Teton Subbasin Total Maximum Daily Load Implementation Plan for Agriculture

Developed for the
Idaho Department of Environmental Quality

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Acronyms

AFO - Animal Feeding Operation

BMP - Best Management Practice

BLM - Bureau of Land Management, USDI.

BPA - Bonneville Power Administration

C-CRP - Continuous Sign-Up, Conservation Reserve Program, FSA

CRP - Conservation Reserve Program

CRM - Coordinated Resource Management

EPA - Environmental Protection Agency

EQIP - Environmental Quality Incentives Program

FSA - Farm Service Agency

HIP - Habitat Incentives Program

IASCD - Idaho Association of Soil Conservation Districts

ICA - Idaho Cattle Association

IDEQ - Idaho Department of Environmental Quality

ISCC - Idaho Soil Conservation Commission

ISDA - Idaho State Department of Agriculture

NRCS - Natural Resource Conservation Service

MOU - Memorandum of Understanding

CSWCD - Clark Soil and Water Conservation District

RCRDP - Resource Conservation and Rangeland Development Program

RMS - Resource Management System

SAWQP - State Agriculture Water Quality Program

TSCD - Teton Soil Conservation District

TMDL - Total Maximum Daily Load

TU - Treatment Units

UI-CES - University of Idaho, Cooperative Extension System

USDA - United States Department of Agriculture

USDI - United States Department of Interior

USFS - United States Forest Service, USDA

USGS - United States Geological Survey, USDI

WQLS - Water Quality Limited Segment

WQPA - Water Quality Program for Agriculture, ISCC

Introduction

Purpose

The purpose of this implementation plan is to identify and recommend best management practices (BMPs) needed to meet Total Maximum Daily Load (TMDL) targets on the Teton River and its tributaries. This implementation plan will satisfy the requirements described in the Idaho Code 39-3601. This implementation plan will also build upon past conservation accomplishments that have been made and will assist other subbasin efforts in restoring beneficial uses in the Teton River subbasin.

Goals

This agricultural component of the Teton River Subbasin TMDL Implementation Plan outlines an adaptive management approach for the implementation of BMPs and development of Resource Management System (RMS) plans to meet the requirements of the Teton River Subbasin TMDL (IDEQ 2003). This implementation plan identifies BMPs to treat approximately 140 miles of streams within the subbasin. These BMPs would improve or restore the physical, chemical, and/or biological functions of the Teton River. This plan identified approximately 19,161 acres of urban development and roads in the subbasin, 173,360 acres of irrigated and non-irrigated cropland, and 18,518 acres of rangeland that may need to be treated to reduce the amount of sediment and nutrients entering §303(d) listed streams (Table 6). Implementation activities have been and will be focused on 251,621 acres of private agricultural lands within the Upper Teton River Subbasin as shown in Table 7.

The goal of this implementation plan is to identify BMPs necessary to meet the requirements of the TMDLs on the following §303(d) listed streams (Table 1). In doing such, this implementation plan will aid in restoration efforts of impaired beneficial uses such as cold-water biota, salmonid spawning, primary contact recreation, and secondary contact recreation in streams on private agricultural lands. Table 1 lists the specific assessment units for each stream segment, which are an accounting system developed by the EPA for the listing of all stream segments.

Objectives

The objectives of this plan will be to reduce the amount of sediment and nutrients entering these streams from agricultural sources. Agricultural pollutant reductions will be achieved through the application of BMPs and RMS systems on site. This plan is not intended to identify which BMPs are appropriate for specific agricultural fields; however, it does recommend BMPs for reducing water quality problems at a subbasin level.

Another objective of this plan will be to conduct BMP effectiveness evaluations and monitoring as it relates to pollutant loading and the designated beneficial uses of the streams listed above. Emphasis will also be placed on the implementation of a water quality outreach program to encourage landowner participation in water quality implementation efforts within the subbasin. Several technical, educational, and financial tasks will be needed to accomplish the objectives, which include:

- Improve riparian and stream channel habitat
- Reduce stream channel erosion
- Improve grazing management
- Decrease sediment, nutrients and bacteria concentrations
- Reduce livestock concentrations on streams
- Monitor project progress and apply adaptive management

This plan recommends that agricultural landowners contact the Teton Soil Conservation District (TSCD), Natural Resources Conservation Service (NRCS), Idaho Association of Soil Conservation Districts (IASCD), Idaho State Department of Agriculture (ISDA) and/or the Idaho Soil Conservation Commission (ISCC) for assistance. These agencies will help landowners determine the specific water quality and other natural resource concerns on their property.

Table 1. EPA's Identified Assessment Units for Stream Segments

Stream	Segment	WQLS #	Assessment Units	Approved TMDL
Badger Creek	Hwy 32 to Teton River	2125	ID17040204SK057_03 ID17040204SK058_03	Sediment
Darby Creek	Hwy 33 to Teton River	2134	ID17040204SK044_02 ID17040204SK045_02	Sediment
Fox Creek	Hwy 33 to Teton River	2136	ID17040204SK041_02 ID17040204SK042_02	Sediment, Temperature
Moody Creek	Forest Boundary to Teton River	2119	ID17040204SK005_04	Nutrients
Packsaddle Creek	Headwaters to Teton River	2129	ID17040204SK018_03 ID17040204SK019_02	Sediment
South Leigh Creek	WY Line to Teton River	2128	ID17040204SK053_03	Sediment
Spring Creek	WY Line to Teton River	2127	ID17040204SK054_03 ID17040204SK056_02 ID17040204SK056_03	Sediment, Temperature
Teton River	Hwy 33 to Bitch Creek	2116	ID17040204SK014_04 ID17040204SK015_04 ID17040204SK016_04	Sediment, Nutrients
Teton River	Trail Creek to Hwy 33	2117	ID17040204SK017_04 ID17040204SK020_04 ID17040204SK028_03	Sediment
North Fork Teton River	Forks to Henry's Fork	2113	ID17040204SK002_05	Sediment, Nutrients

Teton River TMDL

The Idaho Department of Environmental Quality (IDEQ) prepared the Teton River TMDL: Water Body Assessment and Total Maximum Daily Load between the years of 1998-2003. IDEQ submitted the Teton River TMDL to US Environmental Protection Agency (USEPA) in 2003. The TMDL was not revised; however an addendum for Fox, Moody, and Spring Creeks was prepared in March 2003 and approved on May 29th, 2003. USEPA approved the Teton

TMDL on February 24th, 2003. The TMDL addressed nine total segments; nine segments for sediment, three segments for nutrients, and two segments for temperature. There are no state water quality criteria that pertain to flow alteration or habitat alteration, and it is DEQ's policy that TMDLs will not be developed for these (IDEQ 2003).

Beneficial Use Status

The State of Idaho (IDEQ) designated beneficial uses, shown on Table 2, for rivers, creeks, lakes, and reservoirs to meet the requirements of the Clean Water Act. Thirteen water quality limited segments were on the State of Idaho's 1998 §303(d) list (IDEQ 2003). Beneficial uses describe a stream's potential use and they also describe the guidelines for those uses. Many of the streams and lakes in the state have beneficial uses that are specific to that water body, but many small streams across the state have not had any beneficial uses assigned to them. Therefore the State of Idaho assigned a minimum level of beneficial use to all streams without an existing beneficial use. Minimum level beneficial uses keep the waters of the State in compliance with the Clean Water Act that requires all waters to be swimable and fishable (IDEQ 2003).

The following are the beneficial uses that exist in the Teton Subbasin; agricultural water supply, industrial water supply, cold-water aquatic life, salmonid spawning, primary contact recreation, secondary contact recreation, domestic water supply, wildlife habitat, aesthetics, and special resource water (IDEQ 2003).

The Teton River's beneficial uses are not fully supported due to sediment, nutrients, temperature, habitat alteration, and flow alteration. The support status of cold water aquatic life and salmonid spawning beneficial uses are influenced by physical factors such as water quantity and habitat structure, as well as water quality. Although DEQ has no authority relative to water quantity, it must determine 1) whether support of a beneficial use is impaired because of water quality or habitat conditions and 2) the sources of pollutants that may be degrading water quality (IDEQ 2003). Table 2 summarizes the pollutants of concern and status of each beneficial use by stream in the Teton Subbasin and Table 3 lists the beneficial uses assigned to each stream. Some of the sources of pollutants that IDEQ listed in the subbasin assessment are streambank erosion and cropland erosion**.**

Table 2. Beneficial Use Support Status of Water Quality Limited Segments (IDEQ 2003)

Stream	WQLS #	Pollutant	Support Status	Concerns
Badger Creek	2125	Sediment	Not Supporting	Streambank Erosion, Cropland Erosion
Darby Creek	2134	Sediment, Flow Alteration	Not Supporting	Streambank Erosion, Cropland Erosion
Fox Creek	2136	Sediment, Temperature, Flow Alteration	Not Supporting	Streambank Erosion, Cropland Erosion, Rangeland Erosion
Horseshoe Creek	2130	Flow Alteration	Not Supporting	No TMDL for Flow Alteration
Moody Creek	2119	Nutrients	Not Supporting	Approved Nutrient TMDL
North Leigh Creek	5230	Unknown	Not Supporting	Streambank Erosion, Cropland Erosion
Packsaddle Creek	2129	Sediment, Flow Alteration	Not Supporting	Streambank Erosion, Cropland Erosion
South Leigh Creek	2128	Sediment	Not Supporting	Streambank Erosion, Cropland Erosion
Spring Creek	2127	Sediment, Temperature, Flow Alteration	Not Supporting	Streambank Erosion, Cropland Erosion
Teton River	2116	Sediment, Habitat Alteration, Nutrients	Not Supporting	Streambank Erosion, Cropland Erosion, Rangeland Erosion
Teton River (Teton River Valley segment)	2117	Sediment, Habitat Alteration	Not Supporting	Streambank Erosion, Cropland Erosion, Rangeland Erosion
Teton River	2118	Habitat Alteration	Not Supporting	No TMDL for Habitat Alteration
North Fork Teton River	2113	Sediment, Nutrients	Not Supporting	Streambank Erosion, Cropland Erosion, Rangeland Erosion

Table 3. Beneficial Uses by Stream in the Teton Subbasin (IDEQ 2002)

Stream	Aquatic Life		Recreation		Water Supply					
	Cold	SS	PCR	SCR	DWS	AWS	IWS	WH	Aesthetics	SRW
Badger Creek	Cold	SS				AWS	IWS	WH	Aesthetics	
Darby Creek	Cold	SS				AWS	IWS	WH	Aesthetics	
Fox Creek	Cold	SS				AWS	IWS	WH	Aesthetics	
Horseshoe Creek	Cold	SS				AWS	IWS	WH	Aesthetics	
Moody Creek	Cold	SS				AWS	IWS	WH	Aesthetics	
North Leigh Creek	Cold	SS				AWS	IWS	WH	Aesthetics	
Packsaddle Creek	Cold	SS				AWS	IWS	WH	Aesthetics	
South Leigh Creek	Cold	SS				AWS	IWS	WH	Aesthetics	
Spring Creek	Cold	SS				AWS	IWS	WH	Aesthetics	
Teton River #2118	Cold	SS	PCR		DWS	AWS	IWS	WH	Aesthetics	SRW
Teton River #2117	Cold	SS	PCR		DWS	AWS	IWS	WH	Aesthetics	SRW
Teton River #2116	Cold	SS	PCR		DWS	AWS	IWS	WH	Aesthetics	SRW
North Fork Teton River	Cold	SS		SCR		AWS	IWS	WH	Aesthetics	

Aquatic life beneficial uses include cold water (Cold) and salmonid spawning (SS).
Recreation beneficial uses include secondary contact recreation (SCR) and primary contact recreation (PCR).
Other beneficial uses include: drinking water supply (DWS), agriculture water supply (AWS),
Industrial water supply (IWS), wildlife habitat (WH) and special resource water (SRW).

Background

The Teton River is a major natural resource in Teton County and the State of Idaho. Its value and use for agriculture, fisheries, wildlife, and recreation is directly linked to its water quality (USDA 1992). The Teton Subbasin is one of three watersheds that comprise the Henry's Fork Basin. The Teton River drains an area of 806 square miles in Idaho and 327 square miles in Wyoming. The river originates from headwater streams in the Teton, Big Hole, and Snake River mountain ranges and flows more than 64 miles before discharging into the Henry's Fork River. Twenty river miles southwest of this point, the Henry's Fork joins the South Fork of the Snake River to form the mainstem of the Snake River.

The Teton Subbasin is physically and biologically diverse. A defining feature of the Teton Subbasin is the extensive wetland complex associated with the upper Teton River.
Climate varies within the subbasin according to elevation, but is generally characterized by cold winters and mild summers. Average total rainfall is greatest in May and June and average total snowfall is greatest in December and January.

Three distinct reaches of the Teton River have been defined by the geologic and topographic features of the subbasin. The first reach is called Teton Valley or Teton Basin. The second reach is called Teton canyon. Teton Canyon, with steep walls rising as high as 500 feet, contains the river for approximately 17 miles. In 1975, Teton Dam was completed at the lower end of the canyon to create a reservoir for irrigation water. In June 1976, when the reservoir behind the dam had almost filled, the earthen dam collapsed. The third reach of the river extends from the Teton Dam site to the Henry's Fork, and includes the floodplains of the North and South Forks of the Teton River and the Henry's Fork River. This reach was extensively altered by the flood that followed the collapse of the Teton Dam and by the mitigation and restoration work that followed the flood.

Approximately 75% of land in the Teton Subbasin west of the Idaho-Wyoming border is privately owned, and the principal land use is cultivated agriculture. The eastern portion of Teton Subbasin is located in Teton County, Wyoming and Teton County, Idaho; the western half of the subbasin is located primarily in Madison County. Approximately 25% of the Teton Subbasin is federal or state-owned, and the majority of this land is managed by the Caribou-Targhee National Forest.

Agriculture has historically been the principal land use influencing water quality in the Teton Subbasin. Of the thirteen segments on Idaho's 1998 §303(d) list of water quality impaired water bodies, sediment is cited as the pollutant responsible for impairment of nine segments. The principal processes that generate sediment are 1) sheet and rill erosion due to rain and snow runoff from cultivated fields and 2) streambank erosion due to grazing, channel alteration, and flood irrigation. Significant sources of sediment also include the collapse of Teton Dam; natural mass wasting events, particularly on Teton and Trail Creeks; and poorly maintained roads and culverts, particularly in areas where roads were constructed for timber harvest.

The other pollutants shown on Idaho's 1998 §303(d) list are also associated primarily with agricultural land uses. Flow alteration occurs because flow is diverted from streams for use as irrigation water. Habitat alteration, particularly fish spawning habitat, is directly related to the accumulation of fine sediment in streams. Thermal modification (i.e., temperature) has been attributed to removal of riparian vegetation and loss of shade, apparently due to grazing. Nutrients, particularly nitrogen, have been attributed to cattle manure, fertilizer, and crops such as alfalfa hay.

The effects of agricultural practices on water quality in the Teton Subbasin have not gone unnoticed by the agricultural community, and for more than fifty years, the Madison Soil and Water Conservation District and Teton Soil Conservation District have actively promoted resource conservation practices within the subbasin. Both districts have worked closely with the United States Department of Agriculture (USDA) Natural Resources Conservation Service to educate farmers about conservation practices and to obtain funding to assist farmers in implementing those practices. In fact, many of the streams that appear on Idaho's 1998 §303(d) list were originally listed because the Teton Soil Conservation District (TSCD) requested assistance from the Idaho Department of Health and Welfare in identifying water quality problems. Because of the activities of the conservation districts, the most erodible croplands have been removed from cultivation through the Conservation Reserve Program. Currently, the conservation districts are working through the USDA Environmental Quality Incentives Program to expand implementation of conservation practices.

Generally, the quality of water in the Teton Subbasin is good, as indicated by the continued presence of the native Yellowstone cutthroat trout (*Onchorhynchus clarki bouvieri*). This subspecies of cutthroat trout is an Idaho "species of special concern" because it is low in numbers, limited in distribution, and has suffered significant habitat losses. The decline of Yellowstone cutthroat trout throughout its range has been attributed primarily to hybridization with rainbow trout (*Onchorhynchus mykiss* sp.).

Past and Present Pollution Control Efforts

The Teton Soil Conservation District made several efforts to procure funding for implementation of water quality projects through the State Agricultural Water Quality Project (SAWQP). At that time, IDEQ administered the SAWQP, although projects were approved jointly by IDEQ and the Idaho Soil Conservation Commission (ISCC).

In 1992, the Teton River Basin Study (USDA 1992) was completed at the request of the Teton SCD by the USDA Soil Conservation Service and Forest Service in cooperation with the IDFG. The study was completed in anticipation of funding through the Watershed Protection and Flood Prevention Act (Public Law 83-566), administered by the USDA.

Application for funding of the Bitch Creek project was submitted jointly by the Teton and Yellowstone Soil Conservation Districts in 1994. This application consisted of a SAWQP implementation grant for the Bitch Creek subwatershed portion of the Teton Canyon Water Quality Planning Project. The Bitch Creek implementation project is unique because it is the only project in eastern Idaho to incorporate long-range monitoring to assess project effectiveness. The project began in 1994 and extends through 2009.

The Teton River Riparian Area Demonstration Project, initiated by the TSCD in 1991, was also intended to include long-term monitoring. The project addressed the effects of livestock grazing on water quality at three locations in the upper Teton River watershed, and was apparently funded with SAWQP and §319 nonpoint-source pollution control monies.

A major source of funding currently utilized by the Conservation Districts in the Teton Subbasin is the USDA Environmental Quality Incentives Program (EQIP). The Teton, Madison, and Yellowstone Districts applied for a $1.85 million multi-year grant in 1998. The program requires a 25% cost share by the landowner, and in the first year of the program, 19 landowners applied for a total of $293,406 (IDEQ 2003). The three-District area was awarded only $190,000 in funding however, which reduced the number of participating landowners to approximately 12 (Ray 1999).

There have been two studies conducted within the upper Teton Subbasin: The Teton River Basin Study (TRBS) and the Teton Canyon Water Quality Planning Project also known as the Teton Canyon Watershed Area (TCWA).

Teton River Basin Study Area

The Teton River Basin Study Area is located along the upper Teton River in eastern Idaho. The watershed contains approximately 292,630 acres in Teton County, Idaho and Teton County, Wyoming. The Teton River originates in the study area and meanders 20 miles in a northwesterly direction to State Highway 33. The communities of Tetonia, Driggs, Victor, and Alta are located within, or adjacent to, the study area. The study area is approximately 30 miles east of Rexburg, Idaho.

The study area is bound by the Teton Mountain Range on the east and the Big Hole Mountains of the Snake River Range on the west and south. The southern edge of the study area is formed by the junction point of the Teton Mountain Range and Snake River Range. The northern boundary of the study area is the drainage divide between the Packsaddle Creek and Milk Creek drainages and the drainage divide between Badger Creek and Spring Creek and North and South Leigh Creeks.

For planning purposes, the study area was divided into 24 subwatersheds. Subwatershed boundaries are based on the major natural hydrologic subdivisions occurring within the study area (USDA 1992).

Teton Canyon Watershed Area

The Teton Canyon Watershed Area (TCWA) is located along the Teton River in southeastern Idaho. The watershed contains 267,980 acres in northern Teton, southern Fremont, and eastern Madison Counties, Idaho. The project area also includes acreage in the northwestern portion of Teton County, Wyoming. The communities of Tetonia and Felt are located within the project area, as is the University of Idaho-ARS Tetonia Experimental Station. The project area is approximately 16 miles northwest of Driggs, Idaho; 30 miles east of Rexburg, Idaho; and 30 miles east of St. Anthony, Idaho.

The Teton River enters the project area northwest of Driggs, Idaho at Horseshoe Creek and meanders for 6.35 miles in a northwesterly direction toward Highway 33. North of Highway 33, the river gradient increases as it enters the “Narrows” of Teton Canyon. The Teton River flows northwesterly in the canyon for 11 miles to its confluence with Bitch Creek. After the confluence with Bitch Creek, the Teton River flows westerly for 13 miles, into an ever-larger canyon. The Teton River leaves the TCWA after the Canyon Creek confluence, which is approximately six miles above the location of the collapsed Teton Dam.

The Teton Mountains form the eastern boundary of the project area. The northern boundary is the hydrologic division between the Falls River and the Teton River/Bitch Creek drainages. On the west side of Teton Valley the southern boundary is the divide between the Horseshoe Creek and Twin Creek drainages. East of the Teton River, the southern boundary is the hydrologic divide between Badger and Leigh Creeks. The western project area boundary is the hydrologic divide between the Canyon Creek and Moody Creek drainages.

For planning purposes, the TCWA was divided into seven subwatersheds. Subwatershed boundaries are based on the major natural hydrologic subdivisions occurring within the TCWA (TSCD 1991).

Many of the above mentioned projects began in the early 1990's and have continued up to the present. Since Teton County has a history of installing BMPs that aim to restore water quality and riparian condition, there will be future reports generated to evaluate the effectiveness of these projects.

Project Setting

This implementation plan covers 358,865 acres in the upper Teton Subbasin (Figure 1), which includes twelve 5^{th} level HUC watersheds as shown in Table 4. This plan does not include 5^{th} level HUC watersheds, Moody, Newdale, Parkinson, Rexburg North, or Rexburg South, therefore, pollutant concerns for Moody Creek and the North Fork of the Teton River will not be addressed in this implementation plan. Elevations in the Teton watershed range from 5,100 feet at the confluence of the Teton River and Canyon Creek to 11,923 feet in the Teton Mountains.

Table 4. Watershed Areas and Acreages

HUC 5 Watershed Name	Acres
Judkins	31,795
Milk Creek	38,696
Badger	22,749
North Leigh	60,687
Bear Creek	5,907
Teton Canyon	8,191
Driggs	43,863
Lower Darby	20,935
Darby Creek	4,433
Little Pine	21,532
Victor	18,506
Canyon Creek	81,571
Total	**358,865**

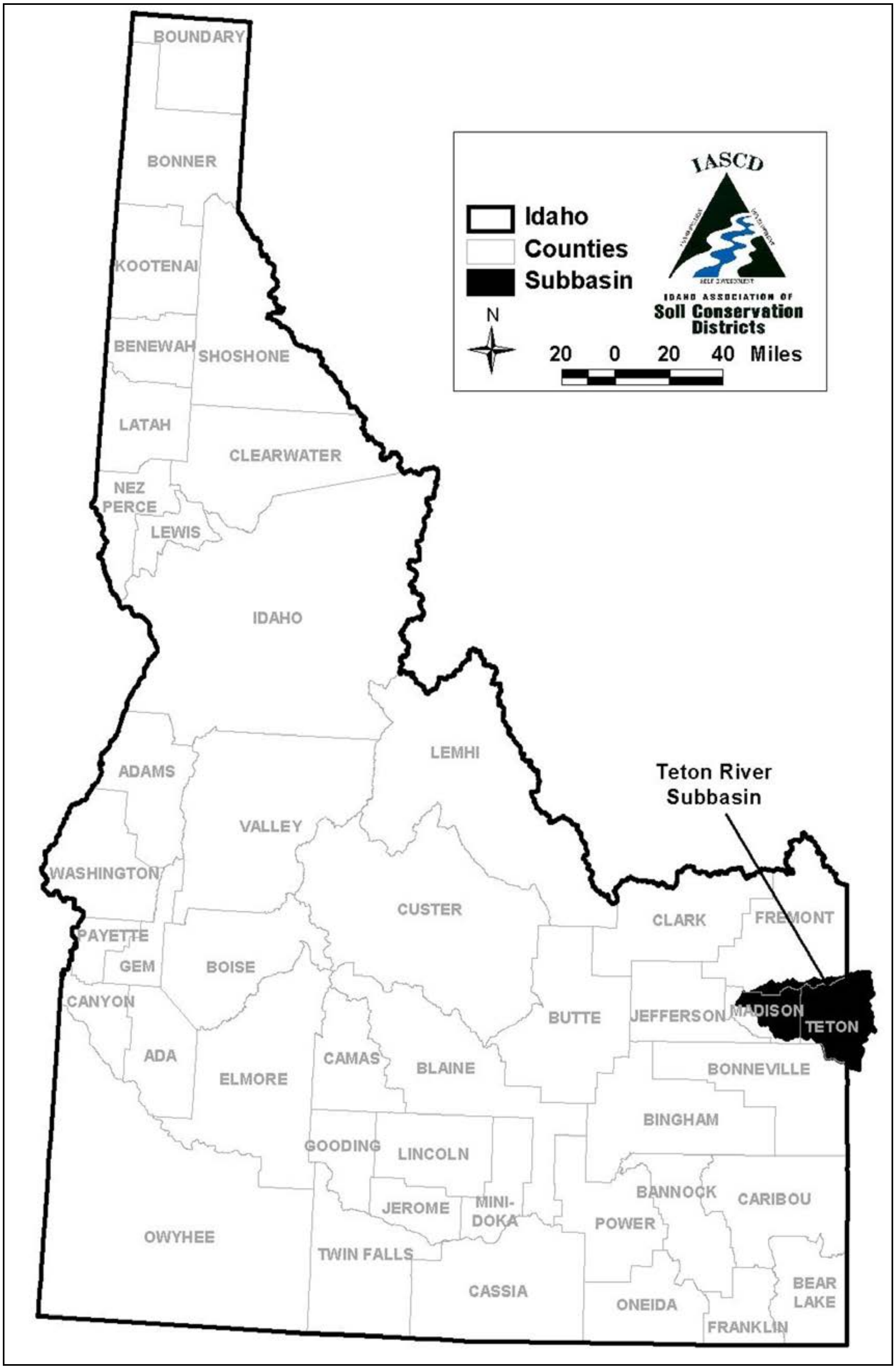

Figure 1. Teton River Subbasin Location Map

Threatened and Endangered Species

The threatened and endangered species that occur in Teton County according to the U.S. Fish and Wildlife Service include: Gray Wolf (*Canis lupus*), Whooping Crane (*Grus americanis*), Canada lynx (*Lynx Canadensis*), Bald eagle (*Haliaeetus leucocephalus*), and Grizzly Bear (*Ursus arctos horribilis*). Teton County also has the candidate species; Yellow-billed cuckoo (*Coccyzus americanus*) (NRCS 2002).

Land Use

The principal land use within the Teton Subbasin is cultivated agriculture. The National Agricultural Statistics Service (NASS) reports that in 1997, 301 farms operated in Teton County, Idaho, yielding total farm acreage of 138,331. In 2002, 302 farms operated in Teton County, Idaho, for total farm acreage of 124,613, a 10 percent decline within a five-year period (NASS 2002). Statistics indicate a decline in total farm acreage and an increase in operators from 1997 to 2002 (Table 5). Only 186 of the 302 farms in Teton County operated as full-time farms in 2002, an increase from 156 full-time farms in 1997. According to the 2002 National Census of Agriculture, approximately 69,000 acres of cropland were harvested out of approximately 92,000 acres of total cropland.

Beef and dairy cattle numbers remained relatively stable with a slight decline from 1997 to 2002, but swine and sheep production declined dramatically. In Teton County, the number of farms reporting milk cows declined from 28 in 1997 to 16 in 2002, while the number of farms reporting beef cattle declined from 107 in 1997 to 83 in 2002 (NASS 2002). The numbers of acres planted in barley in 2002 were about twice the number planted in hay, which in turn were about five and nine times the number planted in potatoes and wheat, respectively. Land use in the small portion of Fremont County contained within the Teton Subbasin is comparable to land use in Teton County.

Non-federal land in the Teton SCD is used for irrigated cropland, dry cropland, woodland, rangeland, pasture, and hayland. Private land uses within the Teton SCD are changing due to the pressure of urban development. Only small acreages of “new land” have the potential to be brought into agricultural production. Private homes and recreational property development near Jackson Hole, Wyoming make land unavailable for agricultural production. Agricultural landowners are selling their land in response to low agricultural commodity prices and high demand for residential and investment housing in the Teton SCD. Excluding municipalities, in 2003 there were an estimated 5,235 lots covering 12,116 private land acres approved for development in Teton County. Approximately 325 additional lots covering 1593 acres are pending approval by the Teton County Planning and Building Department (Teton Soil Conservation District 2005).

For private lands, cropland and pasture totaled 173,360 acres or 68.8% of the Upper Teton Subbasin, which included both non-irrigated and irrigated lands. In comparison, rangeland totaled 18,518 acres or 7.3% of the subbasin. Forest lands comprised 19,891 acres or 7.9% of the Upper Teton Subbasin. All land uses are listed in Table 6 and displayed in Figure 2.

Table 5. Agriculture Statistics for Teton County, Idaho: 1997 and 2002[1].

Parameter	Teton County	
	1997	2002
Farms	301	302
Average farm size (acres)	460	413
Total farm acreage (acres)	138,331	124,613
Total cropland (acres)	102,864	91,979
Total harvested cropland (acres)	78,122	68,768
Irrigated land (acres)	57,871	55,715
Market value of crops ($1,000)	17,298	19,998
Market value of livestock and poultry, and products ($1,000)	5,675	4,127
Beef cows	6,706	5,484
Milk cows	1,200	989
Hogs and pigs inventory	78	49
Sheep and lambs inventory	182	98
Wheat for grain (acres)	4,529	4,362
Barley for grain (acres)	45,881	38,533
Potatoes (acres)	7,166	7,066
Hay - Alfalfa, other (acres)	NA	18,701

[1]Source: NASS 2002.

Table 6. Private Land Use in the Upper Teton Subbasin

Land Use	Acres	Percent of Total
Cropland and Pasture	173,360	68.8%
Forest	19,891	7.9%
Mines and Gravel Pits	128	0.1%
Rangeland	18,518	7.3%
Riparian	8,486	3.4%
Roads	5,914	2.4%
Urban	13,247	5.3%
Wetland	12,078	4.8%
Total	**251,622**	**100%**

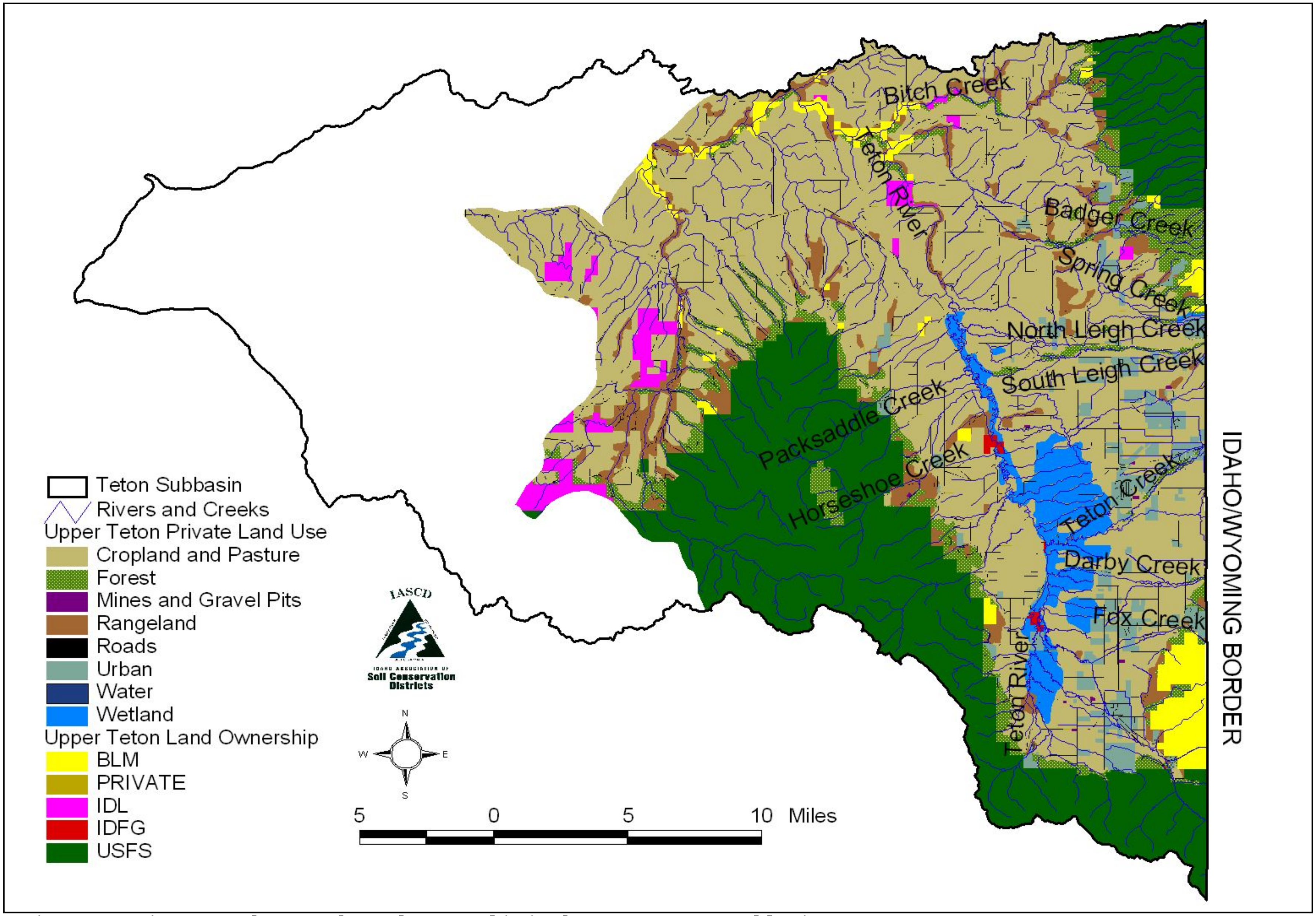

Figure 2. Private Land Use and Land Ownership in the Upper Teton Subbasin

Land Ownership

A large percentage of the land in the Teton Subbasin in Idaho, 377,978 acres or 73.4%, is privately owned. Bureau of Land Management (BLM) manages 10,354 acres or 2.0% of the total land in the Teton Subbasin. The Idaho Department of Lands (IDL) manages 18,067 acres or 3.5% of the total land in the Teton Subbasin. The Idaho Department of Fish and Game (IDFG) manages 471.8 acres or 0.1% of the total land in the Teton Subbasin. The U.S. Forest Service (USFS) manages 108,018 acres or 21.0% of the total land in the Teton Subbasin. The vast majority of federally owned land in the subbasin is managed by the Caribou-Targhee National Forest (IDEQ 2003).

Private lands still dominant the largest percentage of land in the Upper Teton Subbasin, accounting for 251,621 acres or 70.2%. The remaining land is managed by the BLM, IDL, IDFG, and USFS. Table 7 lists the acreage and percent of total land for each of the land owners/managers. Figure 2 shows land ownership in the Upper Teton subbasin.

Table 7. Land Ownership in the Upper Teton Subbasin

Land Owners/Managers	Acres	Percent of Total
Private	251,621	70.2%
BLM	9,945	2.8%
IDL	6,083	1.7%
IDFG	472	0.1%
USFS	90,567	25.2%
Total	**358,688**	**100%**

Accomplishments

In the 1980s and early 1990s, the Teton SCD, the Madison Soil and Water Conservation District (MSWCD), and the Yellowstone Soil Conservation District (YSCD) made several efforts to obtain funding for implementation of water quality projects. The Districts proposed many project areas, some of which received funding for planning but did not receive funding for implementation. Programs approved for funding were the Bitch Creek South SAWQP, CRP, EQIP, RCRDP, Teton River SAWQP, TRDP, and WHIP (Figure 3). Table 8 lists some of the current accomplishments in the Teton Subbasin. The BMPs implemented and funds spent by these SAWQP projects are listed in Tables 9-12. The planning documents for funded and unfunded projects are valuable references and contain extensive information regarding land use, agricultural practices, and characterization of nonpoint-source pollution originating on agricultural lands.

Table 8. Conservation Program Contracts in the Upper Teton Subbasin

Project Name	Funding Source and Project Number	Period	Watershed Acres Addressed by Projects	Funds Spent
Teton River Implementation	SAWQP, AG 32	October 1, 1991 to September 30, 2006	35,320	$1,587,676
Bitch Creek South Implementation	SAWQP, AG 40	December 20, 1994 to December 20, 2009	53,553	$417,891
CRP	Farm Bill	1987 to present	11,795	$424,620

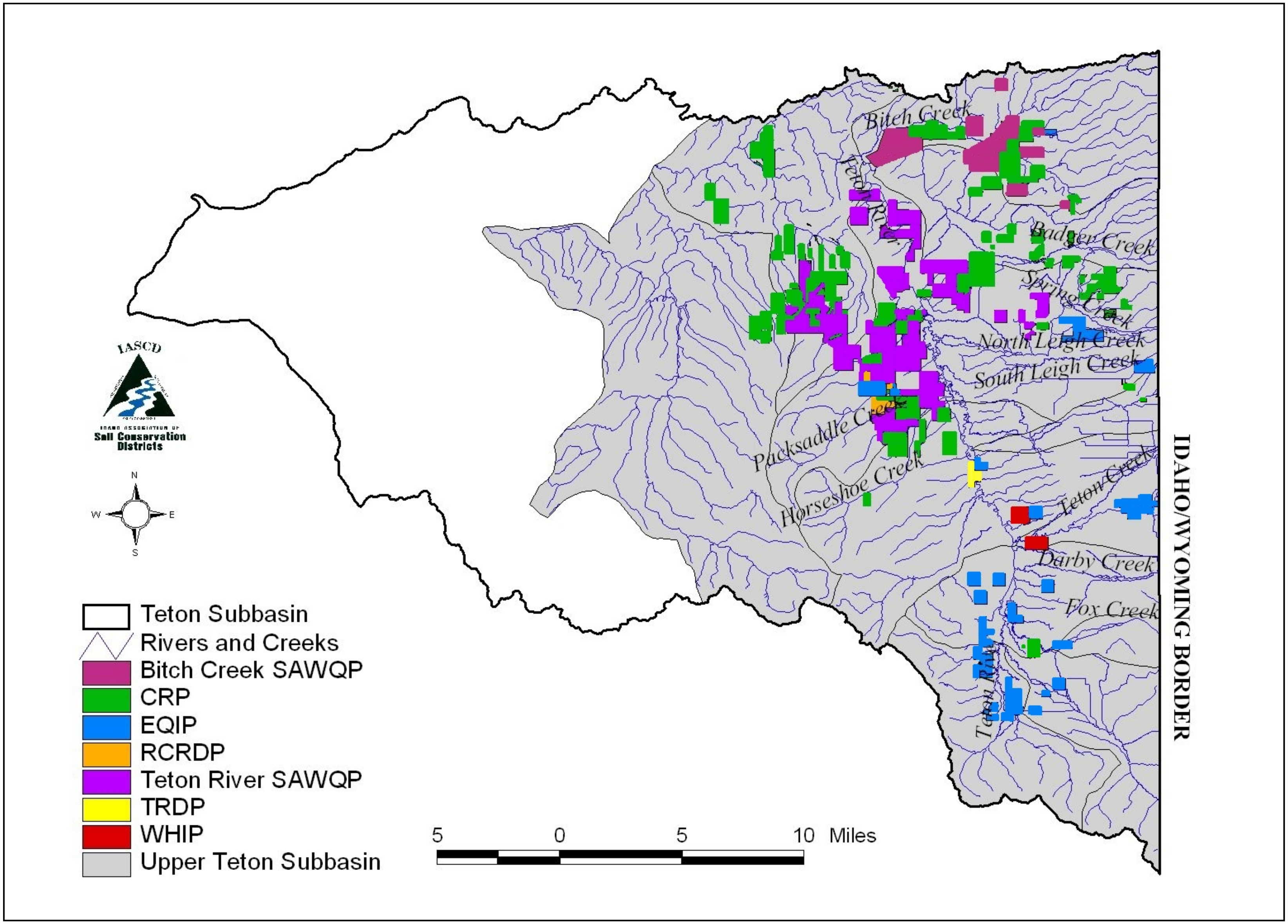

Figure 3. Conservations Programs implemented in the Upper Teton River Subbasin
(This figure was revised in February 2014 to obtain compliance with Section 1619 of the Farm Bill.)

Table 9. Teton River - SAWQP Cost Share Totals / BMPs Implemented (1991-2003)

Practice	Units / Amt.	Actual Cost	State Cost Share	Cooperator Match
Conservation Cover (327)	118 ac	$6,740	$1,679	$1,691
Contour farming (330)	5,613 ac	$35,690	$16,840	$18,849
Critical Area Planting (342)	11 ac	$5,653	$4,084	$1,570
Fencing (382)	11,408 ft	$15,679	$11,123	$4,556
Grade Stabilization Structure (410)	1,378 ft	$8,000	$7,200	$800
Grass & Legumes in Rotation	79 ac	$5,347	$3,980	$1,367
Hayland Planting (512-519)	686 ac	$44,730	$31,602	$13,128
Pipeline (516)	1,389 ft	$2,111	$1,042	$1,069
Reservoir Tillage (303)	93 ac	$1,001	$751	$250.
Residue Management - air seed (329b)	15,556 ac	$661,363	$463,665	$197,698
Residue Management - mulch till (329b)	2,183 ac	$48,408	$10,916	$37,492
Streambank Protection (580)	178 ft	$1,700	$1,275	$425
Subsoiling / Deep Tillage (324)	6,938 ac	$134,490	$71,010	$64,476
Tanks / Watering Facility (614)	7 ac	$630	$156	$474
Terraces (600)	4,547 ft	$5,430	$3,957	$1,473
Water & Sediment Control Basins (638)	48 ea/2,045 ft	$28,854	$18,761	$10,093
Totals		**$1,005,826**	**$648,041**	**$355,411**

Table 10. Teton River BMPs - Cooperators Cost (1991-2003)

Practice	Units / Amt.	Actual Cost	State Cost Share	Cooperator Match
Conservation Cover (327)	1410 ac	$1,072	$0	$1,072
Conservation Cropping Sequence (328)	57737 ac	$276,183	$0	$276,183
Conservation Tillage - mulch till (329b)	7535 ac	$75,388	$0	$75,388
Conservation Tillage - one pass air (329b)	13988 ac	$558,816	$0	$558,816
Contour farming (330)	2304 ac	$14,971	$0	$14,971
Crop Residue Use (344)	8046 ac	$31,943	$0	$31,943
Filter Strip (393)	2 ac	$6	$0	$6
Forage Harvest Management (511)	217 ac	$106	$0	$106
Irrigation Water Management (449)	20453 ac	$210,676	$0	$210,676
Livestock / Use Exclusion (472)	1376 ac	$40,128	$0	$40,128
Nutrient Management (590)	36520 ac	$18,261	$0	$18,261
Pasture and Hayland Management (510)	5096 ac	$2,487	$0	$2,487
Pest Management (595)	36140 ac	$18,071	$0	$18,071
Planned Grazing System (548)	45 ac	$23	$0	$23
Proper / Prescribed Grazing Use (528)	2149 ac	$537	$0	$537
Residue Management - Seasonal (344)	210 ac	$1,894	$0	$1,894
Subsoiling (324)	694 ac	$13,172	$0	$13,172
Upland Wildlife Habitat Management (645)	10715 ac	$5,342	$0	$5,342
Use Exclusion (472)	73 ac	$2,199	$0	$2,199
Totals	**204,710 ac**	**$1,271,275**	**$0**	**$1,271,275**
Overall Totals of BMPs Implemented to Date		**$2,277,101**	**$648,041**	**$1,626,686**
			18%	**82%**

Table 11. Bitch Creek South – SAWQP Cost Share Totals / BMPs Implemented (1994-2003)

Practice	Units / Amt.	Actual Cost	State Cost Share	Cooperator Match
Conservation Cover (327)	43 ac	$6,468	$3,507	$2,961
Conservation Tillage - one pass air (329b)	1,502 ac	$60,884	$45,213	$15,671
Conservation Tillage - mulch till (329b)	436 ac	$4,355	$2,178	$2,178
Contour farming (330)	560.6 ac	$3,364	$1,682	$1,682
Fencing (382)	9,521 ft	$18,185	$12,853	$5,332
Hayland Planting (512)	1,083 ac	$66,113	$44,503	$21,610
Pipeline (516)	2,228 ft	$4,247	$1,671	$2,576
Subsoiling (324)	1,195 ac	$21,406	$14,750	$6,656
Terraces (600)	4 ea	$4,000	$2,000	$2,000
Water & Sediment Control Basins (638)	563 ft / 10 ea	$5,628	$4,192	$1,436
Totals		**$194,650**	**$132,549**	**$62,102**

Table12. Bitch Creek South BMPs - Cooperators Cost (1994-2003)

Practice	Units / Amt.	Actual Cost	State Cost Share	Cooperator Match
Conservation Cropping Sequence (328)	11,584 ac	$57,921	$0	$57,921
Conservation Tillage - mulch till (329b)	1,929 ac	$19,293	$0	$19,293
Contour farming (330)	1,964 ac	$13,241	$0	$13,241
Crop Residue Use (344)	115 ac	$461	$0	$461
Deferred Grazing (528)	953 ac	$544	$0	$544
Irrigation Water Management (449)	1,175 ac	$12,342	$0	$12,342
Nutrient Management (590)	11,584 ac	$5,792	$0	$5,792
Pasture and Hayland Management (510)	5,168 ac	$2,718	$0	$2,718
Pest Management (595)	11,704 ac	$5,852	$0	$5,852
Proper / Prescribed Grazing Use (528)	1,089 ac	$272	$0	$272
Residue Management - Seasonal (344)	543 ac	$2,172	$0	$2,172
Subsoiling (324)	391 ac	$2,347	$0	$2,347
Upland Wildlife Habitat Management (645)	4,720 ac	$2,464	$0	$2,464
Totals	**52,920 ac**	**$125,419**	**$0**	**$125,419**
Overall Totals of BMPs Implemented to Date		**$320,069**	**$132,548**	**$187,520**
			41%	**59%**

Problem Identification

Pollutants of Concern

The following pollutants were identified by the State of Idaho's 1998 §303(d) list as responsible for, or contributing to, impaired water quality conditions in the Teton Subbasin: thermal modification (i.e. temperature), nutrients, sediment, flow alteration, and habitat alteration. Thermal modification (i.e. temperature) affected two segments as shown in Table 2. Nutrients and habitat alteration each affected three segments. Sediment affected nine stream segments. Flow alteration affected five segments. A pollutant was not identified for North Leigh Creek, a stream that was added to the 1998 §303(d) list because it was assessed as water quality impaired using BURP data. Although the BURP assessment process can determine that a beneficial use is not supported, it cannot identify the pollutant responsible.

All of the identified pollutants in this subbasin originate as nonpoint sources. There are three point-source discharges however, that require permits under the National Pollutant Discharge Elimination System (NPDES) in the Teton Subbasin but none discharge into a §303(d) listed stream segments. They are the municipal wastewater treatment systems in Driggs, Grand Targhee Ski Area, and Rexburg. (IDEQ 2003).

There are no state water quality criteria that pertain to flow alteration or habitat alteration, and it is DEQ's policy that TMDLs will not be developed for these pollutants. Among the assumptions used to compile Idaho's 1998 §303(d) list, DEQ asserts that flow alteration and habitat alteration are 1) not defined by the CWA as pollutants, and 2) unsuitable for TMDL development (DEQ 1998b). The capacity of a waterbody to support aquatic life is initially determined by the presence of water and secondarily by the quality of that water. However, the relationship between flow apportionment and water quality is clearly addressed in Idaho's water quality standards (IDAPA 58.01.02.050.01) as follows:

> *The adoption of water quality standards and the enforcement of such standards is not intended to conflict with the apportionment of water to the state through any of the interstate compacts or decrees, or to interfere with the rights of Idaho appropriators, either now or in the future, in the utilization of the water appropriations which have been granted them under the statutory procedure...*

Identified Problems

Current land use practices and structures in the Teton subbasin are contributing factors to the degradation of beneficial uses. The removal of vegetation and canopy cover, unstable diversions and culverts, road encroachment, and concentrated livestock feeding and watering areas are underlying factors contributing to water quality problems. IDEQ presumes that beneficial uses were or would be fully supported between current and natural background loading rates. The strategy is to establish a no net trend in load capacities through the installment of best management practices on land surrounding the thirteen streams in the subbasin, which are on the State of Idaho's 1998 §303(d) list. IASCD has gathered monitoring data to help quantify and identify the pollutant(s) of concern for each of the §303(d) listed streams.

Temperature

The most highly altered stream segment in the Teton Subbasin extends through the Teton Canyon from Bitch Creek to the Teton Dam site. According to Randle et al. 2000, "the construction and subsequent failure of the Teton Dam has likely increased summer river water temperatures by 1 to 2 degrees F." This increase in river water temperature was attributed to increased travel time and the loss of riparian vegetation. The temperature load that can be assimilated by any of the stream segments in the subbasin without violating water quality standards or impairing beneficial uses is unknown.

Nutrients

Nutrients can be carried into streams along with sediment. Floyd Bailey, SCS State Agronomist, stated, "that for each ton of cropland sediment delivered to a water body, there are an estimated 3 pounds of nitrogen and 2.8 pounds of phosphorous delivered to that water body." Based on the assumption that each ton of cropland-generated sediment contained three pounds of nitrogen, the *Teton River Basin Study* (USDA 1992) estimated that 226 tons of nitrogen was delivered to the Badger Creek and Packsaddle Creek subwatersheds. Excessive concentrations of nutrients, specifically nitrogen and phosphorus, may diminish water quality and impair beneficial uses through the process of eutrophication. Animal feeding operations may also be a source of nutrients to §303(d) listed streams. Furthermore, there are watersheds within the Teton Subbasin that are located in the Ashton/Drummond/Teton nitrate areas of concern (Mahler and Keith 2002).

Water samples collected by the USGS at gage station 13055000, *Teton River near St. Anthony*, were analyzed for nutrients. Water quality data from the gage station indicated that total phosphorus concentrations originating in the subbasin upstream of the North and South Forks of the Teton River are well below the recommended EPA value of 0.1 mg/L. In contrast, the concentrations of dissolved nitrogen ($NO_2 + NO_3$) equaled or exceeded the target concentration of 0.3 mg/L in more than half (38 of 72) of the samples analyzed (IDEQ 2003).

In addition, IASCD water quality data showed only one exceedance of total phosphorus above the target concentration of 0.1 mg/L for Spring Creek (Jenkins 2005). However, total nitrate and nitrogen ($NO_2 + NO_3$) for Badger, Darby, Fox, Spring, and South Leigh Creeks regularly exceeded the target concentration of 0.3 mg/L (Table 13). Packsaddle Creek was the exception, with only one exceedance of total nitrate and nitrogen throughout the three year sampling period.

The nutrient load that can be assimilated by any of the stream segments in the subbasin without violating water quality standards or impairing beneficial uses is unknown.

Sediment

Three primary geomorphic processes involved with flowing water are erosion, transport, and deposition. Soil particles are detached, moved, and deposited either gradually or rapidly and this movement can be caused by human activities or natural processes (FISWRG 1998). Agricultural sources of sediment include; sheet and rill, gully, stream channel, and irrigation-induced erosion. The Teton SCD concluded that sediment is the most serious pollutant in the watershed with irrigated and non-irrigated cropland as the largest contributor.

IASCD water quality data showed only one exceedance of total suspended solids above the 80 mg/L target concentration (Jenkins 2005). Water quality data clearly indicated that suspended sediment was not a problem for Badger Creek, Fox Creek, Darby Creek, Packsaddle Creek, South Leigh Creek, and Spring Creek; considering there was only one exceedance on Spring Creek over the course of a three-year sampling period.

The sediment load that can be assimilated by any of the stream segments in the subbasin is unknown; sediment reductions for individual reaches were estimated. The sediment load and reductions were defined in the Teton River Subbasin TMDL (IDEQ 2003). The inventoried streams, sediment loads, and the number of target exceedances are listed below in Table 13. Because of the relationship between nutrient additions and sediment additions from land use, it is assumed that methods to reduce sediment pollution will likewise reduce nutrient pollution (IDEQ 2003). Load reductions needed to meet target levels of nitrogen and phosphorous are listed in Table 14 for the upper Teton River. Table 15 lists the estimates of sediment yield for tributaries in the upper Teton Subbasin.

Table 13. Mean values generated for IASCD water quality data from 2002 through 2004

303(d) listed stream	Status	Total Suspended Solids (mg/L)	Total Nitrate and Nitrite (mg/L)	Total Phosphorus (mg/L)	Number of days sampled
Badger Creek	Mean	6.93	0.36	0.03	27
	# of Target Exceedances	0	10	0	
Fox Creek	Mean	8.45	1.60	0.03	51
	# of Target Exceedances	0	51	0	
Darby Creek	Mean	6.43	0.78	0.03	30
	# of Target Exceedances	0	26	0	
Packsaddle Creek	Mean	14.1	0.07	0.03	19
	# of Target Exceedances	0	1	0	
South Leigh Creek	Mean	3.73	0.59	0.03	22
	# of Target Exceedances	0	14	0	
Spring Creek	Mean	16.8	1.02	0.04	24
	# of Target Exceedances	1	24	1	

Flow Alteration
Flow alteration is the removal of water from a stream channel by an irrigation diversion. EPA does not recognize flow alteration as a pollutant requiring a TMDL. In the Teton Subbasin, flow alteration will not be addressed in the TMDL or the implementation plan. There are no state water quality criteria that pertain to flow alteration and it is DEQ's policy that TMDLs will not be developed for these.

Habitat Alteration
Fish spawning habitat was addressed in the subbasin assessment as being most effected by excessive sediment and removal of riparian vegetation. There are no state water quality criteria that pertain to habitat alteration and it is DEQ's policy that TMDLs will not be developed for these pollutants.

Critical Areas
Areas of agricultural lands that contribute excessive pollutants to water bodies are defined as "Critical Areas" for BMP implementation. Critical areas are prioritized for treatment based on their proximity to a water body of concern and their potential for pollutant transport and delivery

to the receiving water body. Agricultural critical areas within the subbasin are: cropland with sheet and rill erosion, unstable and erosive stream banks, over utilized pasture and range lands, unstable irrigation diversion structures, areas of channelization or vegetation removal, and Animal Feed Operations adjacent to stream corridors.

Tiers

There are four tiers that have been delineated within the subbasin. These tiers were determined by the proximity of the critical areas to the §303(d) listed stream segments. Each tier is assigned treatment units that describe land units with similar use, resource concerns, and soil properties.

Tier 1 Unstable and erosive streambanks and riparian areas adjacent to the river that have a direct and substantial influence on the river. Tier 1 is made of Treatment Unit #10.

Tier 2 Irrigated cropland and pasture with an indirect, yet significant influence on the river. Tier 2 is comprised of Treatment Units #6 – 9.

Tier 3 Non-irrigated cropland and pasture with an indirect, yet significant influence on the river. Tier 3 is comprised of Treatment Units #1 - 5, 11, 12.

Tier 4 Animal Facilities

Table 14. Estimated sediment reductions for §303(d) listed streams (IDEQ 2003)

Subwatershed	WQLS[1] Number	Current Yield (tons/year)	Alternative 3 Yield (tons/year)	Reduction
North Fork Teton River	2113	89,522	52,818	41%
Upper Teton River to Bitch Creek	2116	205,946	121,508	41%
Upper Teton River to Spring Creek	2117 2118	179,683	105,141	41%
Badger Creek	2125	26,263	16,367	38%
Spring Creek	2127 5230	20,844	12,027	42%
South Leigh Creek	2128	15,228	8,269	46%
Packsaddle Creek	2129	3,589	1,924	46%
Horseshoe Creek	2130	20,705	13,265	36%
Darby Creek	2134	2,601	694	73%
Fox Creek	2136	3,336	949	72%

[1]Water quality limited segment

Table 15. Load reductions necessary to meet loading capacity (minus 10% margin of safety[2]) for the Upper Teton River (Highway 33 to Bitch Creek) (IDEQ 2003).

	Load Capacity (lb./yr.)	Existing Load (lb./yr.)	Reduction
Upper Teton River, Highway 33 to Bitch Creek (WQLS[1] Number = 2116)			
Nitrogen (nitrate)	305,645	494,270	38%
Total Phosphorous	101,882	461,319	78%

[1]Water quality limited segment
[2]Margin of Safety: A 10% margin of safety has been used in calculation of loading capacity to adjust for uncertainty related to nutrient load calculations.

Table 16. Estimates of sediment yield for tributaries to the Upper Teton River, headwaters through Spring Creek (USDA 1992). Streams in bold are §303(d) listed for sediment.

Watershed Name (USDA 1992)	Current Yield (tons/year)			Alternative 2 (tons/year)			Alternative 3 (tons/year)		
	Land Use	Stream-bank	Total	Land Use	Stream-bank	Total	Land Use	Stream-bank	Total
Rammel Hollow	16,735		16,735	10,475		10,475	8,757		8,757
Spring Creek	17,148	3,696	20,844	11,820	2,391	14,211	10,610	1,417	12,027
S. Leigh Creek	12,311	2,917	15,228	8,477	1,882	10,359	6,994	1,275	8,269
Packsaddle Cr.	2,486	1,103	3,589	1,951	479	2,430	1,739	185	1,924
Dry Hollow	5,973		5,973	3,709		3,709	3,161		3,161
Horseshoe Cr.	18,517	2,188	20,705	14,816	1,367	16,183	12,723	542	13,265
No Name	11,293		11,293	7,713		7,713	5,963		5,963
Dry Creek	17,925	362	18,287	11,469	362	11,831	9,527	362	9,889
Teton Creek	2,024	4,392	6,416	1,738	2,948	4,686	1,538	1,890	3,428
Spring Creek II	3,073		3,073	2,253		2,253	1,817		1,817
Twin Creeks	4,457	1,641	6,098	3,355	1,026	4,381	2,979	367	3,346
Mahogany Cr.	4,210	1,746	5,956	3,635	1,208	4,843	3,407	665	4,072
Teton River	5,736		5,736	4,375		4,375	3,628		3,628
Foster Slough	227		227	194		194	173		173
Darby Creek	907	1,694	2,601	760	821	1,581	648	46	694
Bouquet Creek	1,502	336	1,838	1,329	157	1,486	1,244	89	1,333
Patterson Creek	2,122	506	2,628	1,869	375	2,244	1,759	263	2,022
Trail Creek	10,715	2,823	13,538	8,922	1,985	10,907	8,238	983	9,221
Fox Creek	1,430	1,906	3,336	960	1,080	2,040	817	132	949
Game Creek	1,807		1,807	1,743		1,743	1,678		1,678
Moose Creek	2,997	892	3,889	2,890	892	3,782	2,783	892	3,675
Drake Creek	968		968	635		635	554		554
Little Pine Cr.	2,406	1,100	3,506	2,165	908	3,073	2,057	526	2,583
Warm Creek	3,713	1,699	5,412	2,930	617	3,547	2,635	78	2,713
Totals	**150,682**	**29,001**	**179,683**	**110,183**	**18,498**	**128,681**	**95,429**	**9,712**	**105,141**

Note: - Current Yield represents Alternative 1
- Land use indicates all sources except streambank erosion
- Sediment yield from Teton River streambank erosion is not displayed in this table

Table 17. Combined critical acres for the Badger Creek, Fox Creek, North Leigh Creek, and Teton River Valley watersheds.

	Tier 1	Tier 2	Tier 3	Tier 4
Watershed	**Riparian Acres**	**Cropland and Pasture Acres**	**Rangeland Acres**	**Animal Facilities (each)**
Badger Creek	653	11,259	2,012	0
Fox Creek	358	5,592	874	5
North Leigh Creek	1,397	24,061	1,549	1
Teton River Valley	1,406	19,685	2,922	11
Total	**3,814**	**60,597**	**7,357**	**17**

Proposed Treatment Units (TUs)

The following TUs describe areas with similar land uses, productivity, resource concerns, and treatment needs. These TUs not only provide a method for delineating and describing land use but are also used to evaluate land use impacts to water quality and in the formulation of alternatives for solving problems.

Treatment Unit #1 - Non-Irrigated Cropland

Acres	Soils	Resource Problems
7,943	Soils highly erosive and are shallow to moderately deep. Moderately steep uplands. Predominantly located on long, broad, upland ridges. Slopes range from 4 to 12%	Sheet, rill, ephemeral gully, and gully erosion. Sediment and nutrient transport during runoff. Lack of residue and water control systems. Wind erosion.

Treatment Unit #2 - Non-Irrigated Cropland

Acres	Soils	Resource Problems
6,766	Soils are wind-deposited silt loams and are shallow to moderately deep with long, gently sloping alluvial fans, low terraces and level to sloping bottomlands. Slopes range from 0 to 4%	Sheet, rill, ephemeral gully, and gully erosion. Sediment and nutrient transport during runoff. Lack of residue and water control systems. Wind erosion.

Treatment Unit #3 - Non-Irrigated Cropland

Acres	Soils	Resource Problems
15,488	Soils are deep, wind-deposited silt loams with flat to sloping uplands. Forms the broad, gently sloping tops of micro-watersheds above steeper slopes. Slopes range from 0 to 4%	Sheet, rill, ephemeral gully, and gully erosion. Sediment and nutrient transport during runoff. Lack of residue and water control systems. Wind erosion.

Treatment Unit #4 - Non-Irrigated Cropland

Acres	Soils	Resource Problems
41,014	Soils are deep, wind deposited silt loams with moderately steep to steep rolling uplands. Forms the tops of micro-watersheds. Slopes range from 4 to 12%	Sheet, rill, ephemeral gully, and gully erosion. Sediment and nutrient transport during runoff. Lack of residue and water control systems. Wind erosion.

Treatment Unit #5 - Non-Irrigated Cropland

Acres	Soils	Resource Problems
16,318	Soils are deep, wind-deposited silt loams with steep to very steep uplands. Forms the steep side slopes of farmed watercourses. Slopes range from 12 to 24%	Sheet, rill, ephemeral gully, and gully erosion. Sediment and nutrient transport during runoff. Lack of residue and water control systems. Wind erosion.

Treatment Unit #6 - Irrigated Cropland

Acres	Soils	Resource Problems
20,179	Soils are deep, wind-deposited silt loams with flat to sloping uplands. Forms the broad gently-sloping tops of micro-watersheds above steeper slopes or the flatter depositional bottoms of micro-watersheds below steeper slopes. Slopes range from 0 to 4%	Sheet, rill, ephemeral gully, and gully erosion occur annually. Some irrigation induced erosion. Sediment and nutrient transport during runoff. Wind erosion.

Treatment Unit #7 - Irrigated Cropland

Acres	Soils	Resource Problems
22,888	Soils are deep, wind-deposited silt loams with moderately steep sloping uplands. Forms the tops of micro-watersheds dissected by numerous steep farmed draws. Slopes range from 4 to 12%	Sheet, rill, ephemeral gully, and gully erosion occur annually. Some irrigation induced erosion. Sediment and nutrient transport during runoff. Wind erosion.

Treatment Unit #8 - Irrigated Cropland

Acres	Soils	Resource Problems
4,153	Soils are deep, wind-deposited silt loams with steep to very steep rolling uplands. Forms the steep side slopes of farmed watercourses. Slopes range from 12 to 20%	Sheet, rill, ephemeral gully, and gully erosion occur annually. Some irrigation induced erosion. Sediment and nutrient transport during runoff. Wind erosion.

Treatment Unit #9 - Irrigated Cropland

Acres	Soils	Resource Problems
27,174	Soils are shallow with long gently sloping alluvial fans, low terraces and level bottomland. Generally located in a floodplain adjacent to streams or watercourses. Slopes range from 0 to 4%	Sheet, rill, ephemeral gully, and gully erosion occur annually. Some irrigation induced erosion. Sediment and nutrient transport during runoff. Wind erosion.

Treatment Unit #10 - Riparian Lands along Stream Corridors

Acres	Soils	Resource Problems
18,320	Riparian lands along stream corridors. Soils are hydric, deep and poorly drained to very poorly drained. Slopes range from 0 to 4%	Overgrazing, Removing streamside vegetation, Straightening stream channel , Improper culvert placement, Flooding, Stream evolution, Reduced sub-water flows, Erosion of uplands, Water quality degradation, Sedimentation, forage production, loss of livestock shelter, loss of wildlife habitat, reduced quality of fisheries, recreation use, reduced ecological condition and habitat diversity

Treatment Unit #11 - Upland Areas along Teton River

Acres	Soils	Resource Problems
8,120	Typically these upland soils are in association with riparian areas. Soils are deep, well drained and non-hydric. Surface textures of soils include silt loams, gravelly loams, and loams. Water tables do not occur above 6 feet. Slopes range from 0 to 4%	Overgrazing, Removing streamside vegetation, Straightening stream channel, Farming, Flooding, Stream evolution, Soil erosion, Poorly controlled flood irrigation systems, Water quality degradation, Sedimentation, Forage production, Loss of livestock shelter, Loss of wildlife habitat, Reduced quality of fisheries, Recreation use, Reduced ecological condition and habitat diversity

Treatment Unit #12 - Rangeland and Forest Land away from Stream Corridors

Acres	Soils	Resource Problems
58,168	Surface soil textures range from loams, silt loams, gravelly loams, cobbly loams, and extremely stony loams. Soils are well drained and are not hydric. Slopes range from 0 to 80%	Water quality degradation, Sedimentation, Brush encroachment, Noxious weeds, Loss of wildlife habitat, Reduced ecological condition and habitat diversity, Overgrazing of uplands, Season of use by livestock, Roads, Overland runoff/surface and gully erosion, Urbanization

Implementation Alternatives

Summary of Teton SCD Priorities

The main focus of the Teton SCD five year priorities are as follows:

- To reduce the quantity of animal waste, *E.coli*, nitrate + nitrite, total phosphorous, sedimentation, and streambank erosion impacting water quality by researching pollutants and providing financial and technical assistance to landowners.
- To improve the quality and quantity of vegetation by controlling noxious weeds, improving wetland and riparian areas, and encouraging producers to meet the requirements of the Farm Bill; improving forage on grazing lands and promoting agro-forestry to reduce snow and wind impacts.
- To effectively operate the Teton SCD in accordance with Idaho Soil Conservation District law by being an effective voice for conservation, conducting an active information and education program for the youth, and interacting with other agencies regarding SCD policy and recommendations.
- To improve fish and wildlife habitat by assisting and informing landowners of fish and wildlife issues and programs.

Planning Considerations

The basic consideration for developing alternative methods of treatment was to maintain or enhance the water quality of the Teton River and its tributaries by reducing the amount of sediment entering the system. Trout fisheries were identified as the primary beneficiary of any action (USDA 1992).

Implementation alternatives were developed that focused on the identified treatment units. Three alternatives have been outlined in this implementation plan for application on private and state land. The goals of these alternatives are to address agricultural nonpoint source pollution control on critical acres. The following alternatives were used for consideration:

1. No Action - Future without Project Action
2. Non-structural - Future with Project Action
3. Structural and Non-structural - Future with Project Action

Description of Alternatives

<u>Alternative 1 No action - Future without Project</u>

This alternative as defined in the Teton River Basin Study (USDA 1992) is "future without project action" where there is no project action but where the existing conservation programs would continue at their present level without additional project activities or voluntary landowner participation. This alternative predicts the conservation treatment that would be accomplished utilizing current ongoing programs with no accelerated financial or technical assistance. This alternative provides a basis for comparison. Current programs which affect the degree of watershed protection on privately owned land are listed in Table 19.

<u>Alternative 2 Non-structural - Future with Project</u>

This alternative is defined as a "future with project action: non-structural" alternative where a water quality project is implemented with accelerated technical assistance but with no additional financial assistance other than the ongoing programs in targeted areas listed in Alternative 1.

This alternative predicts the conservation treatment that would be accomplished by accelerating only technical assistance to implement BMPs on the critical acres. Practices applied under this alternative are primarily non-structural in nature and include conservation tillage, chiseling and subsoiling, cross-slope farming, permanent vegetative cover, filter strips, fencing, planned grazing systems, streambank protection, pasture management, and proper grazing use (USDA 1992).

This alternative would reduce accelerated sheet and rill, gully, and irrigation-induced erosion. It would also reduce nutrient and bacteria runoff from animal waste and fertilizer applications. This will improve water quality in the watershed and reduce pollutant loading to the Teton River. Beneficial uses would be sustained or improved with implementation of this alternative. This alternative includes voluntary landowner participation.

It is anticipated that project action will protect 75 percent of the cropland acres to reduce erosion to one and one-half times the "tolerable" (T) levels. This action will also adequately protect all streambank erosion sites that can reasonably be treated with a combination of management and or vegetative establishment practices.

Alternative 3 Structural and Non-structural

This alternative as defined in the Teton River Basin Study (USDA 1992) is "future with project action: structural and non-structural" where a water quality project is implemented with both accelerated technical and financial assistance. A combination of structural and non-structural practices would be applied under this alternative.

This alternative, with voluntary landowner participation, would reduce accelerated stream bank and bed erosion. It would also reduce nutrient and bacteria runoff from entering the river and creeks. This alternative would improve water quality, riparian vegetation, aquatic habitat and fish passage in the watershed and reduce pollutant loading to the Teton River. Beneficial uses would be improved with implementation of this alternative. This alternative includes voluntary landowner participation.

It is anticipated that project action will protect 75 percent of the cropland to reduce erosion to "tolerable" (T) levels. Additional conservation practices (BMPs) such as grass waterways, terraces, water and sediment control basins, streambank protection, and streambank revetment would be planned to further reduce the amounts of sediment and associated pollutants reaching streams. This action will also adequately protect all streambank erosion sites with a combination of management, vegetative establishment, and/or structural practices.

Alternative Selection

Alternative 3, “Future with Project Action - structural and non-structural” has been selected for implementation by the Teton SCD for the upper Teton Subbasin. This alternative will best meet the objectives set forth in their resource conservation plan by improving water quality in the Teton River and in the SAWQP plans by protecting and improving the designated beneficial uses of the Teton River.

Estimated Costs for TMDL Agricultural Implementation

IASCD estimated the cost to implement the agricultural component of the Teton River Subbasin TMDL would be approximately $20 million for the entire Teton Subbasin (Koester 1997). Currently, the estimated cost for the agricultural portion of the TMDL is approximately $9 million for the upper Teton Subbasin. This estimate is based on the critical acres amounts for land uses in each watershed listed in Table 17 and then applied to BMP cost-share lists (NRCS 2005). Estimated BMP installation costs were compiled from each watershed listed in the appendices. The figures presented in Table 18 were derived by summing the implementation, administrative, and technical costs for each watershed.

Table 18. Estimated Costs for TMDL Agricultural BMPs in the Teton Subbasin

Watershed or Subwatershed	Tier 1 Riparian Cost	Tier 2 Crop/Pasture Cost	Tier 3 Range/Forest Cost	Tier 4 Animal Facilities Cost	Watershed or Subwatershed Total Cost
Badger Creek	$421,093	$295,628	$88,633	$0	$805,534
Fox Creek	$493,708	$399,087	$45,252	$122,952	$1,060,999
N. Leigh Creek	$1,874,441	$1,361,225	$75,420	$24,568	$3,335,654
Teton R. Valley	$986,560	$1,008,057	$120,672	$270,360	$2,385,649
BMP Subtotal	**$3,775,802**	**$3,063,997**	**$329,977**	**$417,880**	**$7,587,656**
Administration & Technical (20% of BMPs)	$755,160	$612,799	$65,995	$83,576	$1,517,531
Subbasin Total	**$4,530,962**	**$3,676,796**	**$395,972**	**$501,456**	**$9,105,187**

Agricultural Bacteria Sources and BMPs

Surface runoff of animal wastes contaminates a receiving water body with four types of pollutants; pathogenic and non-pathogenic microorganisms, biodegradable organic matter, nutrients, and salts (SCS 1989). Bacterial sources from agricultural land include animal waste storage in animal feed operations and corrals, applications of accumulated animal waste on crop and pasture lands, and livestock droppings on range lands or into water bodies. Animal feed operations for dairy or beef cattle are under regulation (IDAPA 02.04.14.001 and IDAPA 02.04.15.001) to eliminate runoff or discharges. These regulations require waste systems to be designed for a 25-year, 24-hour storm event as well as average 5-year runoff events from the feeding areas or milking facilities. On lands where animal wastes are applied, phosphorus and nitrogen thresholds are used to ensure applications are based on crop nutrient needs.

Woods Creek Area: Driggs, Idaho

E.coli bacteria counts are elevated in the Woods Creek area (IDEQ 2003). Teton County has requested further investigation to identify possible sources of the bacteria. Obvious potential sources include the city of Driggs wastewater treatment plant (WWTP), land use, and land management. The purpose of this investigation is to provide a gross distribution of *E.coli* organisms throughout the Woods Creek area.

Woods Creek will probably not be considered a high priority for TMDL development. The EPA approved TMDLs in the watershed in 2002 and DEQ will probably not begin TMDL development before 2008. This is not to say that stakeholders cannot work to improve the situation between now and then. If the stream re-attains beneficial use support status, DEQ will remove it from the Impaired Waterbody section of the Integrated Report.

Sampling was conducted once in 2003 and the source(s) for the increasing bacteria are still unknown, however, a second and third round of sampling may narrow the potential source(s). Land use down gradient of the WWTP remains the only viable source of bacteria loading. Cattle, wildlife, and waterfowl were all observed during sample collection, perhaps resulting in a cumulative loading effect downstream. Since the Woods Creek area is protected for Secondary Contact Recreation under the Idaho Water Quality Standards this would fall under treatment unit 11 for upland areas. Even though resource problems have not been identified for possible causes, subsequent BMPs are listed that could possibly be implemented to reduce *E.Coli* concentrations.

Animal Feeding Operations

National Definition: The term "animal feeding operation" or AFO is defined in EPA regulations as a "lot or facility" where animals "have been, are, or will be stabled or confined and fed or maintained for a total of 45 days or more in any 12-month period and crops, vegetation, forage growth, or post-harvest residues are not sustained in the normal growing season over any portion of the lot or facility."

The Idaho Legislature enacted Idaho law, *I.C. §37-401, Title 37, Chapter 4, Sanitary Inspections of Dairy Products* which requires sanitary inspections and nutrient management plans for all dairy farms. Existing dairy farms were required to submit a nutrient management plan for approval to ISDA on or before July 1, 2001. Any new dairy farms are required to have an approved nutrient management plan before issuance of a milk permit. ISDA promulgated rules (IDAPA 02.04.14.000 et seq.) for dairy waste and they were adopted in 1997. ISDA is conducting inspections and soil sampling on all dairies to ensure compliance with the nutrient management plans. There are currently twelve dairies in the subbasin of which nine are milking less than 100 cows and three are milking over 100 cows. All twelve of these dairies have submitted their nutrient management plans to ISDA (ISDA, 2004).

The Idaho Legislature passed Idaho law, (*I.C. §37-4906, Title 22, Chapter 49*) Beef Cattle Environment Control Act in the spring of 2000. Governor Kempthorne then signed this Act in April 2000. ISDA then went into a rule making process and on September 18, 2000, the "Rules of the Department of Agriculture Governing Beef Cattle Animal Feeding Operations" (IDAPA 02.04.15) became effective. After the rules became effective, a Memorandum of Understanding (MOU) was written and signed by ISDA, IDEQ, ICA, and EPA in January 2001. The MOU gave ISDA authority to regulate beef cattle feeding operations that fall under the definitions of IDAPS 02.04.15 not located on Indian Reservations (ISDA 2000).

Bacteria BMPs for Agriculture

Agricultural bacteria sources can be reduced or eliminated by applying BMPs. The following bacteria BMPs shown in Table 19 are available for use by landowners. The most effective BMPs for reducing these agricultural bacterial sources are Waste Storage Facility (NRCS PS 313), Watering Facility (NRCS PS 614), Riparian Forest Buffer (NRCS PS 391A), and Use Exclusion (NRCS PS 472). BMPs that would reduce agricultural phosphorus sources would also reduce animal related bacteria sources. In general, these BMPs significantly reduce agricultural bacteria sources although site-specific situations may occur that other BMPs would also significantly reduce bacteria sources.

Table 19. Bacteria BMPs for Agriculture and Effects on Resource Problems

Conservation Practices	NRCS Practice Standard	Water Quality, Surface Water; Pathogens	Soil Contamination; From Animal Wastes & Other Organics	Animal Habitat, Domestic; Quantity, Quality of Drinking Water
Animal Trails and Walkways	575	Sl to Mod Increase	N/A	Sl to Mod decrease
Brush Management	314	Sl Decrease	N/A	Sl Decrease
Channel Vegetation	322	Sl Decrease	Sl Decrease	N/A
Composting Facility	317	Sl to Sig Decrease	Facilitating	N/A
Conservation Cover	327	Sl Decrease	Mod Decrease	Sl to Sig Decrease
Conservation Crop Rotation	328	Sl Decrease	Sl Decrease	N/A
Constructed Wetland	656	Sl to Sig Decrease	Sl to Mod Decrease	Situational
Contour Buffer Strips	332	Sl Decrease	Insignificant	Situational
Contour Farming	330	Sl Decrease	N/A	Situational
Cover Crop	340	Sl Decrease	Insignificant	Sl to Mod Decrease
Critical Area Planting	342	Sl Decrease	Sl Decrease	Sl Decrease
Deep Tillage	324	Sl Decrease	Sl Decrease	N/A
Diversion	362	Sl to Mod Decrease	N/A	Sl to Mod Decrease
Filter Strip	393A	Sl Decrease	Sl Increase	Sl to Sig Decrease
Forage Harvest Management	511	Sl Decrease	Mod to Sig Decrease	N/A
Heavy Use Area Protection	561	Situational	N/A	Sl to Mod Decrease
Irrigation System, Tailwater Recovery	447	Sl to Sig Decrease	N/A	Situational
Irrigation System-Sprinkler	442	Sl to Mod Decrease	N/A	Sl to Mod Decrease
Irrigation Water Management	449	Sl Decrease	N/A	Sl to Sig Decrease
Nutrient Management	590	Sl to Sig Decrease	Sl to Sig Decrease	Sl to Sig Decrease
Pasture & Hayland Planting	512	Sl Decrease	N/A	Sl Decrease
Pipeline	516	Facilitating	Facilitating	Facilitating
Prescribed Grazing	528A	Sl Decrease	Sl to Mod Decrease	Sl to Mod Decrease
Range Planting	550	Sl to Mod Decrease	Sl to Mod Decrease	Sl to Mod Decrease
Residue Management, Direct Seeding	777	Sl Decrease	Insignificant	Sl Decrease
Residue Management, No-Till	329A	Sl Decrease	Insignificant	Sl Decrease
Riparian Forest Buffer	391A	Mod to Sig Decrease	Sl Increase	Sl to Sig Decrease
Riparian Herbaceous Cover	390	Mod to Sig Decrease	Sl Increase	Sl to Sig Decrease
Roof Runoff Management	558	Sl to Sig Decrease	N/A	N/A
Sediment Basin	350	Sl Decrease	N/A	Sl to Mod Decrease
Spring Development	574	Sl to Sig Decrease	N/A	Sig Decrease
Surface Drainage-Field Ditch	607	Sl to Mod Increase	N/A	Situational
Surface Drainage-Main or Lateral	608	Sl to Mod Increase	Sl Decrease	Situational
Tree/Shrub Establishment	612	Sl Decrease	Sl to Sig Decrease	Sl Decrease
Use Exclusion	472	Sl to Sig Decrease	Sl to Mod Decrease	Sl to Sig Decrease
Waste Storage Facility	313	Sl to Sig Decrease	N/A	N/A
Waste Treatment Lagoon	359	Sl to Sig Decrease	N/A	N/A
Water & Sediment Control Basin	638	Sl Decrease	N/A	Sl to Mod Decrease
Watering Facility	614	Sl to Mod Decrease	Sl to Mod Increase	Sig Decrease
Wetland Enhancement	659	Sl Decrease	Sl Increase	Sl to Mod Decrease
Wetland Restoration	657	Sl Decrease	Sl Increase	Sl to Mod Decrease

Sl = Slight, Mod = Moderate, Sig = Significant, N/A = Not Applicable

Conservation Efforts

Conservation Planning

Past implementation efforts and a long history of conservation in the subbasin has demonstrated that landowners are more likely to install BMPs when technical and financial assistance is available. Conservation districts, IASCD, ISCC, and NRCS personnel contact landowners and operators to solicit participation in the implementation projects. Landowners that want to participate are then contacted to discuss the resource concerns on their property. After an initial on-site meeting with the participant, the technical agency inventories and evaluates all of the resource concerns on the property. Subsequent meetings with the participant are held to discuss problems that can be addressed by developing a conservation plan. Conservation plan alternatives are created to select the most effective BMPs for the resources of concern and the participant's practices. These alternatives are evaluated by the participant for cost, difficulty, maintenance, and durability. Contracts are created to schedule BMP installation after the contract has been finalized.

BMP Implementation

The proposed treatment for sediment, nutrient, and temperature reduction is to implement BMPs through Resource Management System (RMS) conservation plans in TUs within each subwatershed. BMPs will be planned and installed on privately owned agricultural lands through voluntary participation by critical area landowners and operators. The land owner/operator's objectives, site data, and natural resource needs are used to select the BMP component practices that will meet the goals for that site. BMPs are designed for technical and economic feasibility and must be acceptable practices that the responsible party is willing to apply and maintain (APAP 2003). Individual conservation contracts will be developed that include both cost-shared and non-cost-shared BMPs. RMS plans are a combination of BMPs as defined in Idaho's Agricultural Pollution Abatement Plan (ISCC 2003).

BMP Operation and Maintenance

After contracted BMPs have been installed, TSCD, IASCD, ISCC, and/or NRCS will check maintenance and operation by completing annual status reviews, which are conducted throughout the life of the contract. When conservation plans are not under contract agreements, such as when participants install BMPs without financial assistance, they are not obligated by contract to maintain BMPs.

BMP Monitoring and Evaluation

BMP effectiveness monitoring is part of the conservation planning process. Water pollution reductions and beneficial use improvements achieved through application of BMPs are detected through monitoring and evaluation. When water quality goals are not achieved, monitoring and evaluation are used to determine the need for new or modified BMPs. A comprehensive evaluation of BMP effectiveness requires the integration of three types of monitoring: on-site evaluation of practice design; pollutant source and transport monitoring; and in stream beneficial use assessment monitoring. In addition, monitoring involves yearly status reviews that record the progress of implementation of BMP items. Overall, monitoring is conducted to determine how BMPs are installed, operated, and maintained.

Sources of Funding for Agricultural BMP Implementation

State and federal funding sources, such as the USDA, IDEQ, USEPA, and ISCC, are used to install BMPs throughout priority subbasins to meet water quality objectives. Funding programs for implementation of BMPs in the Teton subbasin are CRP, EQIP, RCRDP, WHIP, WQPA, and §319 programs. The following programs may be available to assist landowners and local organizations with technical and financial assistance (Table 20).

Table 20. Sources of Technical and Financial Assistance in the Teton River Subbasin

Funding Program	Acronym	Agency
Water Quality Program for Agriculture	WQPA	ISCC
Resource Conservation & Development	RC&D	NRCS
Emergency Watershed Protection Program	EWP	NRCS
Small Watershed and Flood Prevention Program	PL-566	NRCS
Cooperative River Basin Studies Program	CRBS	NRCS
Rural Clean Water Program	RCWP	NRCS
Food Security Act of 1985	FSA	NRCS
Food, Agricultural, Conservation and Trade Act of 1990	FACTA	NRCS
Section 319 Nonpoint Source Management Program Grants	319	IDEQ
Resource Conservation and Rangeland Development Program	RCRDP	ISCC
Grazing Lands Conservation Initiative	GLCI	NRCS
Natural Resource Conservation Credit	--	ISCC
Environmental Quality Incentives Program	EQIP	NRCS
Soil and Water Conservation Assistance Program	SWCA	NRCS
FWS Partners Program	--	USFWS
Columbia Basin Fish and Wildlife Program	CBFWP	CBFWA
Conservation Reserve Program	CRP	FSA
Continuous Sign-Up Conservation Reserve Program	CCRP	FSA
Wetland Reserve Program	WRP	NRCS
Wildlife Habitat Incentives Program	WHIP	NRCS
Habitat Improvement Program	HIP	IDFG
State Revolving Fund	SRF	IDEQ & ISCC
Conservation Security Program	CSP	NRCS
Grasslands Reserve Program	GRP	FSA
Conservation Reserve Enhancement Program	CREP	FSA
Emergency Conservation Program	ECP	FSA
National Fish and Wildlife Foundation Grants Program	NFWFGP	NFWF
Fisheries Restoration and Irrigation Mitigation Program	FRIMA	USFWS
Water Conservation Field Services Program	WCFSP	BOR
Conservation of Private Grazing Land	CPGL	NRCS
Conservation Technical Assistance	CTA	NRCS
Farmland Protection Program	FPP	NRCS
Forestry Incentives Program	FIP	NRCS & FS
Aberdeen, Idaho Plant Materials Center	PMC	NRCS
National Cooperative Soil Survey Program	NCSS	NRCS
Stewardship Incentive Program	SIP	FSA
Nutrient Management Program	NMP	ISDA
Floodplain Management Services Program	FPMS	USACE
Continuing Authorities Program, Sections 206 & 1135	CAP	USACE
Idaho Water Resource Board Financial Program	--	IDWR
Idaho Fish Screening & Passage Program	--	IDFG

Information and Outreach

The conservation partnership (TSWCD, IASCD, ISCC, and USDA-NRCS) will use their combined resources to provide information to agricultural landowners and operators within the subbasin. A local outreach plan will be developed by the conservation partnership. Newspaper articles, district newsletters, watershed and project tours, landowners meetings, and one on one personal contact will be used as outreach tools. Outreach efforts will:

- Provide information about the TMDL process.
- Provide water quality monitoring results.
- Accelerate the development of conservation plans and program participation.
- Provide progress reports.
- Enhance technology transfer related to BMP implementation.
- Increase awareness of agriculture's contribution to conserve and enhance natural resources.
- Increase the public's awareness of agriculture's commitment to meeting the TMDL challenge.

Water Quality Monitoring

IASCD and ISDA have collected water quality samples in the Teton subbasin. Most samples have been taken biweekly throughout the growing season (April to October) and monthly through the rest of the year (November to March) (Fischer 2002 and 2004). The water quality monitoring sites located on the tributaries to the Teton River (Figure 4) were selected with the assistance of the Teton Soil Conservation District. The sites were chosen to best identify the general impacts to the Teton River and its tributaries. These sites will also be used as implementation monitoring locations to evaluate the effectiveness of BMPs. At each water quality monitoring site, dissolved oxygen, specific conductance, pH, temperature, total dissolved solids, and flow was measured. In addition, water samples were collected and analyzed for total suspended solids, nitrogen, phosphorus, and bacteria at each monitoring site. For more detailed information regarding the IASCD water quality monitoring program reference the Upper Teton River Subbasin Monitoring Report 2004 (Fischer 2004).

Monitoring of the Teton Subbasin involves many different agencies. The Teton SCD, the Henry's Fork Watershed Council, the Watershed Advisory Group, Idaho Falls Regional Department of Environmental Quality (IDEQ), NRCS, Idaho State Department of Agriculture (ISDA), and Idaho Association of Soil Conservation Districts will coordinate monitoring. Funding for the monitoring project was provided by the ISDA and IASCD.

Program Objectives for Water Quality Monitoring

IASCD worked in cooperation with the above mentioned agencies in an attempt to complete the following objectives:

- Identify those streams that exceed water quality standards.
- Evaluate the impact of cropland, pasture, rangeland, and recreation on the tributaries of the Teton River.
- Evaluate the water quality and discharge rates along creeks and drains.
- Attempt to determine which areas contribute to the greatest level of loading with respect to TMDL parameters.
- Locate future areas where BMPs may be implemented to reduce sediment loads and where riparian evaluations may be used to assess stream bank condition.
- Educate the public about the project.

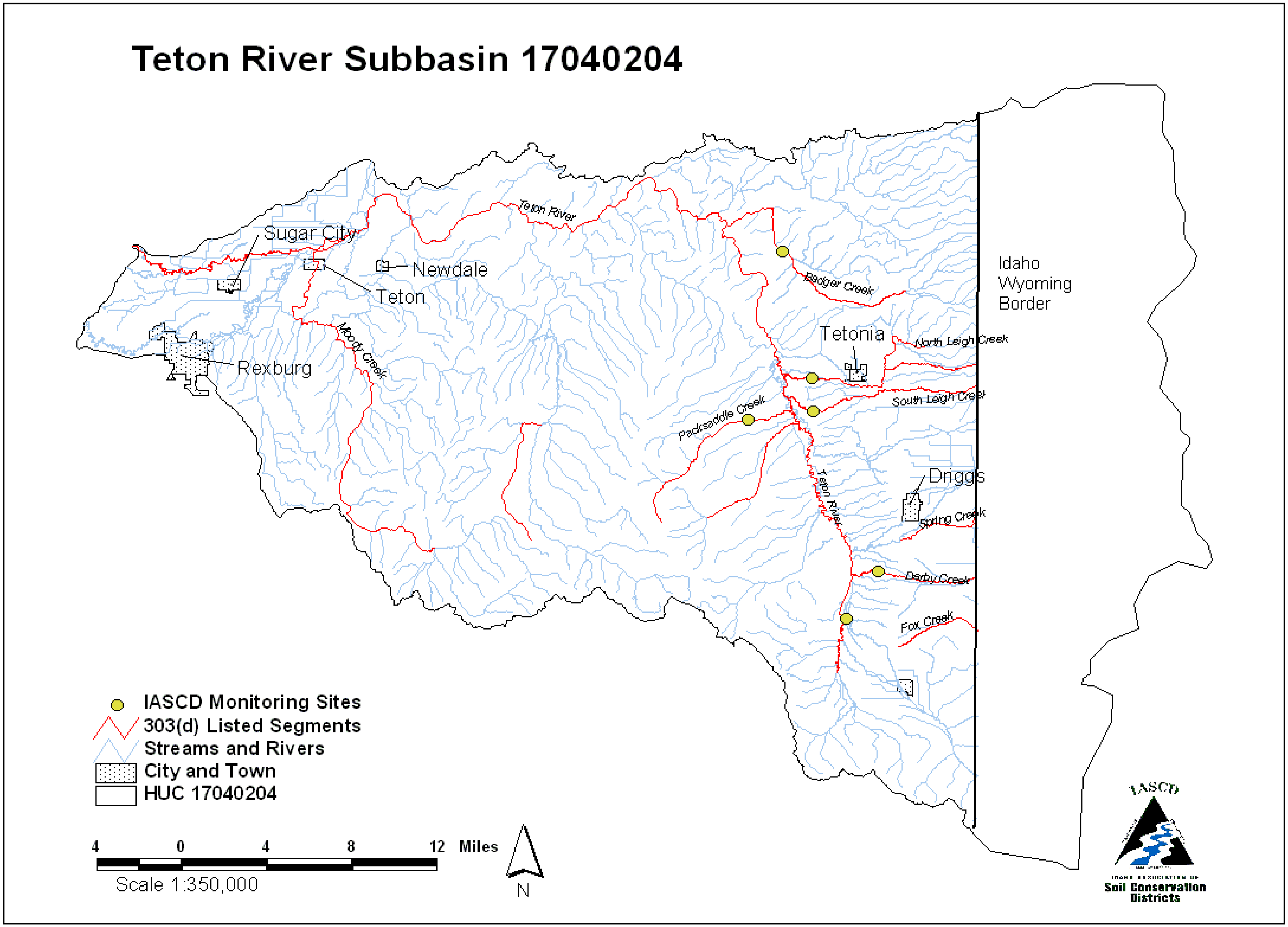

Figure 4. Water Quality Monitoring Sites in the Teton River Subbasin

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APPENDIX A

Badger Creek Watershed

Agricultural TMDL Implementation Plan

Introduction

Purpose

The purpose of this plan is to recommend BMPs that would improve or restore physical, chemical and biological functions of Badger Creek. The plan will build upon past conservation accomplishments made through the Teton Canyon SAWQP and PL566 Teton River Basin Study planning projects and will also assist or compliment other subbasin efforts in restoring beneficial uses.

Goals and Objectives

The goal of this implementation plan is to restore beneficial uses on §303(d) listed stream segments. The objectives of this plan are to identify critical areas and to recommend BMPs for reducing sediment loading to Badger Creek.

Beneficial Use Status

IDEQ designated beneficial uses on rivers, creeks, lakes and reservoirs to meet the requirements of the federal Clean Water Act. Badger Creek is on the state of Idaho's §303(d) list of water quality impaired water bodies (IDEQ, 1998). Badger Creek is listed for sediment from US Highway 32 to the Teton River, which is approximately 8.5 miles in length. Beneficial uses that are designated on Badger Creek include cold water aquatic life and salmonid spawning. These beneficial uses are not fully supported (IDEQ, 2003).

Project Setting

For the purpose of this implementation plan, the Badger Creek watershed encompasses the 5th level HUC watershed, Badger. The Badger Creek watershed encompasses 22,721 acres or 36 square miles in Idaho. There are 19,987 acres of private land, 317 acres managed by BLM, 35 acres managed by the IDL, and 2,382 acres managed by the CTNF in the watershed. Cropland is the major private land use in the watershed totaling 63 % of the acres as shown in Table A-1.

The watershed is in the northeastern part of the subbasin as shown in Figure A-1. The watershed is bounded on the east by the Teton Mountains and the state of Wyoming, on the north by the Judkins and North Fork Teton watersheds, on the west by the Teton River, and the south by the North Leigh Creek watershed. Elevations in Badger Creek range from 7,500 feet near the state line to 6,000 feet near the confluence with the Teton River. The North and South Forks of Badger Creek are the headwaters of Badger Creek. Bull Elk Creek is the only major tributary entering Badger Creek and it enters about five miles upstream from the confluence of the Teton River. Just below the Badger Creek and Bull Elk confluence, Badger Creek is confined in a very narrow steep walled basalt canyon with up to 80% slopes and very limited access to the creek. Badger Creek, along with other creeks in the Teton Subbasin, has a very unique quality whereby the headwaters are perennial, the mid-section is intermittent due to irrigation diversions and water subbing into groundwater, and the confluence of Badger Creek and the Teton River is perennial due to spring water input.

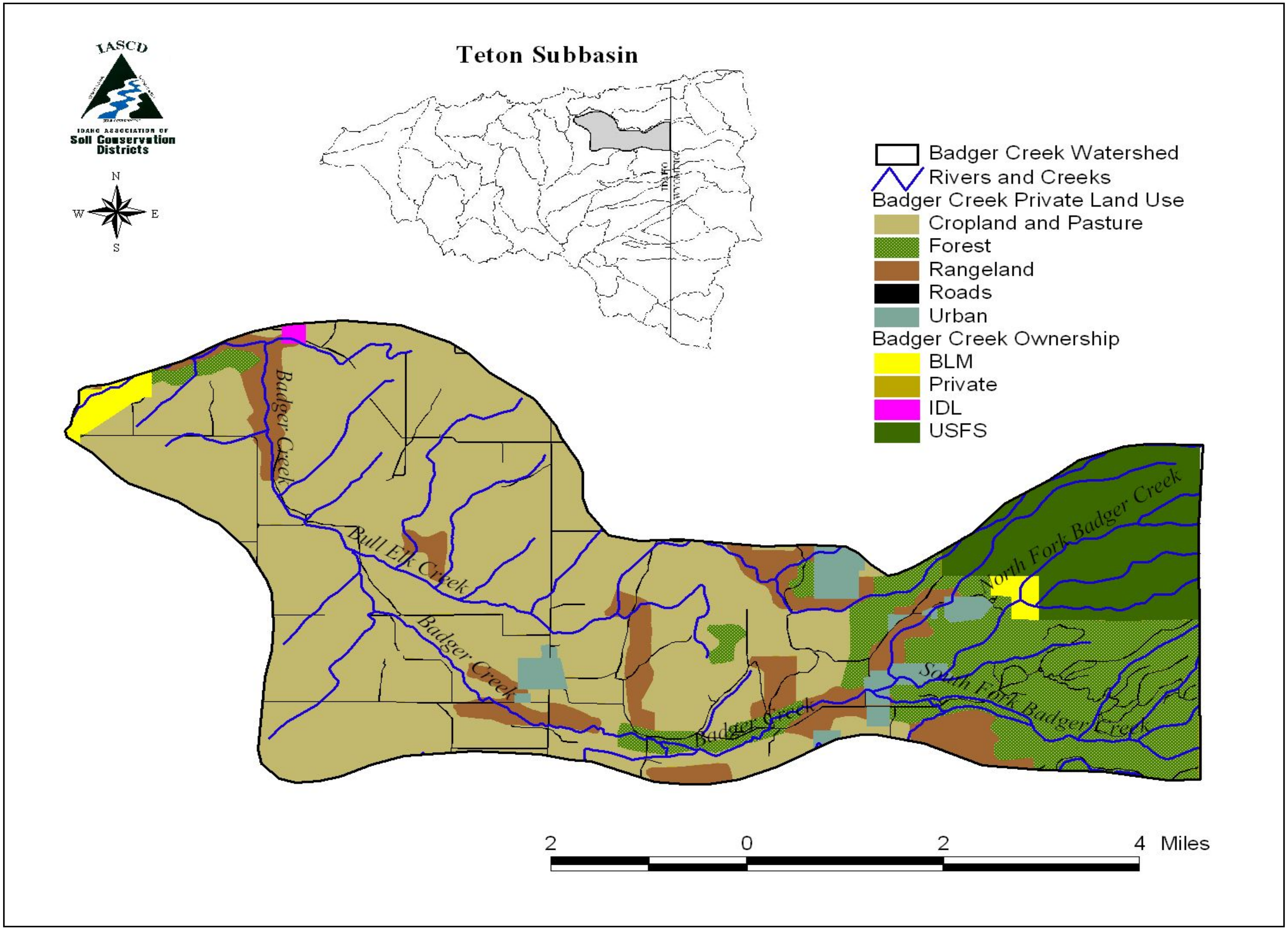

Figure A-1. Badger Creek Watershed in the Teton Subbasin

Table A-1. Private Land Uses in the Badger Creek Watershed

Land Use	Acres	Percent of Total
Cropland and Pasture	12,683	63.3%
Forest	3,511	17.5%
Rangeland	2,048	10.2%
Riparian	683	3.4%
Roads	496	2.5%
Urban	617	3.1%
Total	**20,038**	**100.0%**

Accomplishments

The TSCD and area landowners implemented the Bitch Creek South SAWQP project with six contracts totaling 355 acres in the Badger Creek watershed. The Bitch Creek South SAWQP project had a total cost of $218,156 and the land owners covered 41% of that total cost. The Teton River SAWQP project had four contracts totaling 312 acres in the Badger Creek watershed. The Teton River SAWQP project had a total cost of $152,131 and the land owners covered 34% of that total cost. Along with these two SAWQP projects, many of the land owners enrolled their cropland into the Conservation Reserve Program (CRP) with 1,083 acres in the Badger Creek watershed. CRP had a total cost of $249,008 and the land owners covered 13% of that total cost (FSA 2004). The accomplishments of these projects are outlined below in Table A-2.

Table A-2. Completed BMP Amounts and Costs in the Badger Creek Watershed

Funding Program	Best Management Practice	Units Treated	Cost-Share	Participant Funds	Total Funds
CRP	Conservation Cover	1,083	$212,502	$32,472	$24,4974
Bitch Creek South SAWQP	Conservation cover	43 ac	$,3507	$2,961	$6,468
Bitch Creek South SAWQP	Cons. Tillage (air seeding)	924 ac	$27,864	$8,908	$36,772
Bitch Creek South SAWQP	Cons. Tillage (mulch till)	436 ac	$2,178	$2,178	$4,356
Bitch Creek South SAWQP	Contour Farming	561 ac	$1,682	$1,682	$3,364
Bitch Creek South SAWQP	Hayland Planting	713 ac	$28,694	$13,429	$42,123
Bitch Creek South SAWQP	Subsoiling	925 ac	$11,828	$4,715	$16,543
Bitch Creek South SAWQP	Terrace	209 ft	$470	$202	$672
Bitch Creek South SAWQP	Water and sediment basins	563 ft/10 ea	$4,192	$1,436	$1,728
Teton River SAWQP	Contour Farming	1556 ac	$4,668	$6,262	$10,930
Teton River SAWQP	Critical Area Planting	1 ac	$743	$215	$958
Teton River SAWQP	Grass & Legume Rotation	79 ac	$3,980	$1,367	$5,347
Teton River SAWQP	Hayland Planting	81 ac	$3,463	$3,050	$6,513
Teton River SAWQP	Residue Man. (air seeding)	2,165 ac	$64,938	$28,692	$93,630
Teton River SAWQP	Residue Man. (mulch till)	713 ac	$3,568	$3,568	$7,136
Teton River SAWQP	Subsoiling	1,534 ac	$19,681	$,7935	$27,616

Soil Erosion Reductions

There are approximately 1,723 acres of highly erodible cropland enrolled in CRP and SAWQP projects. These acres were assumed to have an estimated pre-erosion rate of 15 tons per acre per year or a soil loss of 25,845 tons per year, based on pre-erosion rates of other creeks in the Teton subbasin (USDA 1990). Currently these same acres have an estimated erosion rate of one ton per acre per year or a soil loss of 1,723 tons per year. The annual soil savings are 24,122 tons per year or a 93% reduction in average annual soil erosion shown in Table A-3. The SAWQP projects anticipated that with the implementation of BMPs, it would reduce soil erosion to T.

Table A-3. Soil Erosion Reductions in the Badger Creek Watershed

Land Treatment	Average Annual Soil Loss (tons/acre/year)	Treated Acres	Annual Soil Loss (tons/year)
Before CRP& SAWQP	15	1,723	24,122
After CRP & SAWQP	1	1,723	1,723
Annual Soil Erosion Savings on treated acres in Badger Creek watershed = 24,122 tons/yr			

Problem Statement

Pollutants of Concern

The Teton Subbasin Assessment and TMDL specified that sediment was the pollutant of concern in Badger Creek. Badger Creek has a current loading of 26,263 tons per year and a recommended loading of 16,367 tons per year or a 38% reduction of sediment (IDEQ 2003).

Identified Problems

In 1991, the TSCD identified sheet, rill, gully, irrigation induced, wind, and stream bank erosion as problems in the watershed. Critical erosion periods are spring runoff, spring rains, and summer thunderstorms (USDA 1992).

Water Quality Monitoring Results

IASCD, in cooperation with TSCD and ISDA, conducted integrated water column sampling on Badger Creek at fixed intervals during the 2002, 2003, and 2004 field seasons. Monitoring data from these three field seasons indicated that Badger Creek did not exceed the TMDL target of 80mg/L for total suspended solids (TSS) as shown in Table A-4 (Jenkins 2005).

Table A-4. TSS Loads for Badger Creek

Monitoring Site	Average TSSed Load (tons/day)	Average TSS @ 80 mg/L Target (tons/day)	Average TSS Reduction	TSS Target Exceedance
Badger Creek	1.77	0	0	0

Critical Areas

Critical areas are those areas having the most significant impact on the quality of the receiving waters. Critical areas include pollutant source and transport areas. The watershed consists of approximately 22,721 acres with private land accounting for 19,987 acres. The predominant private land uses that may be treated with BMPs are cropland and rangeland, respectively 12,683 and 2,048 acres.

Critical acres in the Badger Creek watershed total 17,312 acres and are defined as private land minus all treated acres and excluding urban development and roads. With the TMDL targets set at reducing fine sediment to 27% or less for particles less than 6.3 mm, 10% or less for 0.85 mm particles and 80% or greater bank stability on any 328 foot section of stream, it is estimated that 100% or 17,312 acres of private land would need BMPs implemented for sediment to meet these targets. In order to allocate available resources more effectively, implementation should be focused toward the tiers shown in Table A-5.

Table A-5. Critical Areas in the Badger Creek Watershed

	Tier 1	Tier 2	Tier 3	Tier 4
Watershed	**Riparian Acres**	**Cropland and Pasture Acres**	**Rangeland Acres**	**Animal Facilities**
Badger Creek	653	11,259	2,012	0

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 A-6 lists the BMP amounts and costs of BMPs that may be used to restore beneficial uses in Badger Creek.

Table A-6. Estimated BMP Installation Costs for the Badger Creek Watershed

Implementation Tiers	C/S Funds	Participant Funds	Total Funds
Tier 1 Stream channels and riparian areas	$315,820	$105,273	$421,093
Tier 2 Cropland and Pasture	$521,721	$173,907	$695,628
Tier 3 Rangeland	$66,475	$22,158	$88,633
Tier 4 Animal Facilities	$0	$0	$0

APPENDIX B

Fox Creek Watershed

Agricultural TMDL Implementation Plan

Introduction

Purpose

The purpose of this plan is to recommend BMPs that would improve or restore physical, chemical and biological functions of Fox Creek and the Teton River. The plan will build upon past conservation accomplishments made through the Teton Canyon SAWQP and PL566 Teton River Basin Study planning projects and will assist or compliment other subbasin efforts in restoring beneficial uses.

Goals and Objectives

The goal of this implementation plan is to restore beneficial uses on §303(d) listed stream segments. The objectives of this plan are to identify critical areas and to recommend BMPs for reducing sediment and temperature loading to Fox Creek. Also, BMPs for reducing sediment in the Teton River from Trail Creek to HWY 33, in particular between Trail Creek and Fox Creek, will be recommended. Even though the temperature TMDL for Fox Creek has been rescheduled, some of the BMPs for sediment increase shading which may reduce temperature loading to Fox Creek.

Beneficial Use Status

IDEQ designated beneficial uses on rivers, creeks, lakes and reservoirs to meet the requirements of the federal Clean Water Act. Fox Creek and the Teton River are on the state of Idaho's §303(d) list of water quality impaired water bodies (IDEQ, 1998). Fox Creek is listed for sediment from the Wyoming line to the Teton River, which is approximately 9 miles in length. Beneficial uses that are designated on Fox Creek include cold-water aquatic life and salmonid spawning. These beneficial uses are not fully supported 0.5 miles downstream of Hwy 33. The Teton River is listed for sediment and habitat alteration from Trail Creek to Hwy 33 (IDEQ 2003). The portion of the Teton River included in the Fox Creek Watershed, between Trail Creek and Fox Creek, is approximately 1.2 miles in length.

Project Setting

For the purpose of this implementation plan, the Fox Creek watershed encompasses portions of the 5th level HUC watersheds, Darby Creek, Lower Darby, and Victor. The Fox Creek watershed covers 15,941 acres or approximately 17 square miles in Idaho. There are 10,984 acres of private land, 4,899 acres managed by BLM, 50 acres managed by the IDFG, and 7.7 acres managed by the CTNF in the watershed. Cropland is the major private land use in the watershed totaling 54.2 % of the private land acres shown in Table B-1.

The watershed is in the south eastern part of the subbasin as shown in Figure B-1. The watershed is bounded on the east by the Teton Mountains and the state of Wyoming, on the north by the Darby Creek watershed, on the west by the Teton River and the Big Hole Mountain, and on the south by the Victor and Little Pine Creek watersheds. Elevations in Fox Creek watershed range from 8,200 feet in the east near the Idaho/Wyoming state line and 6,035 feet in the west where Fox Creek joins the Teton River. The headwaters of Fox Creek start in Wyoming and then flow into Idaho. Fox Creek drains from the Teton Mountains where it is perennial from the headwaters through the mid-section, at which point Fox Creek develops into several intermittent channels near the Idaho/Wyoming state line. A majority of the water in Fox Creek is diverted during the irrigation season. Near the confluence of Fox Creek and the Teton River several springs add water to Fox Creek, making the creek perennial.

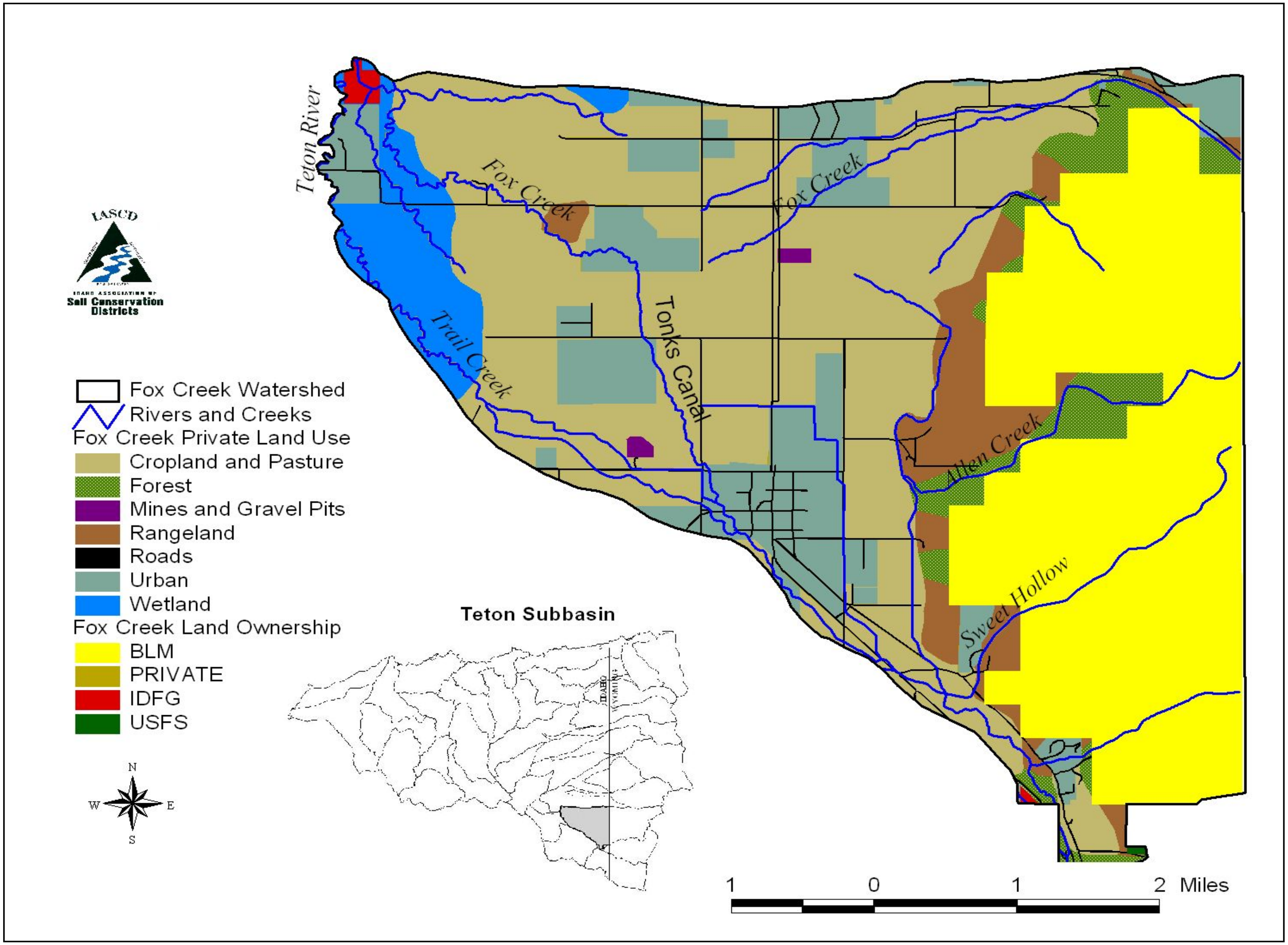

Figure B-1. Fox Creek Watershed in the Teton Subbasin

Table B-1. Private Land Uses in the Fox Creek Watershed

Land Use	Acres	Percent of Total
Cropland and Pasture	5,958	54.2%
Forest	666	6.0%
Mines & Gravel Pits	33	0.3%
Rangeland	880	8.0%
Riparian	383	3.5%
Roads	365	3.3%
Urban	2,006	18.3%
Wetland	699	6.4%
Total	**10,990**	**100.0%**

Accomplishments

The TSCD and area landowners implemented EQIP projects with four contracts totaling 368 acres under treatment in the Fox Creek watershed. Along with the EQIP contracts, one land owner enrolled his cropland into the Conservation Reserve Program (CRP) totaling 78.6 acres in the Fox Creek watershed (FSA 2004). The EQIP projects had a total cost of $92,539 and the land owners covered 25% of that total cost. Landowners have used EQIP and CRP to assist them in implementing BMPs that may improve the beneficial uses in the §303(d) listed stream segments. The accomplishments of these projects are outlined below in Table B-2.

Table B-2. Completed BMP Amounts and Costs in the Fox Creek Watershed

Funding Program	Best Management Practice	Units Treated	Cost-Share Funds	Participant Funds	Total Funds
CRP	Conservation cover	79 ac	$11,475	$2,358	$13,833
EQIP	Fence	1311 ft	$1,475	$492	$1,967
EQIP	Pipeline	500 ft	$1,470	$490	$1,960
EQIP	Pumping Plant for Water Control	2 ea	$1,236	$412	$1,648
EQIP	Structure for water control	3 ea	$1,313	$438	$1,751
EQIP	Waste Storage Facility	715yd³/5ea	$63,910	$21,303	$85,213

Soil Erosion Reductions

There are approximately 79 acres of highly erodible cropland enrolled in CRP. These acres had an estimated pre-erosion rate of 15 tons per acre per year or a soil loss of 1,185 tons per year (USDA 1990). Currently these same acres have an estimated erosion rate of one ton per acre per year or a soil loss of 79 tons per year. The annual soil savings are 1,106 tons per year or a 93% reduction in average annual soil erosion shown in Table B-3.

Table B-3. Soil Erosion Reductions in the Fox Creek Watershed

Land Treatment	Average Annual Soil Loss (tons/acre/year)	Treated Acres	Annual Soil Loss (tons/year)
Before CRP	15	79	1,185
After CRP	1	79	79
Annual Soil Erosion Savings on treated acres in Fox Creek watershed = 1,106 tons/yr			

Problem Statement

Pollutants of Concern

The Teton Subbasin Assessment and TMDL specified that sediment and temperature were the pollutants of concern in Fox Creek and that sediment was the pollutant of concern in the stretch of the Teton River from Trail Creek to HWY 33. Current sediment loading into Fox Creek is 3,336 tons per year and current sediment loading into the Teton River is 5,736 tons per year (USDA 1992). A recommended reduction in sediment loading using Alternative 3 would yield 949 tons per year (72 % reduction) for Fox Creek and 3,628 tons per year (38% reduction) for the Teton River (USDA 1992).

Identified Problems

In 1991, the TSCD identified sheet, rill, gully, irrigation induced, wind, and stream bank erosion as problems in the watershed. Critical erosion periods are spring runoff, spring rains, and summer thunderstorms (USDA 1992).

Water Quality Monitoring Results

IASCD, in cooperation with TSCD and ISDA, conducted integrated water column sampling on Fox Creek at fixed intervals during the 2002, 2003, and 2004 field seasons. Monitoring data from these three field seasons indicated that Fox Creek did not exceed the TMDL target of 80mg/L for total suspended solids (TSS) as shown in Table B-4 (Jenkins 2005).

Table B-4. TSS Loads for Fox Creek

Monitoring Site	Average TSSed Load (tons/day)	Average TSS @ 80 mg/L Target (tons/day)	Average TSS Reduction	TSS Target Exceedance
Fox Creek	0.91	0	0	0

Critical Areas

Critical areas are those areas having the most significant impact on the quality of the receiving waters. Critical areas include pollutant source and transport areas. The Fox Creek watershed consists of approximately 15,941 acres with private land accounting for 10,984 acres. The predominant private land uses within the watershed are cropland and rangeland, respectively 5,958 and 880 acres.

Critical acres in the Fox Creek watershed total 8,178 acres and are defined as private land minus all treated acres and excluding urban development, mines and gravel pits, and roads. With the TMDL targets set at reducing fine sediment to 27% or less for particles less than 6.3 mm in diameter, 10% or less for particles less than 0.85 mm in diameter, 80% or greater bank stability on any 328 foot section of stream, reducing temperature to 22 ºC or less with a maximum daily average of 19 ºC for cold water aquatic life, and reducing temperature to 13 ºC or less with a maximum daily average of 9 ºC for salmonid spawning; it is estimated that 100% or 8,178 acres of private land would need BMPs implemented for sediment and temperature to meet these targets. In order to allocate available resources more effectively, implementation should be focused toward the tiers shown in Table B-5.

Table B-5. Critical Areas in the Fox Creek Watershed

Implementation Tiers	Tier 1	Tier 2	Tier 3	Tier 4
Watershed	**Riparian Acres**	**Cropland and Pasture Acres**	**Rangeland Acres**	**Animal Facilities (each)**
Fox Creek	358	5,592	874	5

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 B-6 lists the BMP amounts and costs of BMPs that may be used to restore beneficial uses in the Fox Creek watershed.

Table B-6. Estimated BMP Installation Costs for the Fox Creek Watershed

Implementation Tiers	C/S Funds	Participant Funds	Total Funds
Tier 1 **Stream channels and riparian areas**	$370,281	$123,427	$493,708
Tier 2 **Cropland and Pasture**	$299,315	$99,772	$399,087
Tier 3 **Rangeland**	$33,939	$11,313	$45,252
Tier 4 **Animal Facilities**	$92,214	$30,738	$122,952

APPENDIX C

North Leigh Watershed

Agricultural TMDL Implementation Plan

Introduction

Purpose

The purpose of this plan is to recommend BMPs that would improve or restore physical, chemical and biological functions of North Leigh Creek, South Leigh Creek, Packsaddle Creek, Spring Creek, and the Teton River. The plan will build upon past conservation accomplishments made through the Teton Canyon SAWQP and PL566 Teton River Basin Study planning projects and will assist other subbasin efforts in restoring beneficial uses.

Goals and Objectives

The goal of this implementation plan is to restore beneficial uses on §303(d) listed stream segments. The objectives of this plan are to identify critical areas and to recommend BMPs for reducing sediment loading to Packsaddle Creek, South Leigh Creek, Spring Creek, and the Teton River. Also, BMPs for reducing nutrients in the Teton River from Highway 33 to Bitch Creek will be recommended. Spring Creek is listed for temperature and some of the BMPs for sediment increase shading which may reduce temperature, however, a TMDL was not developed for temperature at this time. North Leigh Creek is listed for unknown pollutants but North Leigh Creek is identified in the subbasin assessment as being impacted by sediment.

Beneficial Use Status

IDEQ designated beneficial uses on rivers, creeks, lakes and reservoirs to meet the requirements of the federal Clean Water Act. North Leigh Creek, Packsaddle Creek, South Leigh Creek, Spring Creek, and Teton River are on the state of Idaho's §303(d) list of water quality impaired water bodies (IDEQ, 1998). Beneficial uses that are designated for these creeks include cold-water aquatic life and salmonid spawning.

The beneficial use of cold water aquatic life was not met for North Leigh Creek, the main stem of Packsaddle Creek, or Spring Creek. There are contradictory reports for the beneficial use, cold water aquatic life, for South Leigh Creek. Based on MBI scores, South Leigh Creek, near the Idaho/Wyoming state line, needs verification regarding the status of the beneficial use, cold water aquatic life. South Leigh Creek, seven miles downstream of the state line, does not support cold water aquatic life based on MBI scores. Another site on South Leigh Creek, 1 mile downstream of the state line, was found to support cold water aquatic life based on MBI and HI scores. Salmonid spawning was fully supported for all of the above creeks (IDEQ, 2003). The portion of the Teton River included in the North Leigh Creek Watershed, between Trail Creek and HWY 33, is approximately 15 miles in length. The Teton River was not originally reported to fully support cold water aquatic life or salmonid spawning. However, preliminary data from Harrop's Bridge, HWY 33 crossing, later indicated that the Teton River supported the cold water aquatic life beneficial use. This data was not considered for the TMDLs developed in the Teton River Subbasin Assessment and Total Maximum Daily Load (IDEQ 2003).

Project Setting

For the purpose of this implementation plan, the North Leigh watershed encompasses the 5th level HUC watershed, North Leigh. The watershed covers 60,612 acres or 95 square miles in Idaho. There are 49,724 acres of private land, 927 acres managed by BLM, 916 acres managed by the Idaho Department of Lands, and 9,046 acres managed by CTNF in the watershed.

Cropland is the major private land use in the watershed totaling 75 % of the acres shown in Table C-1. The watershed is in the north central part of the subbasin as shown in Figure C-1.

The watershed is bounded on the east by the Teton Mountains and the state of Wyoming, on the north by the Badger Creek watershed, on the west by the Teton River and the Big Hole Mountains, and on the south by the Driggs and Bear Creek watersheds. Elevations in the North Leigh watershed range from 8,200 feet in the east where North and South Leigh Creeks originate in the Jedediah Smith Wilderness area to 8,000 feet in the west where Packsaddle Creek originates in the Big Hole Mountains to 6,000 feet near the confluence of Teton River and Badger Creek. Creeks that drain from the Teton Mountains in the North Leigh watershed have perennial headwaters, intermittent mid-sections due to irrigation diversions and a very porous gravel substrate allowing the water to sub into the ground water, and perennial tail waters near the Teton River confluence due to the input of water from springs. Packsaddle Creek drains the Big Hole Mountains and is perennial above the pipeline diversion before water is diverted for irrigation from June 1 to September 15. After the diversion, Packsaddle Creek remains dry to the Teton River.

Table C-1. Private Land Uses in the North Leigh Watershed

Land Use	Acres	Percent of Total
Cropland	37,027	74.5%
Forest	3,457	7.0%
Rangeland	2,102	4.2%
Riparian	1,784	3.6%
Roads	1,161	2.3%
Urban	3,109	6.2%
Wetland	1,084	2.2%
Total	**49,724**	**100%**

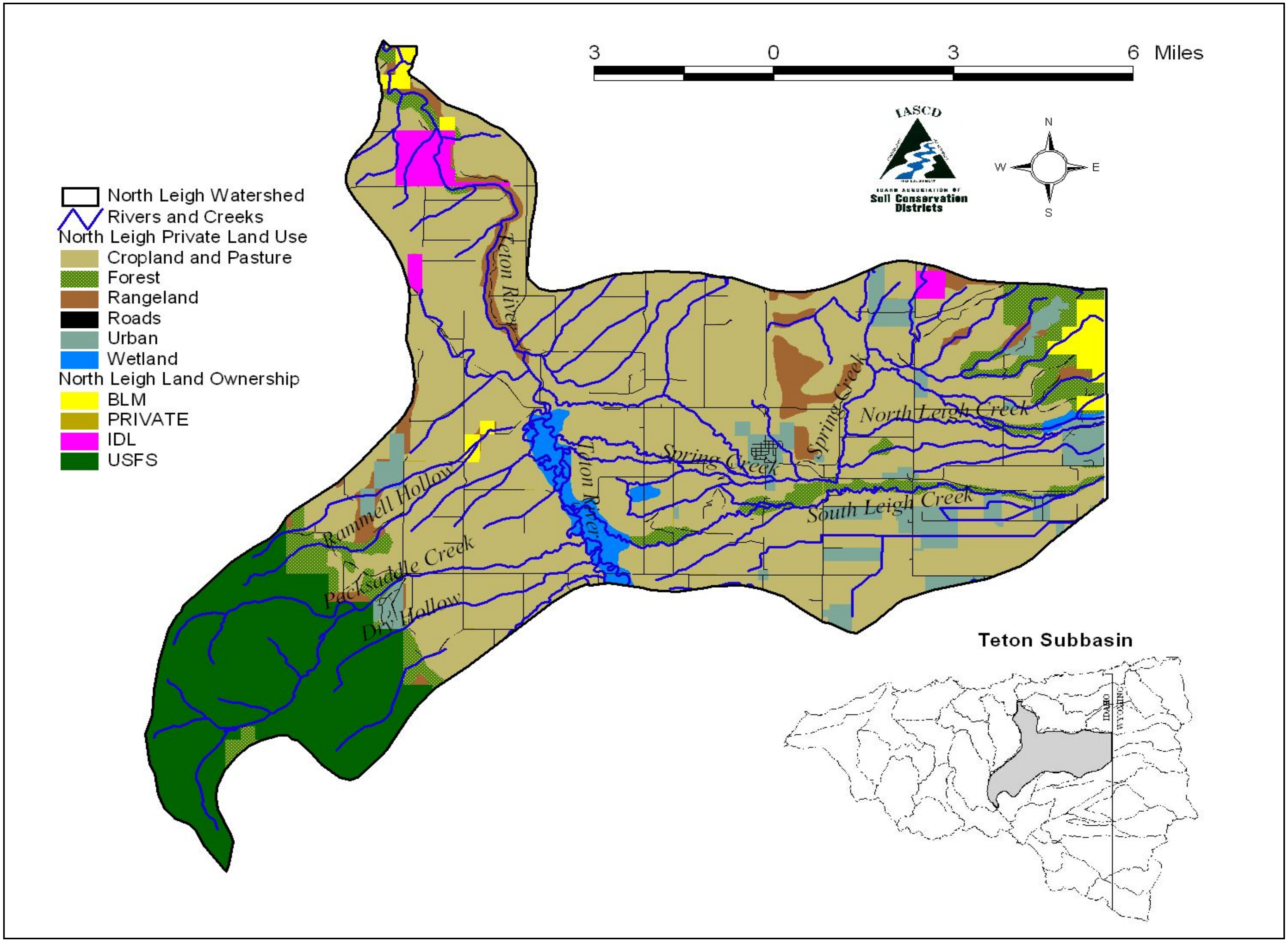

Figure C-1. North Leigh Watershed in the Teton Subbasin

Accomplishments

The TSCD and area landowners implemented the Teton River SAWQP project with 25 contracts totaling 12,477 acres under treatment in the North Leigh watershed. The Teton River SAWQP project had a total cost of $906,230 and the land owners covered 36% of that total cost. It was anticipated that with successful implementation of BMPs the project would achieve 85% reduction in soil erosion from cropland thus improving beneficial uses in the nearby streams (TSCD 1991). Along with the Teton River SAWQP project, many of the land owners enrolled their cropland into the Conservation Reserve Program (CRP) with 3,673 acres in the North Leigh watershed (FSA 2004). Landowners have used two other programs, EQIP and RCRDP, to assist them in implementing BMPs that may improve the beneficial uses in the §303(d) listed stream segments. There were two EQIP contracts that treated 897 acres. EQIP projects had a total cost of $31,411 and the landowners covered 25% of the total cost. There was also one RCRDP contract that treated 72 acres. Some of these projects overlapped and were implemented in the same area. The accomplishments of these projects in the North Leigh Creek watershed are outlined below in Table C-2.

Table C-2. Completed BMP Amounts and Costs in the North Leigh Watershed

Funding Progra	Best Management Practice	Units Treated	Cost-Share Funds	Participant Funds	Total Funds
CRP	Conservation Cover	3,673 ac	$601,854	$110,175	$712,030
EQIP	Waste storage facility	4	$23,238	$7,746	$30,984
EQIP	Pipeline	22 ft	$113	$38	$150
EQIP	Fence	87 ft	$208	$69	$277
RDRDP	Irrigation System	8,590 ft	$34,278	$45,683	$79,961
SAWQP	Conservation Cover	117.8 ac	$1,678	$1,691	$3,369
SAWQP	Contour Farming	5,613 ac	$16,840	$18,849	$35,689
SAWQP	Critical Area Planting	11 ac	$4,083	$1,569	$5,653
SAWQP	Fencing	11,408 ft	$11,123	$4,556	$15,679
SAWQP	Grade Stabilization Structure	1,378 ft	$7,200	$800	$8,000
SAWQP	Grass & Legumes in Rotation	79 ac	$3,980	$1,367	$5,347
SAWQP	Hayland Planting	686 ac	$31,602	$13,128	$44,730
SAWQP	Pipeline	1,389 ft	$1,042	$1,069	$2,111
SAWQP	Reservoir Tillage	93 ac	$751	$250	$1,001
SAWQP	Residue Management (air seeding)	13,274 ac	$395,478	$174,879	$570,087
SAWQP	Residue Management (mulch till)	2,183 ac	$10,916	$37,492	$48,408
SAWQP	Streambank protection	178 ft	$1,275	$425	$1,700
SAWQP	Subsoiling	6,6850.5	$69,826	$64,082	$132,911
SAWQP	Tanks	7 ea	$156	$474	$630
SAWQP	Terraces	4,547 ft	$3,957	$1,473	$5,430
SAWQP	Water & Sediment Basins	73 ea	$18,761	$10,093	$28,854

Soil Erosion Reductions

There are approximately 16,150 acres of highly erodible cropland enrolled in CRP and SAWQP projects. These acres had an estimated pre-erosion rate of 15 tons per acre per year or a soil loss of 242,250 tons per year (USDA 1990). Currently these same acres have an estimated soil erosion rate of one ton per acre per year or a soil loss of 16,150 tons per year. The annual soil savings are 226,100 tons per year or a 93% reduction in average annual soil erosion shown in

Table C-3. The Teton River SAWQP anticipated that with the implementation of BMPs it would reduce soil erosion to T.

Table C-3. Soil Erosion Reductions in the North Leigh Watershed

Land Treatment	Average Annual Soil Loss	Treated Acres	Annual Soil Loss (tons/year)
Before CRP& SAWQP	15	16,150	242,250
After CRP & SAWQP	1	16,150	16,150
Annual Soil Erosion Savings in the North Leigh Creek Watershed = 226,100 tons/yr			

Problem Statement

Pollutants of Concern

The Teton Subbasin Assessment and TMDL specified that sediment was the pollutant of concern in North Leigh Creek, South Leigh Creek, Spring Creek, Packsaddle Creek, and the Teton River. The Subbasin Assessment also identified nutrients as a pollutant for the Teton River from Hwy 33 to Badger Creek and temperature as a specified pollutant for Spring Creek. Current sediment loading is15,228 tons per year into South Leigh Creek, 20,844 tons per year into Spring Creek, 3,589 tons per year into Packsaddle Creek, and 5,736 tons per year into the Teton River (USDA 1992). A recommended reduction in sediment loading into each of these creeks using Alternative 3 would yield 8,269 tons per year (46% reduction) for South Leigh Creek, 12,027 tons per year (42% reduction) for Spring Creek, 1,924 tons per year (46% reduction) for Packsaddle Creek, and 3,628 tons per year (38 % reduction) for the Teton River. Nutrient loading for Teton River Hwy 33 to Bitch Creek is 494,270 lb/yr nitrogen and 461,319 lb/yr phosphorus (IDEQ 2003).

Identified Problems

In 1991, the TSCD identified sheet, rill, gully, irrigation induced, wind, and stream bank erosion as problems in the watershed. Critical erosion periods are spring runoff, spring rains, and summer thunderstorms (USDA 1992).

Water Quality Monitoring Results

IASCD, in cooperation with TSCD and ISDA, conducted integrated water column sampling on Packsaddle Creek, South Leigh Creek, and Spring Creek at fixed intervals during the 2002, 2003, and 2004 field seasons. Monitoring data from these three field seasons indicated that there was only one incidence where Spring Creek exceeded the TMDL target of 80mg/L for total suspended solids (TSS) as shown in Table C-4 (Jenkins 2005).

Table C-4. TSS Loads for the North Leigh Watershed

Monitoring Site	Average TSSed Load (tons/day)	Average TSS @ 80 mg/L Target (tons/day)	Average TSS Reduction	TSS Target Exceedance
PackSaddle Creek	0.44	0	0	0
South Leigh Creek	0.20	0	0	0
Spring Creek	1.20	1.15	0.05	1

Critical Areas

Critical areas are those areas having the most significant impact on the quality of the receiving waters. Critical areas include pollutant source and transport areas. The watershed consists of approximately 60,612 acres with private land accounting for 49,724 acres. The predominant private land uses within the watershed are cropland and rangeland, respectively 37,027 acres and 2,102 acres.

Critical acres in the North Leigh Creek watershed total 31,310 acres and are defined as private land minus all treated acres and excluding urban development and roads. With the TMDL targets set at reducing fine sediment to 27% or less for particles less than 6.3 mm, reducing fine sediment to 10% or less for 0.85 mm particles, having 80% or greater bank stability on any 328 foot section of stream, reducing temperature to 22 ºC or less with a maximum daily average of 19 ºC for cold water aquatic life, and reducing temperature to 13 ºC or less with a maximum daily average of 9 ºC for salmonid spawning; it is estimated that 100% or 31,310 acres of private land would need BMPs implemented for sediment and temperature to meet these targets. In order to allocate available resources more effectively, implementation should be focused toward the tiers shown in Table C-5.

Table C-5. Critical Areas in the North Leigh Creek Watershed

Implementation Tiers	Tier 1	Tier 2	Tier 3	Tier 4
Watershed	**Riparian Acres**	**Cropland and Pasture Acres**	**Rangeland Acres**	**Animal Facilities (each)**
North Leigh Creek	1,397	24,061	1,549	1

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 C-6 lists the BMP amounts and costs of BMPs that may be used to restore beneficial uses in North Leigh Creek watershed.

Table C-6. Estimated BMP Installation Costs for the North Leigh Creek Watershed

Implementation Tiers	C/S Funds	Participant Funds	Total Funds
Tier 1 **Stream channels and riparian areas**	$1,405,831	$468,610	$1,874,441
Tier 2 **Cropland and Pasture**	$1,020,919	$340,306	$1,361,225
Tier 3 **Rangeland**	$56,565	$18,855	$75,420
Tier 4 **Animal Facilities**	$18,426	$6,142	$24,568

APPENDIX D

Teton River Valley Watershed

Agricultural TMDL Implementation Plan

Introduction

Purpose

The purpose of this plan is to recommend BMPs that would improve or restore physical, chemical and biological functions of the Teton River and its tributaries, Darby Creek, Horseshoe Creek, and Teton Creek. The plan will build upon past conservation accomplishments made through the Teton Canyon SAWQP and PL566 Teton River Basin Study planning projects and will also assist other subbasin efforts in restoring beneficial uses.

Goals and Objectives

The goal of this implementation plan is to restore beneficial uses on §303(d) listed stream segments. The objectives of this plan are to identify critical areas and to recommend BMPs for reducing sediment loading to the Teton River, Darby Creek, and Fox Creek.

Beneficial Use Status

IDEQ designated beneficial uses on rivers, creeks, lakes, and reservoirs to meet the requirements of the federal Clean Water Act. The Teton River is on the state of Idaho's §303(d) list of water quality impaired water bodies (IDEQ, 1998). The Teton River is listed for habitat alteration from the headwaters to Trail Creek, which is approximately 3 miles in length; and for sediment and habitat alteration from Trail Creek to HWY 33, which is approximately 16 miles in length. Beneficial uses that are designated for the Teton River include cold-water aquatic life and salmonid spawning. The Teton River was not reported to fully support cold water aquatic life or salmonid spawning (IDEQ 2003).

The beneficial uses, cold water aquatic life and salmonid spawning, were not reported to be supported in Darby Creek. IDEQ conducted BURP sampling at five locations, from the diversion near the Idaho/Wyoming line to the Teton River from 1995 to 1998. At one of these sites, just downstream of HWY 33, Darby Creek did not support the cold water aquatic life beneficial use, so it remained on the §303 (d) list for sediment. IDEQ acknowledged that the site sampled and reported as not supporting the cold water aquatic life beneficial use is dry most of the year (IDEQ 2003). Due to inappropriate data collection, this section of Darby Creek warrants further assessment. Total suspended sediment samples taken by the IDEQ were below the target of 80mg/L, but subsurface sampling by the IDEQ at a site downstream of HWY 33 found that sediment exceeded the target. A TMDL was apparently developed for sediment based on the subsurface sampling data.

Horseshoe Creek is impaired by flow alteration and thus a TMDL was not developed for this creek.

Teton Creek was originally listed on the 1996 §303(d) list for sediment and nutrients from HWY 33 to the confluence of the Teton River, but later removed from the 1998 §303(d) list based on BURP data indicating that the beneficial use, cold water aquatic life, was supported (IDEQ 2003).

Project Setting

For the purpose of this implementation plan, the Teton River Valley watershed encompasses portions of the 5th level HUC watersheds, Bear Creek, Driggs, Little Pine, Lower Darby, and Teton Canyon. The Teton River Valley watershed boundary is delineated by the headwaters of the Teton River at the southern end, the Driggs watershed at the western edge, the Driggs and Bear Creek watersheds at the northern end, and HWY 33 at the eastern edge. The Teton River Valley watershed encompasses 62,228 acres or 97 square miles in Idaho. There are 41,444 acres of private land, 438 acres managed by BLM, 420 acres managed by the IDFG, and 19,927 acres managed by the CTNF in the watershed. Crop land is the major private land use in the watershed totaling 53% of the acres as shown in Table D-1.

The Teton River valley, along this portion of the Teton River, extends vertically from the southeastern to the northeastern portion of the subbasin shown in Figure D-1. The watershed is bounded on the east by the Teton Mountains and the state of Wyoming, on the north by the Judkins and North Fork Teton watersheds, on the west by the Big Hole Mountains, and on the south by the Little Pine Creek and Warm Creek watersheds and the Teton County/Bonneville County line. Elevations in the Teton River valley range from 5,971 feet to 6,167 feet. There are many major tributaries entering the Teton River Valley watershed, including Darby Creek, Dry Creek, Horseshoe Creek, Mahogany Creek, Patterson Creek, Teton Creek, and Twin Creek.

Table D-1. Private Land Uses in the Teton River valley

Land Use	Acres	Percent of Total
Cropland and Pasture	22,049	53.2%
Forest	2,950	7.1%
Mines & Gravel Pits	28	0.1%
Rangeland	2,444	5.9%
Riparian	1,534	3.7%
Roads	985	2.4%
Urban	1,494	3.6%
Wetland	9,960	24.0%
Total	**41,444**	**100%**

Accomplishments

The TSCD and area landowners implemented the Teton River SAWQP project with four contracts totaling 199 acres. The Teton River SAWQP project cost $84,479 and the land owners covered 26% of that total cost. It was anticipated that with successful implementation of BMPs the project would achieve 85% reduction in soil erosion from cropland thus improving beneficial uses in the nearby streams (TSCD 1991). Along with the Teton River SAWQP project, many of the land owners enrolled their cropland into the Conservation Reserve Program (CRP) with 1,067 acres in the Teton River Valley watershed (FSA 2004). In addition, three landowners were involved in the EQIP program which treated 1,293 acres and totaled $102,473.00. Landowners have used two other programs, TRDP and WHIP, to assist them in implementing BMPs that may improve beneficial uses of 303d listed stream segments. There was one TRDP contract that treated 225 acres. There were two WHIP contracts that treated 563 acres. The accomplishments of these projects in the Teton River Valley watershed are outlined below in Table D-2.

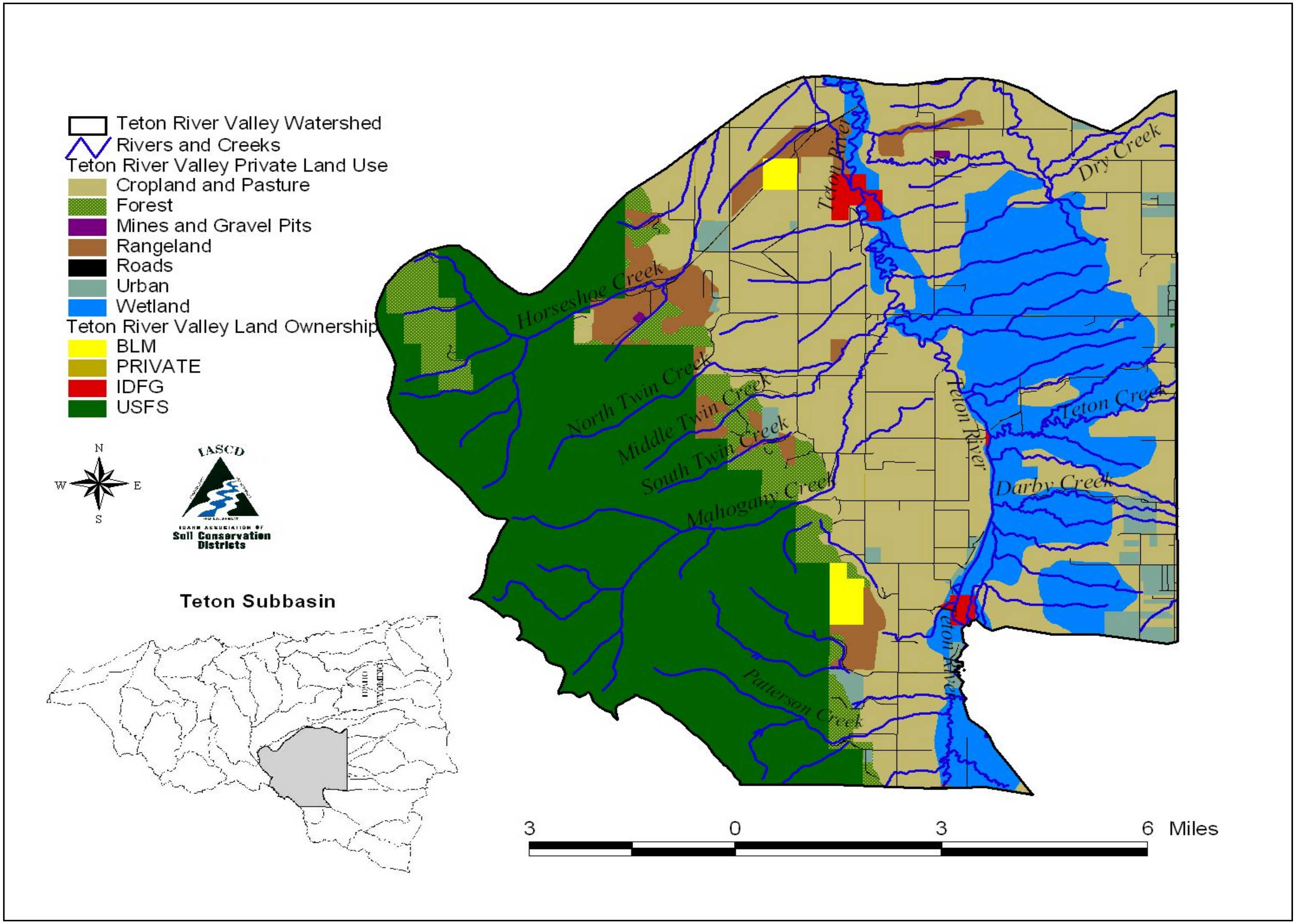

Figure D-1. Teton River Valley in the Teton Subbasin

Table D-2. Completed BMP Amounts and Costs in the Teton River Valley

Funding Program	Best Management Practice	Units Treated	Cost-Share Funds	Participant Funds	Total Funds
CRP	Conservation cover	1,067 ac	$219,729	$32,002	$251,731
EQIP	Animal Trails & Walkways	1,224 ft	$1,011	$337	$1,348
EQIP	Diversion	321 ft	$482	$161	$643
EQIP	Fence	4,321 ft	$6,236	$2,079	$8,315
EQIP	Pumping Plant for Water Control	3	$10,528	$3,509	$14,037
EQIP	Structure for Water Control	417ft/2ea	$2,151	$717	$2,868
EQIP	Waste Storage Facility	4,966 yd^3	$53,296	$17,566	$70,862
EQIP	Well (livestock)	176 ft	$3,300	$1,100	$4,400
SAWQP	Conservation Cover	118 ac	$1,679	$1,691	$3,370
SAWQP	Hayland Planting	72 ac	$4,357	$1,452	$5,809
SAWQP	Residue Mgt. (air seed)	1,852 ac	$55,554	$18,518	$74,072
SAWQP	Subsoiling	68 ac	$921	$307	$1,228
TRDP	Fence	986 ft	$229	$76	$305
TRDP	Pasture Management	237 ac	$1,775	$592	$2,367
TRDP	Pumping Plant for Water Control	2 ea	$2,250	$1,086	$3,336
TRDP	Trough or Tank	2 ea	$780	$260	$1,040
TRDP	Well	1 ea	$319	$106	$425
WHIP	Dike	14,548 yd^3	$10,000	$3,333	$13,333
WHIP	Fence	5,748 ft	$6,467	$2,155	$8,622

Soil Erosion Reductions

There are approximately 1,266 acres of highly erodible cropland enrolled in CRP and SAWQP projects. These acres had an estimated pre-erosion rate of 15 tons per acre per year or a soil loss of 18,990 tons per year (USDA 1990). Currently these same acres have an estimated erosion rate of one ton per acre per year. The annual soil savings are 17,724 tons per year or a 93% reduction in average annual soil erosion shown in Table D-3. The Teton River SAWQP anticipated that with the implementation of BMPs it would reduce soil erosion to T.

Table D-3. Soil Erosion Reductions in the Teton River Valley Watershed

Land Treatment	Average Annual Soil Loss (tons/acre/year)	Treated Acres	Annual Soil Loss (tons/year)
Before CRP& SAWQP	15	1,266	18,990
After CRP & SAWQP	1	1,266	1,266
Annual Soil Erosion Savings on treated acres in Teton River Valley Watershed =17,724 tons/yr			

Problem Statement

Pollutants of Concern

The Teton Subbasin Assessment and TMDL specified that sediment was the only pollutant of concern in the Teton River with a current load of 179,683 tons per year and a recommended load of 105,141 tons per year or a 41% reduction of sediment (IDEQ 2003).

Identified Problems

In 1991, the TSCD identified sheet, rill, gully, irrigation induced, wind, and stream bank erosion as problems in the watershed. Critical erosion periods are spring runoff, spring rains, and summer thunderstorms (USDA 1992).

Water Quality Monitoring Results

IASCD, in cooperation with TSCD and ISDA, conducted integrated water column sampling on Darby Creek at fixed intervals during the 2002, 2003, and 2004 field seasons. Monitoring data from these three field seasons indicated that the Teton River did not exceed the TMDL target of 80mg/L for total suspended solids as shown in Table D-4 (Jenkins 2005).

Table D-4. TSS Loads for the Teton River

Monitoring Site	Average TSSed Load (tons/day)	Average TSS @ 80 mg/L Target (tons/day)	Average TSS Reduction	TSS Target Exceedance
Darby Creek	0.296	0	0	0

Critical Areas

Critical areas are those areas having the most significant impact on the quality of the receiving waters. Critical areas include pollutant source and transport areas. The watershed consists of approximately 62,228 acres with private land accounting for 41,444 acres. The predominant private land uses within the watershed are cropland and rangeland, respectively 22,049 and 2,444 acres.

Critical acres in the Teton River Valley watershed total 35,663 acres and are defined as private land minus all treated acres and excluding urban development, mines and gravel pits, and roads. With the TMDL targets set at reducing fine sediment to 27% or less for particles less than 6.3 mm, 10% or less for 0.85 mm particles and 80% or greater bank stability on any 328 foot section of stream, it is estimated that 100% or 35,663 acres of private land and range land would need BMPs implemented for sediment to meet these targets. In order to allocate available resources more effectively, implementation should be focused toward the tiers shown in Table D-5.

Table D-5. Critical Areas in the Teton River Valley Watershed

Implementation Tiers	Tier 1	Tier 2	Tier 3	Tier 4
Watershed	**Riparian Acres**	**Cropland and Pasture Acres**	**Rangeland Acres**	**Animal Facilities (each)**
Teton River Valley	1,406	19,685	2,429	11

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 D-6 lists the BMP amounts and costs of BMPs that may be used to restore beneficial uses in Teton River Valley.

Table D-6. Estimated BMP Installation Costs for the Teton River Valley

Implementation Tiers	C/S Funds	Participant Funds	Total Funds
Tier 1 Stream channels and riparian areas	$739,920	$246,640	$986,560
Tier 2 Cropland and Pasture	$756,043	$252,014	$1,008,057
Tier 3 Rangeland	$90,504	$30,168	$120,672
Tier 4 Animal Facilities	$202,770	$67,590	$270,360