeland	2,500	637	1,173	4,310
Tier 4	Animal Facilities	8	6	10	24

Implementation Alternatives

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

1. No action
2. Land treatment with non-structural BMPs on crop and rangelands
3. Land 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 Cub River watershed.

Alternative 2 - Land treatment with non-structural BMPs on crop and rangelands

This alternative would reduce accelerated sheet and rill, and gully erosion this will improve water quality in the watershed and reduce pollutant loading to the Cub River, Maple Creek and Worm Creek. Beneficial uses may be improved with implementation of this alternative. This alternative includes voluntary landowner 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 this alternative will reduce soil erosion to "T". This will improve water quality in the watershed and reduce pollutant loading to the Cub River, Maple Creek and Worm Creek. 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 watershed. Beneficial uses would be improved with implementation of this alternative. This alternative includes voluntary landowner 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 the Cub River, Maple Creek and Worm Creek. This alternative includes voluntary and mandatory landowner participation.

Alternative Selection

The FSWCD selected Alternatives 3, 4 and 5 for this watershed. These three alternatives together meet the objectives set forth in the FSWCD five year plan by improving water quality in the Cub River watershed (FSWCD, 2006). Table 13 is an outline of the implementation of alternatives from planning to effectiveness monitoring.

Table 13. Estimated Timeline for TMDL Agricultural Implementation

Task	Output	Milestone
Develop conservation plans and contracts	Completed contract agreements	2011
Finalize BMP designs	Completed BMP plans and designs	2013
Design and install approved BMPs	Certify BMP installations	2019
Track BMP installation	Implementation progress report	2020
Evaluate BMP & project effectiveness	Complete project effectiveness report	2025

Estimated BMP Implementation Costs

Conservation efforts to date in the watershed 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 12 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 watershed may be obtained.

Table 12. Estimated BMP Installation Costs for the Cub River Watershed

Treatment Unit	Best Management Practice	Unit Type	Unit Cost	Unit Amount	Total Funds
TU1 Stream Channels & Riparian	Channel Vegetation	acre	$2,100.00	30	$63,000
	Conservation Cover	acre	$60.00	5	$300
	Critical Area Planting	acre	$200.00	30	$6,000
	Fence, 4-wire	ft.	$1.60	38,143	$61,029
	Heavy Use Area Protection	acre	$800.00	4	$3,200
	Prescribed Grazing	acre	$0.50	30	$15
	Riparian Forest Buffer	acre	$800.00	174	$139,200
	Stream Bank Protection	ft.	$20.00	38,143	$762,860
	Stream Channel Stabilization	ft.	$35.00	38,143	$1,335,005
	Tree/Shrub Establishment	ft.	$4.00	23,840	$95,360
	Use Exclusion (Riparian)	acre	$100.00	30	$3,000
	Watering Facility	No.	$1,000.00	5	$5,000
	Wetland Restoration	acre	$20,000.00	2.5	$50,000
		Stream Channels & Riparian Subtotal			$2,523,969
TU2 Crop Lands	Contour Farming	acre	$2.00	1,234	$2,468
	Critical Area Planting	acre	$150.00	250	$37,500
	Deep Tillage	acre	$14.00	1,234	$17,276
	Drip Irrigation	No.	$3.00	2,966	$8,898
	Irrigation Water Management	acre	$2.00	17,600	$35,200
	Nutrient Management	acre	$55.00	17,600	$968,000
	Pasture & Hayland Planting	acre	$75.00	4,228	$317,100
	Residue Management	acre	$30.00	1,234	$37,020
	Terrace	ft.	$1.50	4,000	$6,000
	Water & Sediment Control Basin	No.	$1.75	200	$350
	Windbreak/Shelterbelt	ft.	$2.75	25,000	$68,750
		Crop Lands Subtotal			$1,498,562
TU3 Range Lands	Brush Management	acre	$24.00	4,312	$103,488
	Fence, 4-wire	ft.	$1.60	52,800	$84,480
	Pipeline, PE 100 psi, 2.0"	ft.	$2.00	45,500	$91,000
	Prescribed Grazing	acre	$0.50	5,500	$2,750
	Pumping plant for water control	No.	$5,000.00	8	$40,000
	Range Planting	acre	$50.00	1,183	$59,150
	Spring Development	No.	$2,400.00	24	$57,600
	Water Well	No.	$8,000.00	8	$64,000
	Watering Facility	No.	$1,000.00	32	$32,000
		Range Lands Subtotal			$534,468
TU4 Animal Facilities	Drip Irrigation	No.	$3.00	1,500	$4,500
	Nutrient Management plan	No.	$500.00	24	$12,000
	Waste Management System	No.	$15,000.00	24	$360,000
	Waste Storage Structure	No.	$7,000.00	15	$105,000
	Watering Facility	No.	$1,000.00	50	$50,000
	Windbreak/Shelterbelt	ft.	$2.75	18,000	$49,500
		Animal Facilities Subtotal			$581,000
				Total	$5,137,999

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. Some of the sources are listed below:

CWA 319: These are EPA funds, which are allocated to the State of Idaho DEQ to be distributed on a competitive basis. These funds are used to treat non-point sources identified in the TMDL implementation plan. http://www.deq.idaho.gov/water/prog_issues/surface_water/nonpoint.cfm#management

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

The Partners for Fish and Wildlife Program in Idaho began as a small "on-the-ground" restoration program in 1988. The program has grown at a steady pace since then. In Idaho, the focus has been on the restoration of degraded riparian areas along streams, and shallow wetland restoration. Recently, there has been increasing interest for in-stream restoration. http://www.fws.gov/partners/pdfs/ID-needs.pdf

WQPA: The ISCC administers The Water Quality Program for Agriculture cost-share program. This program is also coordinated with the TMDL implementation plan, which identifies the highest priority areas. http://www.scc.state.id.us/programs.htm

RCRDP: The ISCC administers the Resource Conservation and Rangeland Development Program. This program is offers low interest loans with terms up to 15 years. http://www.scc.state.id.us/programs.htm

Conservation Improvement Grants, administered by the ISCC, are 50% grants which have a 1 to 2 year contract. http://www.scc.state.id.us/programs.htm

SRF: The ISCC administers the State Revolving Fund. This program offers loans for the installation of BMPs. Loans have a minimum of $500,000 with a maximum term of 20 years. http://www.scc.state.id.us/programs.htm

CRP: The Conservation Reserve Program (CRP) 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. FSA makes annual rental payments based on the agriculture rental value of the land, and it provides cost-share assistance for up to 50% of the participant's costs in establishing approved conservation practices. Participants enroll in CRP contracts for 10 to 15 years. http://www.fsa.usda.gov/dafp/cepd/crp.htm

EQIP: Environmental Quality Incentives Program is a voluntary conservation program from the Natural Resources Conservation Service (NRCS). Through EQIP, farmers may receive financial and technical help with structural and management conservation practices on agricultural land. http://www.id.nrcs.usda.gov/programs/eqip/index.html

WHIP: The Wildlife Habitat Incentives Program is a voluntary program from the NRCS. People who want to develop and improve wildlife habitat primarily on private land can receive technical assistance and up to 75% cost-share assistance. http://www.id.nrcs.usda.gov/programs/whip/index.html

WRP: The Wetland Reserve Program is a voluntary program offering landowners the opportunity to protect, restore, and enhance wetlands on their property. The NRCS provides technical and financial support to help landowners with their wetland restoration efforts. WRP offers three enrollment options:

Permanent easement, 30-year easement; and Restoration cost-share agreement. http://www.id.nrcs.usda.gov/programs/wrp/index.html

GRP: The Grassland Reserve Program is a voluntary program offering landowners the opportunity to protect, restore and enhance grasslands on their property. The NRCS, FSA, and Forest Service are coordinating implementation of GRP, which helps landowners restore and protect grass, range, pasture, shrub lands and certain other lands and provides assistance for rehabilitating grasslands. http://www.id.nrcs.usda.gov/programs/grp/index.html

PL-566: Small Watershed program administered by the NRCS.

CTA: NRCS provides free technical assistance to help farmers and ranchers identify and solve natural resource related problems on their farms and ranches. This may come as advice and counsel, through the design and implementation of a practice or treatment, or part of an active conservation plan. This is provided through the local Soil Conservation District and NRCS. http://www.id.nrcs.usda.gov/

GLCI: The Grazing Land Conservation Initiative was established in 1991 by a coalition of livestock producer organizations, scientific and professional grazing resource organizations, conservation and environmental groups, and state and federal natural resource and agriculture agencies 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/index.htm

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 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 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. 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

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