Thomas Fork Watershed

Agricultural TMDL Implementation Plan

Developed for the

Idaho Department of Environmental Quality

Prepared by

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In Cooperation with the

Idaho Association of Soil Conservation Districts

Bear Lake 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 Dry Creek, Preuss Creek and Thomas Fork (Figure 2). This Agricultural Total Maximum Daily Load (TMDL) Implementation Plan will build upon past conservation accomplishments made through the Thomas Fork State Agriculture Water Quality Program (SAWQP) Study and stream restoration projects by the Bear Lake Regional Commission and the Thomas Fork Stream Bank Stabilization Demonstration Project installed by Bear Lake Soil and Water Conservation District (BLSWCD). These past projects and future projects will help to restore beneficial uses in streams in the Thomas Fork watershed. This plan outlines an adaptive management approach for developing conservation plans that will recommend how and when BMPs will be installed to meet TMDL targets.

Goals and Objectives

The goal of this implementation plan is to restore beneficial uses on §303(d) listed stream segments of Dry Creek, Preuss Creek and Thomas Fork. The objectives of this plan are to identify critical areas and to recommend BMPs for reducing sediment and nutrient loading to §303(d) listed water bodies.

Beneficial Use Status

The Idaho Department of Environmental Quality (IDEQ) designated beneficial uses on rivers, creeks, lakes and reservoirs to meet the requirements of the Federal Clean Water Act. Dry Creek, Preuss Creek and Thomas Fork are listed on the state of Idaho's §303(d) list of water quality impaired water bodies (IDEQ, 1998). Dry Creek's beneficial uses are agriculture water supply, secondary contact recreation, cold-water aquatic life and salmonid spawning. Dry Creek is listed for nutrients and sediment from its headwaters to Thomas Fork, This is about 8.6 miles of which 2.5 miles is on private land. Preuss Creek's beneficial uses are agriculture water supply, secondary contact recreation, cold-water aquatic life and salmonid spawning. Preuss Creek is listed for habitat alteration and sediment, from Caribou Targhee National Forest (CTNF) Boundary to Thomas Fork, which is approximately 3.7 miles in length; this reach is entirely on private land. Thomas Fork's beneficial uses are agriculture water supply, primary contact recreation, cold-water aquatic life and salmonid spawning. Thomas Fork is listed for nutrients and sediment from the Wyoming state line to the Bear River confluence, which is about 27.5 miles of private land. Beneficial uses are not fully supported for Dry Creek, Preuss Creek and Thomas Fork (IDEQ, 2002).

Background

The Thomas Fork watershed has had a long history of settlement starting with the Native Americans who used the area as a summer gathering place to trade with neighboring tribes. Then with the starting of the fur trade many early trappers trapped through the area making reference to a large fork coming from the north, which many feel was the Thomas Fork. Some of the earliest permanent settlers came in 1874 and began ranching near the present town of Border. Few other settlers came to the valley until the railroad came, which provided shipping opportunities for produce to other parts of the United States (BLSWCD, 1999. As more people came to develop farms along Thomas Fork the extensive beaver dams and willows, which covered most of the valley floor along the streams were removed. With the removal of the beaver

dams and willows Thomas Fork could be straightened allowing the deep fertile soils to be farmed. These activities had a negative impact on the stream by increasing high flows and stream velocities, which have eroded the streambed and stream banks. As more and more people learned of the great fishing along the Thomas Fork and its tributaries and the many other recreational interests around Bear Lake this has made tourism one of the focal points to the area's economy. With thousands of visitors to the Bear Lake each year the BLSWCD felt that tributaries to the lake would be their highest priority for improving water quality. The BLSWCD has been very active in the Thomas Fork watershed for many years. In 1993 they secured a State Agriculture Water Quality Program (SAWQP) planning grant through the State of Idaho to look at all resource concerns and give an estimate of the extent and cost to restore each of the resources. With the completion of this planning grant, BLSWCD has been active in securing funding to assist irrigation companies and private landowners with projects. These activities will benefit water quality in the watershed and slow the eutrophication occurring in Bear Lake. These projects will improve habitat and fish passage for Bonneville Cutthroat trout in the area as well.

Project Setting

The Thomas Fork watershed covers 56,146 acres or 87 square miles in the northwest portion of the Central Bear subbasin (Figure 1). There are approximately 31,882 acres of private land and 24,264 acres managed by Idaho Department of Lands (IDL), Bureau Land Management (BLM), U.S. Fish and Wildlife Service (USFWS) and Caribou Targhee National Forest (CTNF) in the watershed. Rangeland is the major private land use in the watershed at 54% of the acres as shown in Table 1. The climate in the watershed is short cool summers followed by long cold winters. These cool short summers provide a typical growing season of 80 days or less with frosts as late as mid-June and as early as September. With average annual precipitation measuring 10 inches at the subbasin floor to 30 inches in the higher elevations. Most of this annual precipitation occurs from October to May in the form of snow. Elevations in the watershed range from 9,700 feet in adjacent mountains to 6,000 feet at the basin floor. With the valley floor so high in elevation, it allows the valley and highland runoff to occur approximately the same time resulting in very short high spring flows. Historically runoff from Dry Creek and Preuss Creek entered the Thomas Fork above the town of Geneva but with the development of the Geneva Ditch, these two creeks are now routed through the irrigation system along the west side of the valley until they return to the Thomas Fork below Geneva. Because of this rerouting the parts of the original channels from Geneva Ditch to Thomas Fork have been eliminated (Figure 2).

Table 1. Private Land Uses in the Thomas Fork Watershed

Land Use	Acres	Percent of Total
Crop Land	12,353	39%
Range Land	17,254	54%
Streams/Riparian	1,497	5%
Roads	778	2%
Total	31,882	100%

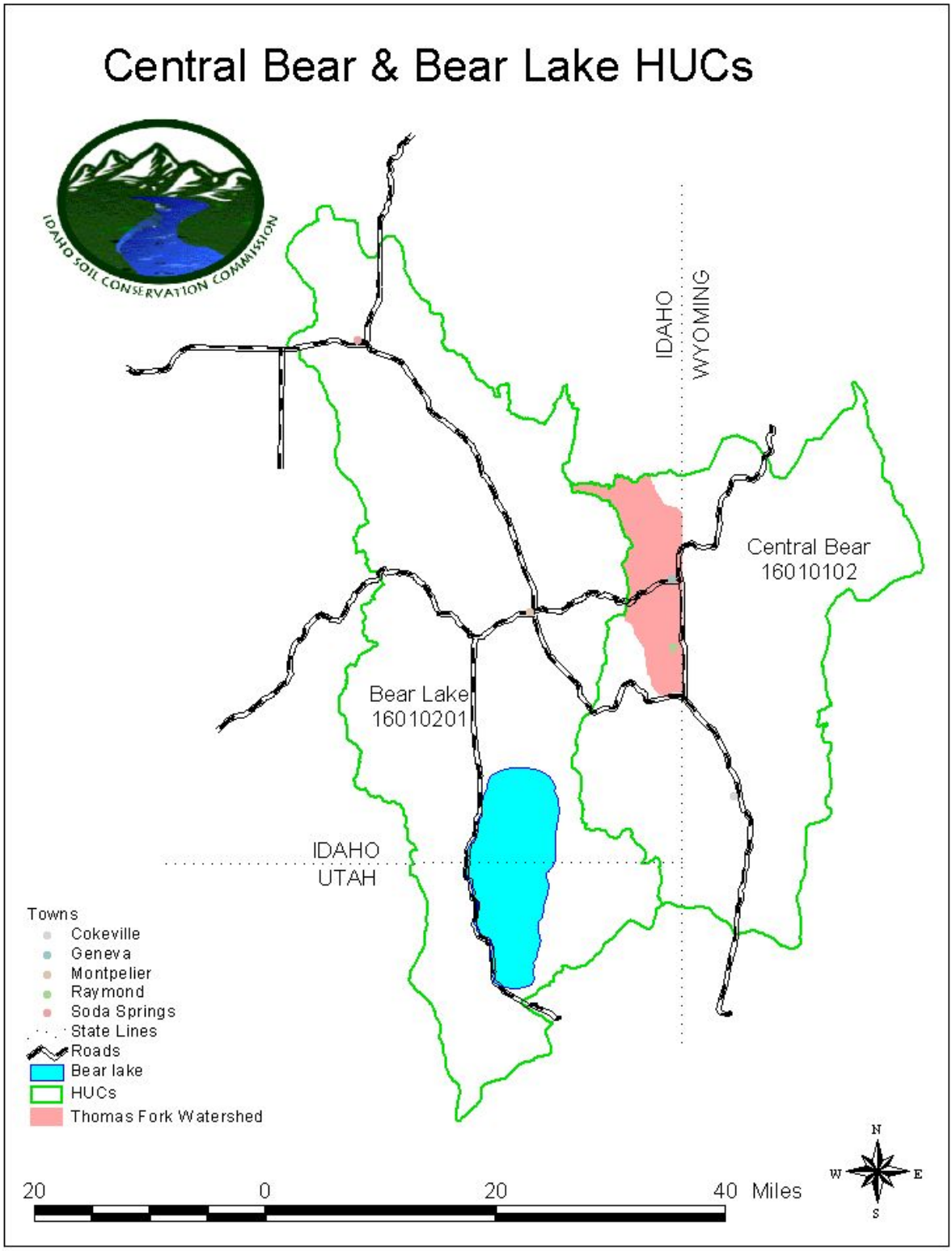


Figure 1 Thomas Fork Watershed in the Central Bear Subbasin

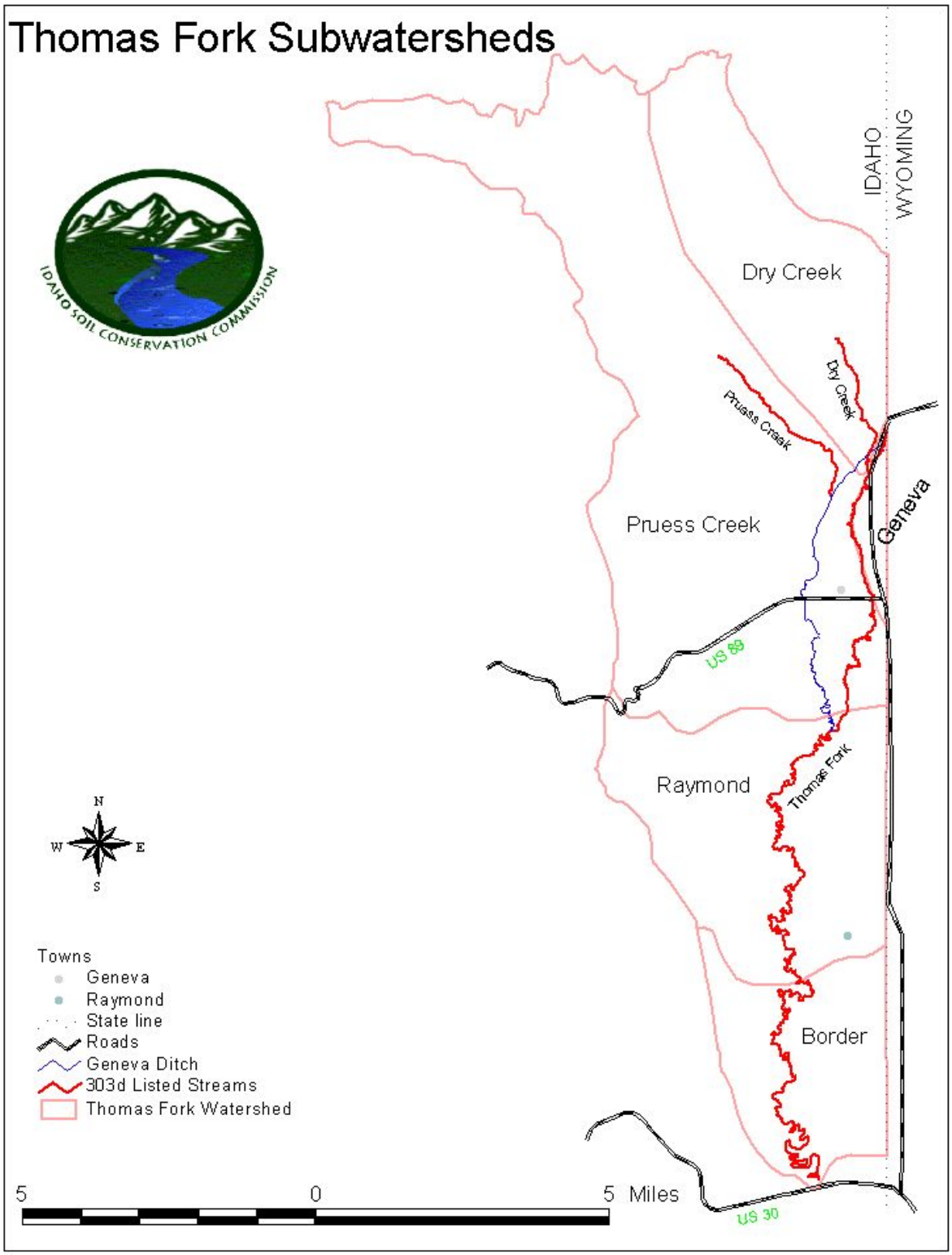


Figure 2. Thomas Fork Subwatersheds

Threatened and Endangered Species

The threatened and endangered species present in Bear Lake County include: Gray wolf (*Canis lupus*), Peregrine falcon (*Falco peregrinus*), Whooping crane (*Grus americanis*) and Bald eagle (*Haliaeetus lucocephalus*). Bear Lake 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.

Accomplishments

In an attempt to show local landowners the benefits of having functioning riparian areas along Thomas Fork, the BLSWCD worked with area landowners to install a willow planting demonstration project on the Thomas Fork. This demonstration project showed area landowners how to do minor stream bank restoration. In 1998 the Bear Lake Soil and Water Conservation District joined up with the Bear Lake Regional Commission to install a stream bank restoration demonstration project with willow planting, revetment, barbs and rock armor. This later project was used to demonstrate a more aggressive approach in restoring the riparian area. In addition to these demonstration projects the Bear Lake Regional Commission has implemented six §319 grants restoring eroding banks on the Thomas Fork and Natural Resource Conservation Service (NRCS) has implemented 10 projects in the past 5 years. These projects are summarized in Table 2.

Table 2. Completed BMP Amounts and Costs in the Thomas Fork Watershed

Funding Program	Best Management Practice	Units Treated	Cost-Share Funds	Participant Funds	Total Funds
Demonstration Project	Stream bank protection	200 ft	$525	$0	$525
319	Stream bank protection Fencing Waste Storage Facility	13,267 ft 10,000 ft 1 ea	$381,744	$254,496	$636,240
EQIP	Waste Storage Facility	8 ea	$95,942	$36,047	$131,989
EQIP	Fence	36,058 ft	$25,133	$20,836	$45,969
EQIP	Pipe line	3,700 ft	$350	$174	$524
EQIP	Trough	8 ea	$3,000	$1,791	$4,791
EQIP	Irrigation Main line	2,220 ft	$21,614	$5,403	$27,017
EQIP	Pumping Plant	1 ea	$5,403	$1,350	$6,753
EQIP	Structure for water control	1 ea	$5,250	$1,312	$6,562
EQIP	Spring Development	1 ea	$932	$230	$1,162
		Totals	$539,893	$321,636	$861,532

Soil Erosion Reductions

Implementation of BMPs on Thomas Fork has obtained 915 tons per year of soil savings or a 28% reduction in average annual soil erosion as shown in Table 3. These reductions were accomplished by treating the reaches that had moderate to very severe streambank erosion. Within each reach the percent of treatment ranged from 16% to 68%, with higher a percent of treatment within reaches having more severe erosion. Looking at the stream as a whole these projects have only treated 8% of the stream and leaving only 3 more reaches with moderate erosion.

Table 3. Soil Erosion Reductions from BMPs installed in the Thomas Fork Watershed

Stream Reach	BMP Treatment	Average Annual Soil Loss (tons/year)	Treated (ft)	Annual Soil Savings tons/year)
TF1	Stream Bank Protection	195	2000	148
TF2	Stream Bank Protection	180	1186	151
TF3	Stream Bank Protection	550	6319	436
TF4	Stream Bank Protection	180	1224	51
TF5	Stream Bank Protection	245	2539	129
TF6	No treatment	300	0	0
TF7	No treatment	695	0	0
TF8	No treatment	535	0	0
TF9	No treatment	180	0	0
TF10	No treatment	165	0	0
TF11	No treatment	50	0	0
	Totals	3,275	13,268	915
	Annual Soil Erosion Savings in Thomas Fork = 915 tons/year			

Problem Statement

Pollutants of Concern

The Bear River Basin / Malad River Subbasin Assessment (DEQ, 2006) specified that sediment and nutrients were pollutants of concern in Dry Creek and Thomas Fork. Pollutants of concern for Preuss Creek are sediment and habitat alteration. These pollutants are degrading the water quality and the wildlife habitat in these streams. The excess sediment and nutrients, which are added to the system in the watershed, are accelerating eutrophication of Bear Lake, which is classified as a Special Resource Water (IDAPA, 58.01.02).

Identified Problems

The BLSWCD 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 spring runoff, spring rains and summer thunderstorms (BLSWCD, 1999).

Water Quality Monitoring and Inventory Results

With the demonstration projects installed the BLSWCD felt that some background water quality data for Thomas Fork was needed to help determine the benefits of future projects. Two monitoring sites were selected, one at the Wyoming state line and the other near the confluence of the Bear River. Water quality samples were collected at these two sites twice a month from April 1991 to September 1991. Then in 1993 the Idaho Soil Conservation Commission awarded a SAWQP planning grant to the BLSWCD with NRCS as the technical lead. To provide a base condition for the area range condition inventories, water quality monitoring was conducted at the same two Thomas Fork sites. Stream erosion condition inventory was conducted on private land in Thomas Fork watershed, which includes Dry Creek and Preuss Creek subwatersheds. This range condition inventory showed the range condition ranging from 15% in good, 60% in fair and 25% in poor condition. Cropland was evaluated as well and showed that it could be eroding from 0.5 to 16 tons per acre depending on current crop and field slope. Each of these were evaluated and assigned a sediment delivery ratio to estimate the amount of loading to the streams. The stream bank erosion condition inventory is summarized in Table 4. Water quality samples were again collected at the Wyoming state line and the confluence with the Bear River in 1994 and 1995. With this water quality monitoring some generalizations can be made about the water quality in Thomas Fork. Total suspended solids are greater at the Wyoming state line than at the Bear River confluence. Phosphorus concentrations and loads decrease downstream with much of the upper watershed total phosphorus load never reaching the confluence with the Bear River. Nitrogen concentrations and loads increase downstream with most of the increases occurring below Raymond Cemetery road (BLSWCD, 1999).

Animal Feed Operations

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 (IDAPA 02.04.14.000). 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 (IDAPA 02.04.15.000).

Idaho Soil Conservation Commission and the Idaho Department of Agriculture assessed the area and found that there are 12 animal feed operations within the watershed. On the ground evaluations will determine any treatment needs to eliminate runoff from leaving the facilities.

Table 4. Thomas Fork, Dry and Preuss Creeks Stream Erosion Condition Inventory, BLSWCD, 1999

Stream	Reach	LRR*	%	Bank HT*	Length*	Tons/year	Category
Dry Creek	1	0.07	15	3	1,930	5	Slight
Dry Creek	2	0.45	65	6	1,097	165	Very Severe
Dry Creek	3	0.3	35	6	407	25	Severe
Dry Creek	4	0.15	25	3	1,057	10	Moderate
Dry Creek	5	0.2	20	4.5	975	15	Moderate
Dry Creek	6	0.1	15	4	2,335	10	Slight
Dry Creek	7	0.15	35	4	1,117	20	Moderate
Dry Creek	8	0.1	20	4	915	5	Moderate
Dry Creek	9	0.1	15	1.5	1,057	5	Slight
Dry Creek	10	0.07	100	1	813	5	Slight
				Total	11,703	265	
Preuss Creek	1	0.5	65	8	1,727	380	Very Severe
Preuss Creek	2	0.05	20	4	7,108	25	Slight
Preuss Creek	3	0.35	15	10	1,015	45	Severe
Preuss Creek	3	0.05	85	2	1,015	5	Slight
				Total	10,865	455	
Thomas Fork	1	0.35	25	5	5,280	195	Moderate
Thomas Fork	2	0.5	40	6	1,785	180	Very Severe
Thomas Fork	3	0.35	40	5	9,220	550	Severe
Thomas Fork	4	0.2	50	5	4,190	180	Moderate
Thomas Fork	5	0.2	15	6	15,925	245	Slight
Thomas Fork	6	0.25	40	4	8,800	300	Moderate
Thomas Fork	7	0.1	40	5	40,855	695	Moderate
Thomas Fork	8	0.15	45	5	18,645	535	Moderate
Thomas Fork	9	0.1	35	3	20,325	180	Slight
Thomas Fork	10	0.1	35	4	11,735	140	Slight
Thomas Fork	10	0.05	20	3	10,475	25	Slight
Thomas Fork	11	0.05	20	3	19,800	50	Slight
				Total	167,035	3,275	

Notes:
LRR = Lateral Recession Rate in Feet/Year
% = Percent of section length eroding at assigned rate
* = Measurements in Feet

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 56,146 acres with private land accounting for 31,882 acres. The predominant private land uses are 12,353 acres of cropland and 17,254 acres of rangeland.

Implementation Tiers

Critical areas adjacent to Dry Creek, Preuss Creek and Thomas Fork 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 influence on the stream**

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

Tier 3 **Upland areas or facilities that indirectly influence the stream**

Proposed Treatment

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 5. These three subwatersheds will be targeted to receive project funds as they can be secured.

Table 5. Treatment Units in the Thomas Fork Watershed

	TU 1	TU 2	TU 3	TU 4
Watershed	Riparian Acres	Crop Land Acres	Range Land Acres	Animal Facilities
Dry Creek	123	547	1,127	1
Preuss Creek	214	4,017	9,411	5
Thomas Fork	1,160	7,789	6,716	6
Total	1,497	12,353	17,254	12

Estimated BMP Implementation Costs

Conservation efforts 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 6 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 6. Estimated BMP Installation Costs for the Thomas Fork Watershed

Treatment Unit	Best Management Practice	Unit Type	Unit Cost	Unit Amount	Total Funds
TU1 Stream Channels & Riparian	Channel Vegetation	acre	$2,100.00	47	$98,700
	Conservation Cover	acre	$60.00	149	$8,940
	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	30	$24,000
	Prescribed Grazing	acre	$0.50	1,466	$733
	Riparian Forest Buffer	acre	$800.00	1,122	$897,600
	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	1,112	$111,200
	Wetland Restoration	acre	$20,000.00	2.5	$50,000
				Subtotal	**$3,451,427**
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	3,087	$6,174
	Nutrient Management	acre	$55.00	10,911	$600,105
	Pasture & Hayland Planting	acre	$75.00	4,228	$317,100
	Residue Management	acre	$30.00	4,228	$126,840
	Terrace	ft.	$1.50	4,000	$6,000
	Water & Sediment Control Basin	No.	$1.75	535	$936
	Windbreak/Shelterbelt	ft.	$2.75	25,000	$68,750
				Subtotal	**$1,192,047**
TU3 Range Lands	Brush Management	acre	$24.00	4,312	$103,488.00
	Fence, 4-wire	ft.	$1.60	104,050	$166,480.00
	Pipeline, PE 100 psi, 2.0"	ft.	$2.00	63,840	$127,680.00
	Prescribed Grazing	acre	$0.50	7,940	$3,970.00
	Pumping plant for water control	No.	$5,000.00	9	$45,000.00
	Range Planting	acre	$50.00	1,183	$59,150.00
	Spring Development	No.	$2,400.00	36	$86,400.00
	Water Well	No.	$8,000.00	8	$64,000.00
	Watering Facility	No.	$1,000.00	55	$55,000.00
				Subtotal	**$711,168**
TU4 Animal Facilities	Drip Irrigation	No.	$3.00	1,500	$4,500
	Waste Management System	No.	$40,000.00	12	$480,000
	Windbreak/Shelterbelt	ft.	$2.75	18,000	$49,500
				Subtotal	**$534,000**
				Total	**$5,888,642**

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 Dry Creek, Preuss Creek, and Thomas Fork.

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 Dry Creek, Preuss Creek, and Thomas Fork. 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 Dry Creek, Preuss Creek, and Thomas Fork. 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 Dry Creek, Preuss Creek, and Thomas Fork. This alternative includes voluntary and mandatory landowner participation.

Alternative Selection

The BLSWCD selected Alternatives 3, 4 and 5 for this watershed. These three alternatives together meet the objectives set forth in the BLSWCD five year plan by improving water quality in the Thomas Fork watershed (BLSWCD, 2004).

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 Bear Lake SWCD to implement water quality improvements on private agriculture and grazing lands. Some of the sources are listed below:

CWA 319: These are Environmental Protection Agency funds, which are allocated to the State of Idaho DEQ to be distributed on a competitive basis. These funds are primarily to be used to treat non-point sources identified in the TMDL implementation plan.

HIP: Idaho Fish and Game's 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 by the Department in partnership with private landowners, non-profit organizations, and state and federal agencies.

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.

RCRDP: The Idaho Soil Conservation Commission administrates The Resource Conservation and Rangeland Development Program. This program is offered as a low interest loan with loan lengths up to 15 years.

SRF: The Idaho Soil Conservation Commission administers The State Revolving Fund. This program is a loan for the installation of BMPs. Loans have a minimum of $500,000 with a maximum term of 20 years.

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. The Commodity Credit Corporation (CCC) makes annual rental payments based on the agriculture rental value of the land, and it provides cost-share assistance for up to 50 percent of the participant's costs in establishing approved conservation practices. Participants enroll in CRP contracts for 10 to 15 years.

EQIP: Environmental Quality Incentives Program (EQIP) is a voluntary conservation program from the USDA Natural Resources Conservation Service. Through EQIP, farmers may receive financial and technical help with structural and management conservation practices on agricultural land.

WHIP: The Wildlife Habitat Incentives Program (WHIP) is a voluntary program from the USDA Natural Resources Conservation Service. People who want to develop and improve wildlife habitat primarily on private land can receive technical assistance and up to 75 percent cost-share assistance.

WRP: The Wetland Reserve Program is a voluntary program offering landowners the opportunity to protect, restore, and enhance wetlands on their property. The USDA Natural Resources Conservation Service (NRCS) provides technical and financial support to help landowners with their wetland restoration efforts. Participants voluntarily limit future use of the land but retain private ownership. WRP offers three enrollment options: Permanent easement, 30-year easement and Restoration cost-share agreement.

GRP: The Grassland Reserve Program (GRP) is a voluntary program offering landowners the opportunity to protect, restore and enhance grasslands on their property. The Natural Resources Conservation Service, Farm Service Agency and Forest Service are coordinating implementation of GRP, which helps landowners restore and protect grassland, rangeland, pastureland, shrubland and certain other lands and provides assistance for rehabilitating grasslands.

PL-566: Small Watershed program administered by USDA Natural Resource Conservation Service.

CTA: USDA Natural Resource Conservation Service 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.

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.

Table 7. 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

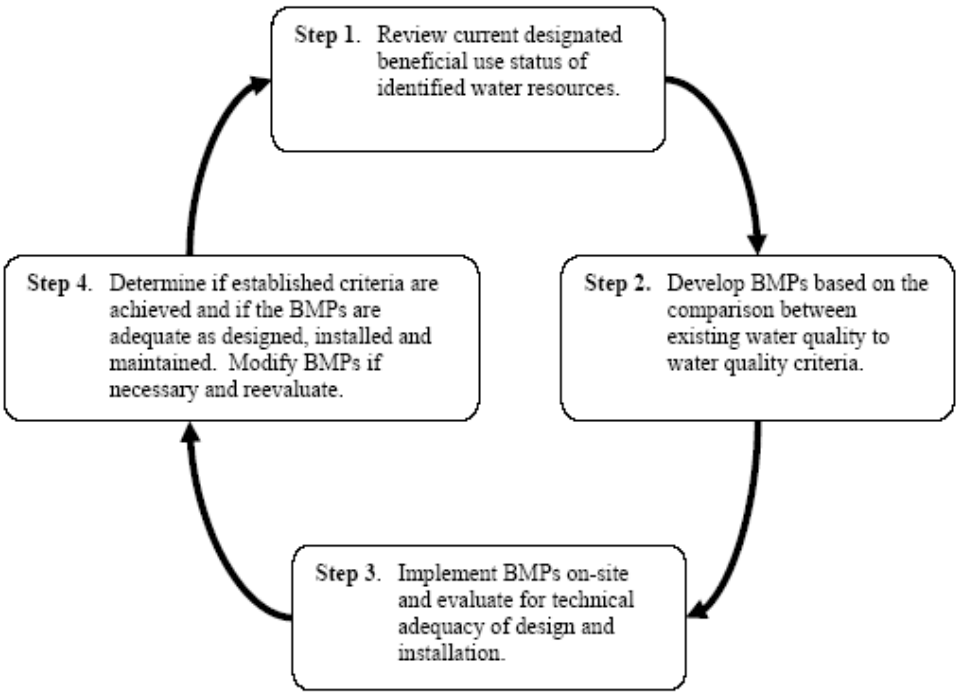
Monitoring and Evaluation

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 (ISCC, 2003). The feedback loop concept is a mechanism for nonpoint

source pollution management based on the implementation and evaluation of BMPs. This feedback loop process will be used to determine if the BMPs are working or not. If it is found that a BMP is not functioning as designed then changes to the conservation plan will be made to add other BMPs which will insure beneficial uses are achieved. A graphical look at the feedback loop process is presented in Figure 2 (ISCC, 2003).

Figure 2. Feedback Loop Process



Watershed Level

At the watershed to subbasin level, there are many government and private groups involved with water quality monitoring. Currently the USGS is monitoring a site near Cokeville, Wyoming for nutrients, sediment, flow and other parameters. This site has continued to receive extensive monitoring by the USGS due to its historical data. Sites near Cokeville have been monitored from 1965 to present with TDS, and flow being the most monitored. 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. To assist the soil and water conservation districts in prioritizing watersheds for treatment, ISDA and IASCD have been doing water quality monitoring at the subbasin level. As data is collected and evaluated, specific watersheds can be focused on to help pinpoint the sources and locations of excess nonpoint source pollution. This monitoring will also show the benefits from the implementation of BMPs on private agriculture lands as projects are implemented.

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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
BLSWCD	Bear Lake Soil and Water Conservation District
BURP	Beneficial Use Reconnaissance Program
BMP	Best Management Practice
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
SAWQP	State Agriculture Water Quality Program
TMDL	Total Maximum Daily Load
TU	Treatment Unit
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

APPENDIX A
Dry Creek Subwatershed
Agricultural TMDL Implementation Plan

Introduction

Subwatershed Setting

The Dry Creek subwatershed covers 8,863 acres or 13.8 square miles in the northern portion of the Thomas Fork watershed, which is in the western part of the Central Bear subbasin as shown in Figure 1. There are approximately 1,843 acres of private land and 7,020 acres managed by BLM and CTNF in the Dry Creek subwatershed. Rangeland is the major private land use in the watershed at 61.2% of the acres as shown in Table A-1. Dry Creek subwatershed is bounded on the east by Wyoming, to the west and south by Preuss subwatershed and to the north by the Salt River subbasin. Dry Creek's climate is short cool summers followed by long cold winters with most of the precipitation occurring from October to May in the form of snow. Average annual precipitation measures 10 inches at the basin floor to 30 inches in the higher elevations. Elevations in Dry Creek range from 8,800 feet to 6,220 feet at the valley floor. Valley and highland runoff occur approximately the same time resulting in very short high spring flows. Historically runoff from Dry Creek entered the Thomas Fork above Geneva near the Wyoming State line, With the development of the Geneva Ditch, Dry Creek is now routed through the irrigation system around the west side of the valley until it returns to the Thomas Fork below Geneva (Figure A-1). The old channel between Geneva Ditch and Thomas Fork is used primarily for high flows but is dry the remainder of the time.

Table A-1. Private Land Uses in the Dry Creek Subwatershed

Land Use	Acres	Percent of Total
Crop Land	547	29.6
Range Land	1127	61.2
Streams/Riparian	123	6.7
Road	46	2.5
Total	1,843	100.0%

Problem Statement

Pollutants of Concern

The Subbasin Assessment for the Idaho Bear River Basin specified that sediment & nutrients are the pollutants of concern in Dry Creek (IDEQ 2002).

Critical Areas

The areas having the most significant impact on the water quality of the receiving waters are critical areas. These critical areas include pollutant source and transport areas. The subwatershed consists of approximately 8,863 acres with private land accounting for 1,843 acres. The predominant private land uses within the subwatershed are cropland and rangeland, respectively 547 and 1127 acres.

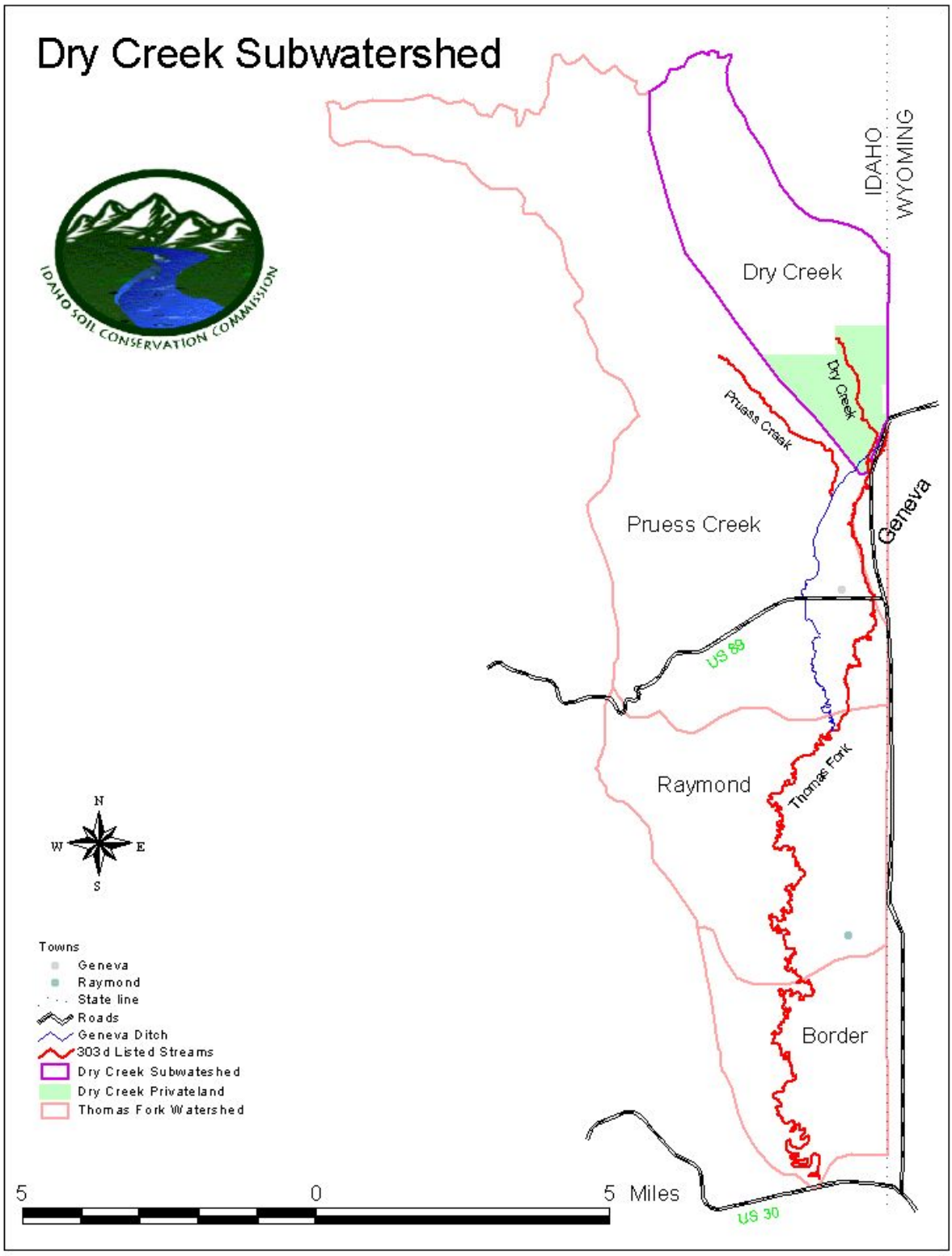

Figure A-1 Dry Creek Subwatershed in the Central Bear Subbasin

Proposed Treatment

The Dry Creek subwatershed is divided into four treatment units (Table A-2). These have similar land uses, soils, productivity, resource concerns and treatment needs (Table A-3).

Table A-2. Treatment Units in the Dry Creek Subwatershed

	TU 1	TU 2	TU 3	TU 4
Watershed	Riparian Acres	Crop Land Acres	Range Land Acres	Animal Facilities
Dry Creek	123	547	1,127	1
Total	**123**	**547**	**1,127**	**1**

Table A-3. Treatment Units with Soil Types

Treatment Unit (TU1) Stream Channels and Riparian Areas

Acres	Soils	Resource Problems
123	**Bear Lake Complex, 0 - 1 percent** **Thomasfork silty clay loam, 0 - 2 percent** **Raynal silty clay loam 0 - 2 percent** These soils formed on flood plains and terraces and are poorly drained with flooding occasional parent material is mixed and clayey alluvium with no restrictive layers	Unstable and erosive stream bed and banks Dewatered stream reaches Lack of riparian vegetation diversity and density Barriers to fish migration and movement

Treatment Unit (TU2) Crop Lands

Acres	Soils	Resource Problems
547	**Bezzant Gravelly silt loam, 8 - 25 percent** **Thomasfork silty clay loam, 0 - 2 percent** **Thatcher – Joes Complex, 1 - 4 percent** These soils formed on foot slopes, fan and stream terraces. They are well drained to poorly drained with no flooding, parent material is alluvium and clayey alluvium with some loess with no restrictive layers	Accelerated sheet and rill or gully erosion

Treatment Unit (TU3) Range Lands

Acres	Soils	Resource Problems
1,127	**Vipont – Prucree Complex, 15 - 30 percent** **Prucree – Dipcreek Complex, 4- 12 percent** **Vipont - Suryon Complex, 30 - 55 percent** These soils formed on hill shoulders. They are well drained with no flooding, parent material is residuum and colluvium from sandstone, quartzite and dolomite with restrictive layers of bedrock at 20 to 40 inches	Accelerated sheet and rill or gully erosion Over utilized range lands

Treatment Unit (TU4) Animal Facilities

Units	Soils	Resource Problems
1	**Bear Lake Complex, 0 - 1 percent** **Thomasfork silty clay loam, 0 - 2 percent** **Raynal silty clay loam 0 - 2 percent** These soils formed on flood plains and terraces. They are poorly drained with flooding occasional parent material is mixed and clayey alluvium with no restrictive layers	Lack of drinking water sources Inadequate waste storage Runoff from corrals or pens

Estimated BMP Implementation Costs

Conservation efforts in the subwatershed 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 A-4 lists the BMPs, along with unit amounts and costs to install each BMP, which may be used to restore beneficial uses in the Dry Creek subwatershed.

Table A-4. Estimated BMP Installation Costs for the Dry Creek subwatershed

Treatment Unit	Best Management Practice	Unit Type	Unit Cost	Unit Amount	Total Funds
TU1 Stream Channels & Riparian	Channel Vegetation	acre	$2,100.00	8	$16,800
	Conservation Cover	acre	$60.00	12	$720
	Critical Area Planting	acre	$200.00	3	$600
	Fence, 4-wire	ft.	$1.60	2,227	$3,563
	Heavy Use Area Protection	acre	$800.00	3	$2,400
	Prescribed Grazing	acre	$0.50	92	$46
	Riparian Forest Buffer	acre	$800.00	92	$73,600
	Stream Bank Protection	ft.	$20.00	2,227	$44,540
	Stream Channel Stabilization	ft.	$35.00	2,227	$77,945
	Tree/Shrub Establishment	ft.	$4.00	1,392	$5,568
	Use Exclusion (Riparian)	acre	$100.00	82	$8,200
	Wetland Restoration	acre	$20,000.00	0.5	$10,000
				Subtotal	**$243,982**
TU2 Crop Lands	Contour Farming	acre	$2.00	55	$110
	Critical Area Planting	acre	$150.00	15	$2,250
	Deep Tillage	acre	$14.00	55	$770
	Drip Irrigation	No.	$3.00	300	$900
	Irrigation Water Management	acre	$2.00	136	$272
	Nutrient Management	acre	$55.00	110	$6,050
	Pasture & Hayland Planting	acre	$75.00	273	$20,475
	Residue Management	acre	$30.00	273	$8,190
	Terrace	ft.	$1.70	1,000	$1,700
	Water & Sediment Control Basin	No.	$800.00	10	$8,000
	Windbreak/Shelterbelt	ft.	$2.75	2,000	$5,500
				Subtotal	**$54,217**
TU3 Range Lands	Brush Management	acre	$24.00	281	$6,744.00
	Fence, 4-wire	ft.	$1.60	6,000	$9,600.00
	Pipeline, PE 100 psi, 2.0"	ft.	$2.00	8,000	$16,000.00
	Prescribed Grazing	acre	$0.50	845	$422.50
	Pumping plant for water control	No.	$5,000.00	1	$5,000.00
	Range Planting	acre	$50.00	112	$5,600.00
	Spring Development	No.	$2,400.00	4	$9,600.00
	Water Well	No.	$8,000.00	1	$8,000.00
	Watering Facility	No.	$1,000.00	5	$5,000.00
				Subtotal	**$65,967**
TU4 Animal Facilities	Drip Irrigation	No.	$3.00	750	$2,250
	Waste Management System	No.	$40,000.00	1	$40,000
	Windbreak/Shelterbelt	ft.	$2.75	1,500	$4,125
				Subtotal	**$46,375**
				Total	**$410,541**

APPENDIX B
Preuss Creek Subwatershed
Agricultural TMDL Implementation Plan

Introduction

Subwatershed Setting

The Preuss Creek subwatershed covers 26,590 acres or 41.5 square miles in the northwest portion of the Thomas Fork watershed, which is in the western part of the Central Bear subbasin as shown in Figure1. There are approximately 14,004 acres of private land and 12,585 acres managed by IDL, BLM, and CTNF in the watershed. Rangeland is the major private land use in the watershed at 67% of the acres and shown in Table B-1. Preuss Creek subwatershed is bounded by Dry Creek subwatershed to the east and to the west by the Preuss Range and to the north by the Salt River subbasin, and to south by the Raymond subwatershed. Preuss Creek's climate is short cool summers followed by long cold winters with most of the precipitation occurring from October to May in the form of snow. Average annual precipitation measures 10 inches at the basin floor to 30 inches in the higher elevations. With elevations in Preuss Creek ranging from 9,700 feet in the Preuss Range to 6,100 feet at the subbasin floor. Valley and highland runoff occur approximately the same time resulting in very short high spring flows. Historically runoff from Preuss Creek entered the Thomas Fork above Geneva but with the development of the Geneva Ditch, Preuss Creek is now routed through the irrigation system until it returns to the Thomas Fork below Geneva. Because of this rerouting of Preuss Creek its original channel has been eliminated from the Geneva Ditch to Thomas Fork (Figure B-1).

Table B-1. Private Land Uses in the Preuss Creek Subwatershed

Land Use	Acres	Percent of Total
Crop Land	4,017	29%
Range Land	9,411	67%
Streams/Riparian	214	1%
Roads	362	3%
Total	**14,004**	**100%**

Problem Statement

Pollutants of Concern

The Subbasin Assessment for the Idaho Bear River Basin specified that sediment and nutrients were pollutants of concern in Preuss Creek (IDEQ 2002).

Critical Areas

Those areas having the most significant impact on the quality of the receiving waters are critical areas. These critical areas include pollutant source and transport areas. The subwatershed consists of approximately 26,590 acres with private land accounting for 14,004 acres. The predominant private land uses within the subwatershed are cropland and rangeland, respectively 4,017 and 9,411 acres.

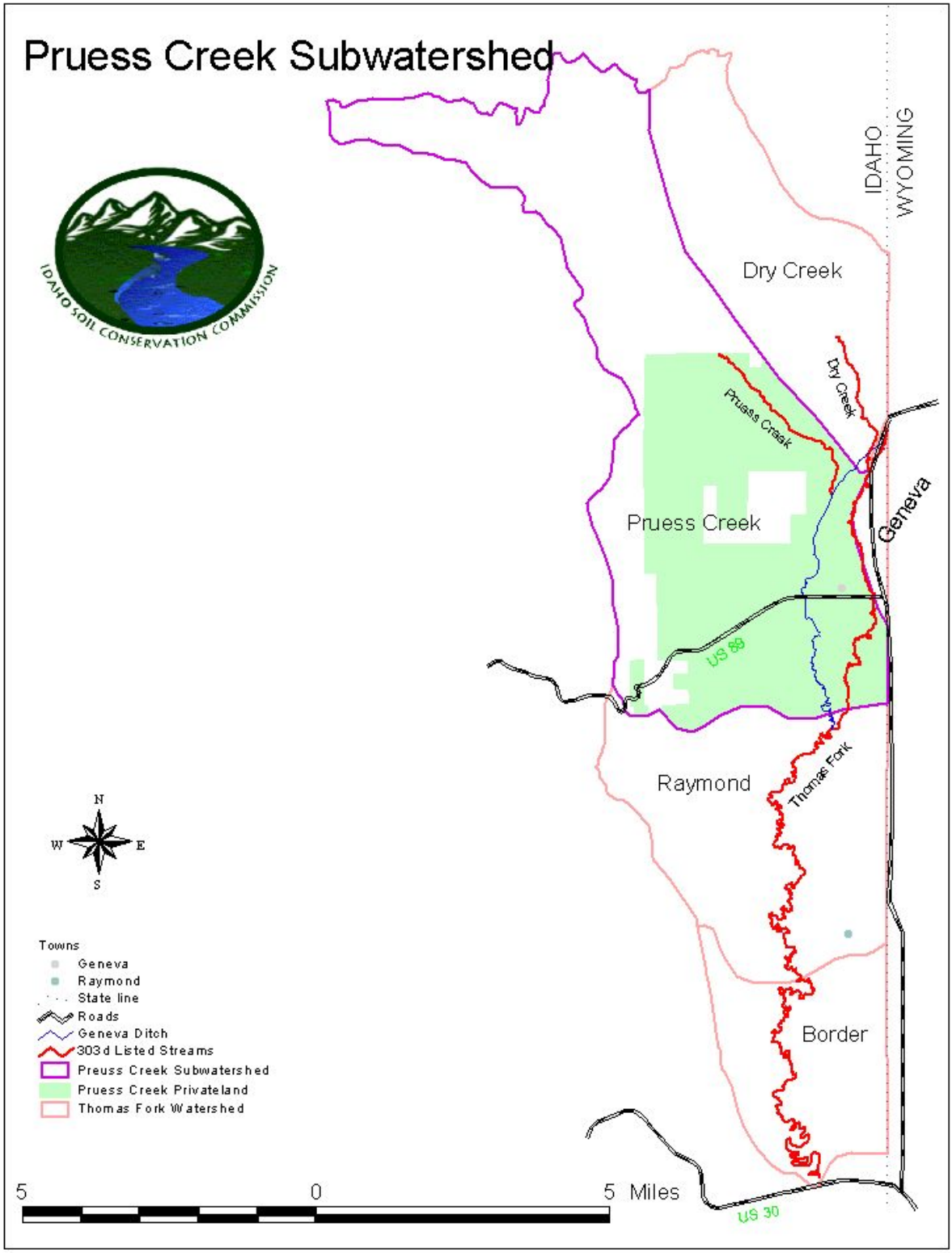

Figure B-1 Preuss Creek Subwatershed in the Central Bear Subbasin

Proposed Treatment

The subwatershed is divided into four treatment units (Table B-2). These have similar land uses, soils, productivity, resource concerns and treatment needs (Table B-3).

Table B-2. Treatment Units in the Preuss Creek subwatershed

	TU 1	TU 2	TU 3	TU 4
Watershed	Riparian Acres	Crop Land Acres	Range Land Acres	Animal Facilities
Preuss Creek	214	4,017	9,411	5
Total	214	4,017	9,411	5

Table B-3. Treatment Units with Soil Types

Treatment Unit (TU1) Stream Channels and Riparian Areas

Acres	Soils	Resource Problems
214	**Bern silt loam, 0 - 2 percent** Raynal – Lago Complex, 0 - 2 percent **Raynal silty clay loam 0 - 2 percent** These soils formed on stream terraces and are poorly drained with flooding rare to none with parent material alluvium and loess with no restrictive layers	Unstable and erosive stream bed and banks Dewatered stream reaches Lack of riparian vegetation diversity and density Barriers to fish migration and movement

Treatment Unit (TU2) Crop Lands

Acres	Soils	Resource Problems
4,017	**Bern silt loam, 0 - 2 percent** **Thatcher silt loam, 4 - 12 percent** **Raynal silty clay loam, 0 - 2 percent** These soils formed on foot slopes, fan and stream terraces. They are well drained to poorly drained with no flooding, parent material is alluvium and loess with no restrictive layers	Accelerated sheet and rill or gully erosion

Treatment Unit (TU3) Range Lands

Acres	Soils	Resource Problems
9,411	**Sprollow–LonJon Gravelly Complex, 30-60 percent** **Vipont – Prucree Complex, 15- 30 percent** **Vipont - Dipcreek Complex, 20 - 55 percent** These soils formed on hill shoulders. They are well drained with no flooding, parent material is alluvium and residuum and colluvium from sandstone, quartzite and dolomite with restrictive layers of bedrock at 20 to 40 inches	Accelerated sheet and rill or gully erosion Over utilized range lands

Treatment Unit (TU4) Animal Facilities

Units	Soils	Resource Problems
5	**Bern silt loam, 0 - 2 percent** Raynal – Lago Complex, 0 - 2 percent **Raynal silty clay loam 0 - 2 percent** These soils formed on stream terraces and are poorly drained with flooding rare to none with parent material alluvium and loess with no restrictive layers	Lack of drinking water sources Inadequate waste storage Runoff from corrals or pens

Estimated BMP Implementation Costs

Conservation efforts in the subwatershed 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 B-4 lists the BMPs, along with unit amounts and costs to install each BMP, which may be used to restore beneficial uses in Preuss Creek.

Table B-4. Estimated BMP Installation Costs for the Preuss Creek Subwatershed

Treatment Unit	Best Management Practice	Unit Type	Unit Cost	Unit Amount	Total Funds
TU1 Stream Channels & Riparian	Channel Vegetation	acre	$2,100.00	14	$29,400
	Conservation Cover	acre	$60.00	21	$1,260
	Critical Area Planting	acre	$200.00	4	$800
	Fence, 4-wire	ft.	$1.60	406	$650
	Heavy Use Area Protection	acre	$800.00	4	$3,200
	Prescribed Grazing	acre	$0.50	214	$107
	Riparian Forest Buffer	acre	$800.00	160	$128,000
	Stream Bank Protection	ft.	$20.00	406	$8,120
	Stream Channel Stabilization	ft.	$35.00	406	$14,210
	Tree/Shrub Establishment	ft.	$4.00	254	$1,016
	Use Exclusion (Riparian)	acre	$100.00	160	$16,000
	Wetland Restoration	acre	$20,000.00	2	$40,000
				Subtotal	**$242,763**
TU2 Crop Lands	Contour Farming	acre	$2.00	401	$802
	Critical Area Planting	acre	$150.00	80	$12,000
	Deep Tillage	acre	$14.00	401	$5,614
	Drip Irrigation	No.	$3.00	416	$1,248
	Irrigation Water Management	acre	$2.00	1,004	$2,008
	Nutrient Management	acre	$55.00	3,012	$165,660
	Pasture & Hayland Planting	acre	$75.00	2,008	$150,600
	Residue Management	acre	$30.00	2,008	$60,240
	Terrace	ft.	$1.50	2,000	$3,000
	Water & Sediment Control Basin	No.	$800.00	475	$380,000
	Windbreak/Shelterbelt	ft.	$2.75	5,000	$13,750
				Subtotal	**$794,922**
TU3 Range Lands	Brush Management	acre	$24.00	2,352	$56,448.00
	Fence, 4-wire	ft.	$1.60	20,540	$32,864.00
	Pipeline, PE 100 psi, 2.0"	ft.	$2.00	14,250	$28,500.00
	Prescribed Grazing	acre	$0.50	2,058	$1,029.00
	Pumping plant for water control	No.	$5,000.00	5	$25,000.00
	Range Planting	acre	$50.00	400	$20,000.00
	Spring Development	No.	$2,400.00	7	$16,800.00
	Water Well	No.	$8,000.00	4	$32,000.00
	Watering Facility	No.	$1,000.00	11	$11,000.00
				Subtotal	**$223,641**
TU4 Animal Facilities	Drip Irrigation	No.	$3.00	625	$1,875
	Waste Management System	No.	$40,000.00	5	$200,000
	Windbreak/Shelterbelt	ft.	$2.75	7,500	$20,625
				Subtotal	**$222,500**
				Total	**$1,483,826**

APPENDIX C
Thomas Fork Corridor
Agricultural TMDL Implementation Plan

Introduction

Subwatershed Setting

The Thomas Fork Corridor subwatershed covers 17,892 acres or 28 square miles, which includes Geneva, Raymond and Border subwatersheds. These are in the northwestern part of the Central Bear subbasin as shown in Figure1. There are approximately 16,035 acres of private land and 1,857 acres managed by USFW, IDL, BLM and CTNF in the subwatershed. Cropland is the major private land use in the subwatershed at 48.5% of the acres and shown in Table C-1. The subwatershed is bounded on the eastside by Wyoming and the Preuss Range on the west to the south is the Bear River and to the north Preuss and Dry Creek subwatersheds. The subwatershed has a climate of short cool summers followed by long cold winters with most of the precipitation occurring from October to May in the form of snow. Average annual precipitation measures 10 inches at the valley floor to 30 inches in the higher elevations. Elevations in Thomas Fork Corridor Subwatershed range from 7,200 feet to 6,000 feet at the valley floor. Valley and highland runoff occur approximately the same time resulting in very short high spring flows. Historically Thomas Fork had many beaver dams and very thick willows along a very wide, broad floodplain, which allowed the high flows of Thomas Fork to spread out lowering its velocity. This reduced the erosive force of the water on its streambanks. With development, this wide floodplain was narrowed and many sections of the Thomas Fork were straightened which has led to very high stream velocities and very poor stream bank condition.

Table C-1. Private Land Uses in the Thomas Fork Corridor Subwatershed

Land Use	Acres	Percent of Total
Crop Land	7,789	48.5
Range Land	6,716	42.0
Streams/Riparian	1,160	7.2
Roads	370	2.3
Total	**16,035**	**100.0%**

Problem Statement

Pollutants of Concern

The Subbasin Assessment for the Idaho Bear River Basin specified that sediment and nutrients are pollutants of concern in Thomas Fork (IDEQ 2002).

Critical Areas

Those areas having the most significant impact on the quality of the receiving waters are critical areas. These critical areas include pollutant source and transport areas. The subwatershed consists of approximately 17,892 acres with private land accounting for 16,035 acres. The predominant private land uses within the subwatershed are cropland and rangeland, respectively 7,789 and 6,716 acres.

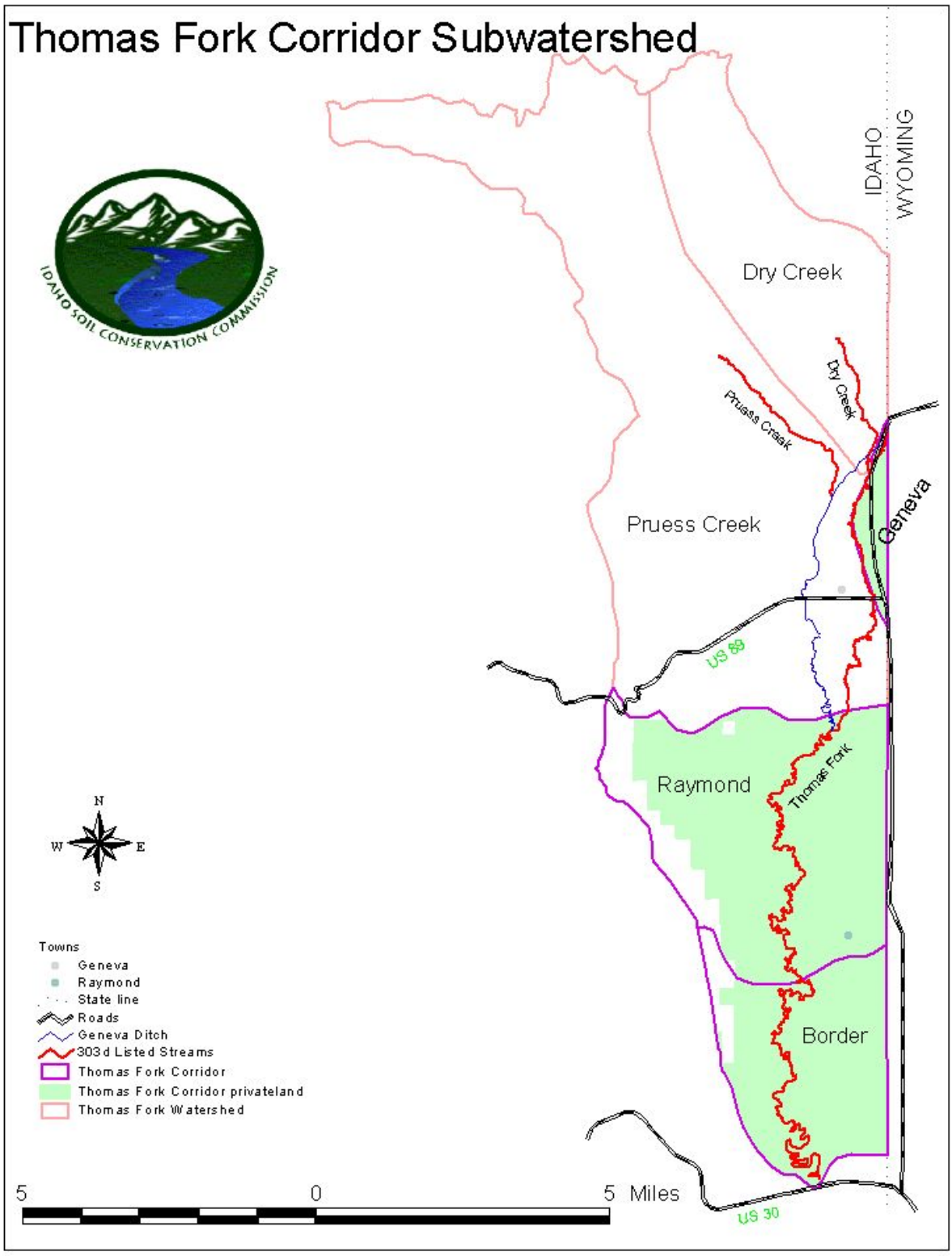

Figure C-1 Thomas Fork Corridor in the Central Bear Subbasin

Proposed Treatment

The subwatershed is divided in to four treatment units (Table C-2). These have similar land uses, soils, productivity, resource concerns and treatment needs (Table C-3).

Table C-2. Treatment Unit Acres by Land Use

	TU 1	TU 2	TU 3	TU 4
Watershed	Riparian Acres	Crop Land Acres	Range Land Acres	Animal Facilities
Thomas Fork	1,160	7,789	6,716	6
Total	**1,160**	**7,789**	**6,716**	**6**

Table C-3. Treatment Units with Soil Types

Treatment Unit (TU1) Stream Channels and Riparian Areas

Acres	Soils	Resource Problems
1,160	**Bear Lake–Chesbrook–Laroco Complex, 0-2 percent** **Bern silt loam, 0 - 2 percent** **Lago _Bear Lake Complex, 0 - 1 percent** These soils formed on stream terraces and flood plains. They are poorly drained with flooding rare with parent material alluvium and loess with no restrictive layers	Unstable and erosive stream bed and banks Dewatered stream reaches Lack of riparian vegetation diversity and density Barriers to fish migration and movement

Treatment Unit (TU2) Crop Lands

Acres	Soils	Resource Problems
7,789	**Georgecanyon Gravelly silt loam, 1- 4 percent** **Bern silt loam, 0 - 2 percent** **Buist Gravelly silt loam, 0 - 1 percent** These soils formed on stream terraces and fan terraces. They are well drained with no flooding and parent material alluvium and loess with no restrictive layers	Accelerated sheet and rill or gully erosion

Treatment Unit (TU3) Range Lands

Acres	Soils	Resource Problems
6,716	**Bear Lake Complex, 0 - 1 percent** **Bear lake – Lago Complex, 0 - 2 percent** **Everry - Preuss Complex, 5 - 45 percent** **Hagen Barth- Woodcanyon Complex 20- 50 percent** These soils formed on stream terraces and foot slopes. They are poorly drained and well drained with flooding occasional to none with parent material alluvium and alluvium over residuum from calcareous siltstone with no restrictive layers to bedrock 40 to 60 inches	Accelerated sheet and rill or gully erosion Over utilized range lands

Treatment Unit (TU4) Animal Facilities

Acres	Soils	Resource Problems
6	**Bear Lake–Chesbrook–Laroco Complex, 0-2 percent** **Bern silt loam, 0 - 2 percent** **Lago _Bear Lake Complex, 0 - 1 percent** These soils formed on stream terraces and flood plains. They are poorly drained with flooding rare with parent material alluvium and loess with no restrictive layers	Lack of drinking water sources Inadequate waste storage Runoff from corrals or pens

Estimated BMP Implementation Costs

Conservation efforts in the subwatershed 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 C-4 lists BMPs, along with unit amounts and costs to install each BMP, which may be used to restore beneficial uses.

Table C-4. Estimated BMP Installation Costs for the Thomas Fork Subwatershed

Treatment Unit	Best Management Practice	Unit Type	Unit Cost	Unit Amount	Total Funds
TU1 Stream Channels & Riparian	Channel Vegetation	acre	$2,100.00	25	$52,500
	Conservation Cover	acre	$60.00	116	$6,960
	Critical Area Planting	acre	$200.00	23	$4,600
	Fence, 4-wire	ft.	$1.60	35,510	$56,816
	Heavy Use Area Protection	acre	$800.00	23	$18,400
	Prescribed Grazing	acre	$0.50	1,160	$580
	Riparian Forest Buffer	acre	$800.00	870	$696,000
	Stream Bank Protection	ft.	$20.00	35,510	$710,200
	Stream Channel Stabilization	ft.	$35.00	35,510	$1,242,850
	Tree/Shrub Establishment	ft.	$4.00	22,194	$88,776
	Use Exclusion (Riparian)	acre	$100.00	870	$87,000
	Wetland Restoration	acre	$20,000.00	11	$220,000
				Subtotal	**$3,184,682**
TU2 Crop Lands	Contour Farming	acre	$2.00	778	$1,556
	Critical Area Planting	acre	$150.00	155	$23,250
	Deep Tillage	acre	$14.00	778	$10,892
	Drip Irrigation	No.	$3.00	2,250	$6,750
	Irrigation Water Management	acre	$2.00	1,947	$3,894
	Nutrient Management	acre	$55.00	7,789	$428,395
	Pasture & Hayland Planting	acre	$75.00	1,947	$146,025
	Residue Management	acre	$30.00	1,947	$58,410
	Terrace	ft.	$1.50	1,000	$1,500
	Water & Sediment Control Basin	No.	$800.00	50	$40,000
	Windbreak/Shelterbelt	ft.	$2.75	18,000	$49,500
				Subtotal	**$770,172**
TU3 Range Lands	Brush Management	acre	$24.00	1,679	$40,296.00
	Fence, 4-wire	ft.	$1.60	77,510	$124,016.00
	Pipeline, PE 100 psi, 2.0"	ft.	$2.00	41,590	$83,180.00
	Prescribed Grazing	acre	$0.50	5,037	$2,518.50
	Pumping plant for water control	No.	$5,000.00	3	$15,000.00
	Range Planting	acre	$50.00	671	$33,550.00
	Spring Development	No.	$2,400.00	25	$60,000.00
	Water Well	No.	$8,000.00	3	$24,000.00
	Watering Facility	No.	$1,000.00	28	$28,000.00
				Subtotal	**$410,561**
TU4 Animal Facilities	Drip Irrigation	No.	$3.00	750	$2,250
	Waste Management System	No.	$40,000.00	6	$240,000
	Windbreak/Shelterbelt	ft.	$2.75	9,000	$24,750
				Subtotal	**$267,000**
				Total	**$4,632,415**