Lower Teton River Subbasin Total Maximum Daily Load Implementation Plan for Agriculture

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In Cooperation with
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Tables

Figures

Appendices

Acronyms

AFO - Animal Feeding Operation

BMP - Best Management Practice

BLM - Bureau of Land Management, USDI.

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

MSWCD - Madison Soil and Water Conservation District

MOU - Memorandum of Understanding

RCRDP - Resource Conservation and Rangeland Development Program

RMS - Resource Management System

SAWQP - State Agriculture Water Quality Program

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

YSCD - Yellowstone Soil Conservation District

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 Moody Creek and the North Fork Teton River. 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 Lower Teton River Subbasin.

Goals

This agricultural component of the Lower 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 30 miles of streams within the subbasin. These BMPs would improve or restore the physical, chemical, and/or biological functions of Moody Creek and the North Fork Teton River. This plan identifies approximately 19,109 acres of riparian corridors, rangeland, and cropland that may need to be treated to reduce the amount of sediment and nutrients entering §303(d) listed streams. Implementation activities have been and will be focused on critical areas of private agricultural lands within the Lower Teton River Subbasin.

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, secondary contact recreation, agricultural water supply, irrigation water supply, wildlife habitat, and aesthetics for 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
- Decrease noxious weed infestations

- Decrease sediment, nutrients and bacteria concentrations entering streams
- Reduce livestock concentrations on streams, improve grazing management
- Monitor project progress and apply adaptive management

This plan recommends that agricultural landowners contact the Madison Soil and Water Conservation District (MSWCD) and/or the Yellowstone SCD (YSCD), 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
Moody Creek	1998: Forest Boundary to (South Fork) Teton River 2002: Confluence of N. and S. Forks Moody Creek to Woodmansee Johnson Canal	2119	ID17040204SK005_04	Nutrients
North Fork Teton River	Forks to Henry's Fork, Snake River	2113	ID17040204SK002_05	Sediment, Nutrients

Background

Project Setting

The Teton River Subbasin is one of three watersheds that comprise the Henry's Fork Basin (Figure 1). In the Lower Teton Subbasin, Moody Creek drains an area of 76 square miles in Idaho and the North Fork Teton River drains 37 square miles in Idaho. Moody Creek originates in the Big Hole Mountains and flows sixteen miles in a steep-walled canyon before being diverted into a canal and later entering the South Fork Teton River. The North Fork Teton River splits off from the mainstem Teton River north of the city of Teton and flows twelve miles before entering the Henrys Fork River. In 1975, the Teton Dam was completed at the lower end of the canyon to create a reservoir for irrigation water. In June 1976, the earthen dam collapsed. The collapse of the Teton Dam directly impacted the North Fork Teton River. The North Fork Teton River was dewatered and hydrologically modified, channelized, after the flood.

Approximately 82% of land in the Lower Teton Subbasin is privately owned, and the principal land use is irrigated cropland. Approximately 18% of the Lower Teton Subbasin is managed by federal or state agencies.

Agriculture is presumed to be the primary land use influencing water quality in the Lower Teton Subbasin. However, there is no current evidence of sediment loading from excessive cropland erosion in the Moody Creek watershed. There are a few riparian areas where grazing is negatively impacting streambank stability. In addition, AFO/CAFO operations are causing streambank erosion and potentially contributing to nutrient loading into Moody Creek and North Fork Teton River.

Sediment is cited as a pollutant responsible for impairment of both of these 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, and poorly maintained roads and culverts. County road failures and spoils were observed along 6000E, south of Moody Creek (personal observation, IASCD 2006).

Nutrients, which were also identified by the 1998 Idaho §303(d) list as pollutants of concern for these streams, are primarily associated with agricultural land use practices. Nutrients, particularly nitrogen, are attributed to animal manure (confined domestic and wildlife sources), over-fertilization, and certain crops, such as alfalfa hay.

Land Use

The principal private land use within the Lower Teton River Subbasin is irrigated cropland. Private lands, specifically cropland and pasture, totaled 124,459 acres or 88% of the Lower Teton River Subbasin, which included both non-irrigated and irrigated lands. In comparison, rangeland totaled 8,932 acres or 6% of the subbasin. Forest lands comprised 1,624 acres or 1% of the Lower Teton River Subbasin. All land uses are listed in Table 2 and displayed in Figure 2.

The National Agricultural Statistics Service (NASS) reports census data every five years. In 1997, 470 farms operated in Madison County, Idaho, yielding a total farm acreage of 222,817. In 2002, 479 farms operated in Madison County, Idaho, for a total farm acreage of 189,990, a 15 percent decline in total cropland acres 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 3). Only 252 of the 479 farms in Madison County operated as full-time farms in 2002, an increase from 236 full-time farms in 1997. According to the 2002 National Census of Agriculture, 132,623 acres of cropland were harvested out of 152,161 acres of total cropland.

Beef and dairy cattle, swine, and sheep production numbers declined from 1997 to 2002. In Madison County, the number of farms reporting milk cows declined from 21 in 1997 to 9 in 2002, while the number of farms reporting beef cattle declined from 149 in 1997 to 130 in 2002 (NASS 2002). Beef cattle numbers declined from 7,080 head in 2002 to 6,100 head in 2006 and milk cattle numbers declined from 567 head to 400 head in 2006 (www.nass.usda.gov).

Land Ownership

A large percentage of the land in the Lower Teton River Subbasin, 141,532 acres or 83%, is privately owned. Bureau of Land Management (BLM) manages 307 acres or less than 1% of the total land in the Lower Teton River Subbasin. The Idaho Department of Lands (IDL) manages 11,974 acres or 7% of the total land in the Lower Teton River Subbasin. The U.S. Forest Service (USFS) manages 16,531 acres or 10% of the total land in the Lower Teton River Subbasin. The federally owned land in the subbasin is managed by the Caribou-Targhee National Forest (IDEQ 2003). Table 4 lists the acreage and percent of total land for each of the land owners/managers. Figure 2 shows land ownership in the Lower Teton River Subbasin.

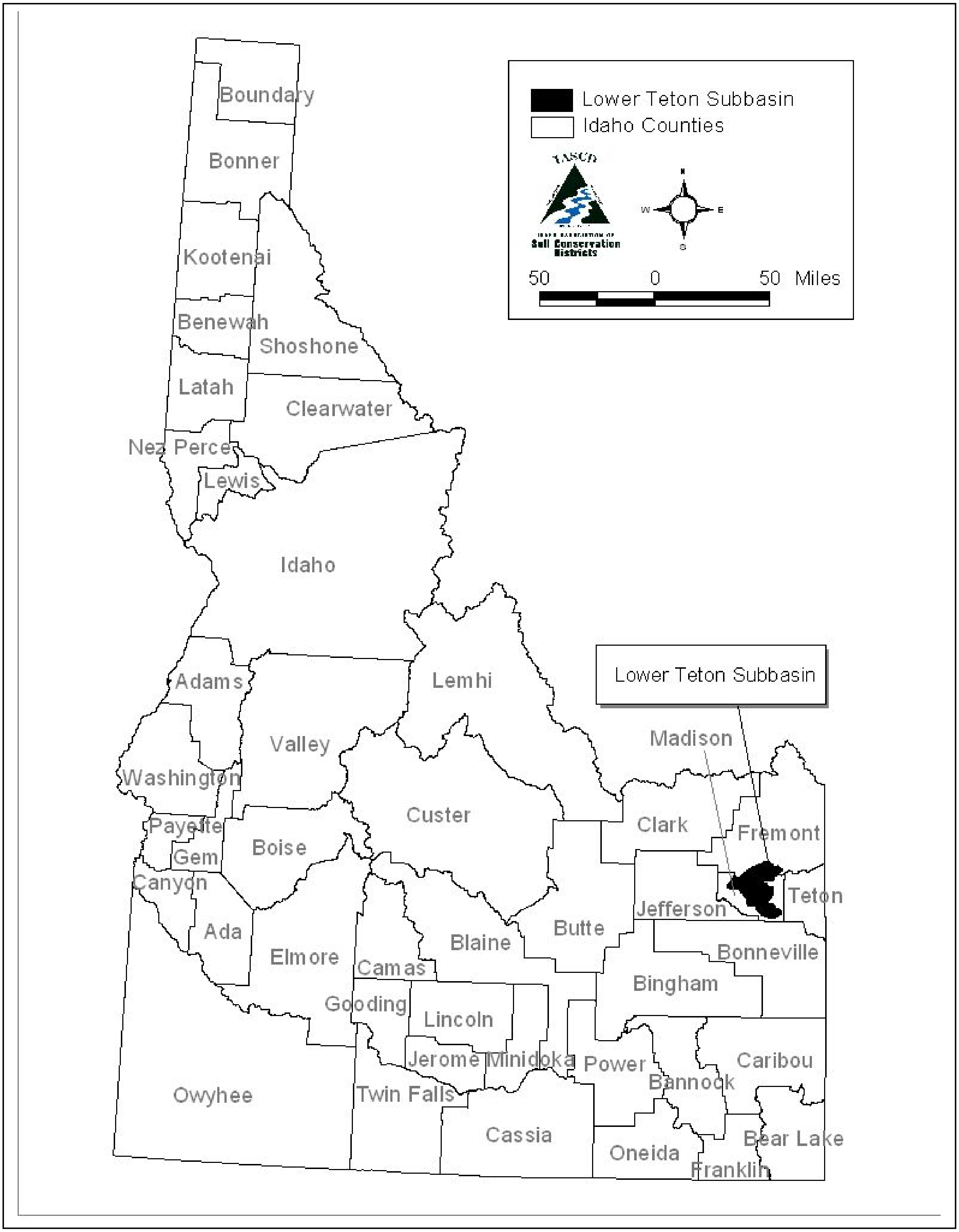

Figure 1. Lower Teton River Subbasin Location Map

Table 2. Private Land Use in the Lower Teton River Subbasin

Land Use	Acres	Percent of Total
Cropland and Pasture	124,459	87.9
Forest	1,624	1.1
Mines and Gravel Pits	551	0.4
Rangeland	8,932	6.3
Riparian	531	0.4
Roads	1,415	1.0
Transitional Areas	864	0.6
Urban	2,736	1.9
Water	181	0.1
Wetland	249	0.2
Total	**141,542**	**100**

Table 3. Agriculture Statistics for Madison County, Idaho: 1997 and 2002[1].

Parameter	Teton County	
	1997	2002
Farms	470	479
Average farm size (acres)	474	379
Total farm acreage (acres)	222,817	189,990
Total cropland (acres)	174,147	152,161
Total harvested cropland (acres)	147,243	132,623
Irrigated land (acres)	128,649	115,750
Market value of crops ($1,000)	73,134	92,672
Market value of livestock and poultry, and products ($1,000)	7,340	5,926
Beef cows (number)	16,302	7,080
Milk cows (number)	7,104	567
Hogs and pigs inventory (number)	131	25
Sheep and lambs inventory (number)	461	361
Wheat for grain (acres)	45,270	32,601
Barley for grain (acres)	47,500	48,153
Potatoes (acres)	40,045	34,617
Hay - Alfalfa, other (acres)	15,890	17,039

[1]Source: NASS 2002.

Table 4. Land Ownership in the Lower Teton Subbasin

Land Owners/Managers	Acres	Percent of Total
Private	141,531	83
BLM	307	<1
IDL	11,974	7
USFS	16,531	10
Total	**170,343**	**100**

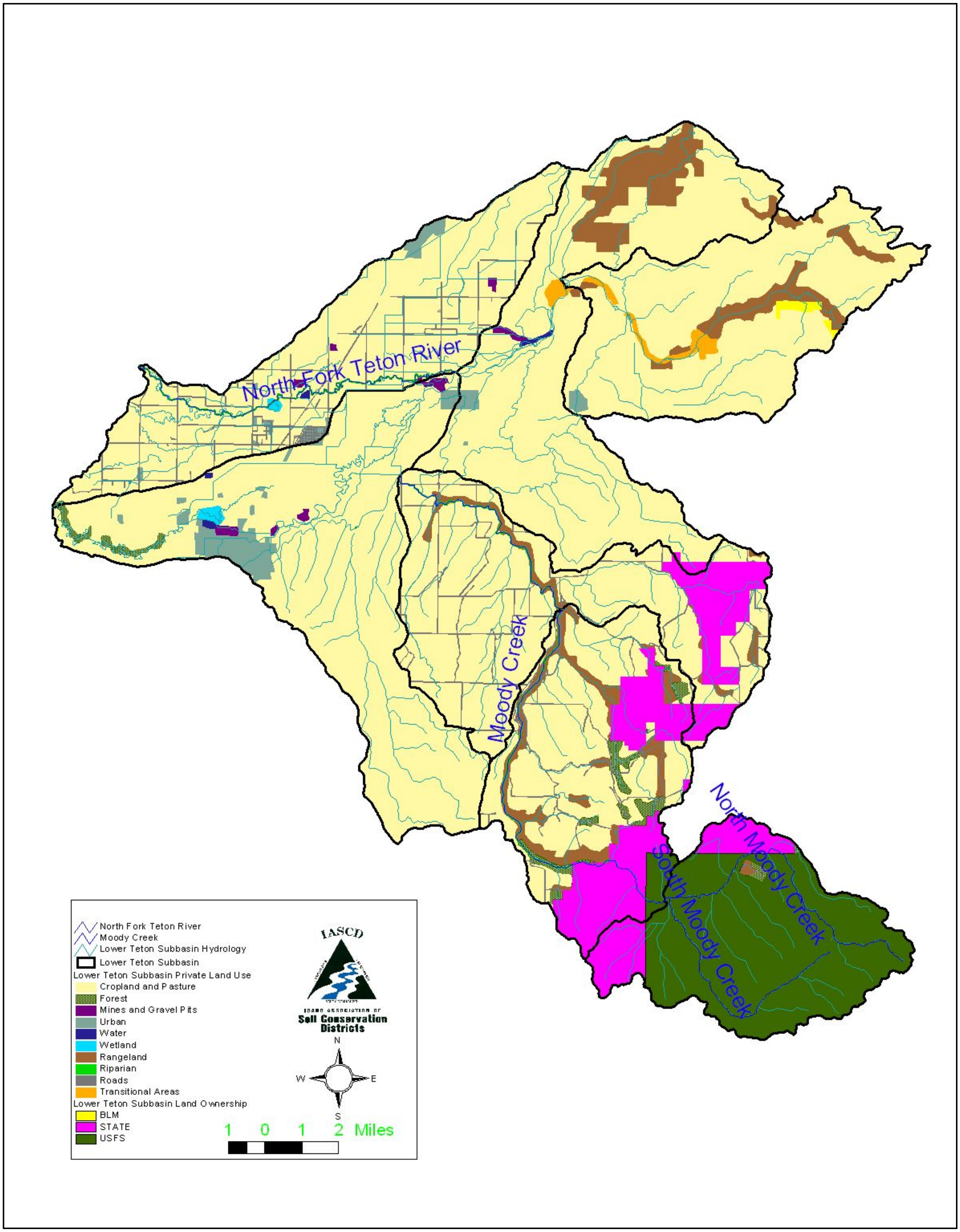

Figure 2. Private Land Use and Land Ownership in the Lower Teton River Subbasin

Accomplishments

The effects of agricultural practices on water quality in the Lower Teton River Subbasin have not gone unnoticed by the agricultural community. The Madison Soil and Water Conservation District and the Yellowstone Soil Conservation District have actively promoted resource conservation practices within the subbasin. Both districts have worked closely with NRCS and state agencies to educate farmers about conservation practices and to obtain funding to assist farmers in implementing those practices.

The major sources of funding utilized by these conservation districts are the Conservation Reserve Program (CRP), the Environmental Quality Incentives Program (EQIP), and the Agricultural Conservation Reserve Program-Long Term Agreement (ACP-Lta) (Figure 3). Watershed acres treated by these programs were based on contract unit amounts or common land unit acreages. In some cases, for ACP-Lta, entire sections were mapped when specific tracts were not identified in contracts. Table 5 lists conservation program accomplishments in the Lower Teton River Subbasin. Table 6 displays the best management practices (BMPs) installed in the subbasin under these programs (FSA 2006, NRCS 2006).

Table 5. Conservation Programs implemented in the Lower Teton River Subbasin

Program Name	Funding Source	Period	Watershed Acres Addressed by Projects	Funds Spent
CRP	Farm Bill	1998 to 2006	8,272	$2,708,455
EQIP	Farm Bill	2001-2006	8,016	$602,231
ACP-Lta/RCRDP	Farm Bill	1982-1997	2,383	$133,024

Table 6. BMPs implemented in Fremont and Madison counties in the subbasin

Practice #	Practice Name	Amount	Units	Cost Share Payment
100	Comprehensive Nutrient Management Plan	1	ac	$750
313	Waste Storage Facility	80	yd^3	$160
313D	Waste Storage Facility	400	yd^3	$4,000
324	Deep Tillage	2,532	ac	$41,874
324	Subsoiling	121	ac	$610
327	Conservation Cover	8,272	ac	$2,708,455
328	Conservation Crop Rotation	551	ac	$25,093
329A	Residue Management	475	ac	$7,125
329B	Residue Management	1,408	ac	$21,117
344	No Till	163	ac	$3500
382	Fence	703	ft	$3,515
430DD	Irrigation Water Conveyance, Pipeline	2,988	ft	$16,327
442	Irrigation System, Sprinkler	1,333	ac	$311,897
464	Irrigation Water Cons., Land Leveling	121	no	$8,900
512	Pasture and Hayland Planting	108	ac	$6,190
516	Pipeline	1,120	ft	$1,400
528	Prescribed Grazing	25	ac	$25
533	Pumping Plant	2	no	$10,645
575	Animal Trails and Walkways	1	ac	$675
580	Streambank and Shoreline Protection	2,005	ft	$50,895
587	Irrigation Water Cons., Str. for Water Control	33	no	$11,500
590	Nutrient Management	1,023	ac	$21,504
595	Pest Management	591	ac	$17,730
600	Terraces	66,961	ft	$59,513
609	Surface Roughening	3,060	ac	$26,256
614	Watering Facility	1	no	$1,000
638	Water and Sediment Control Basin	64	no	$25,100
642	Water Well	1	no	$5,000
645	Upland Wildlife Habitat Management	591	ac	$2,955

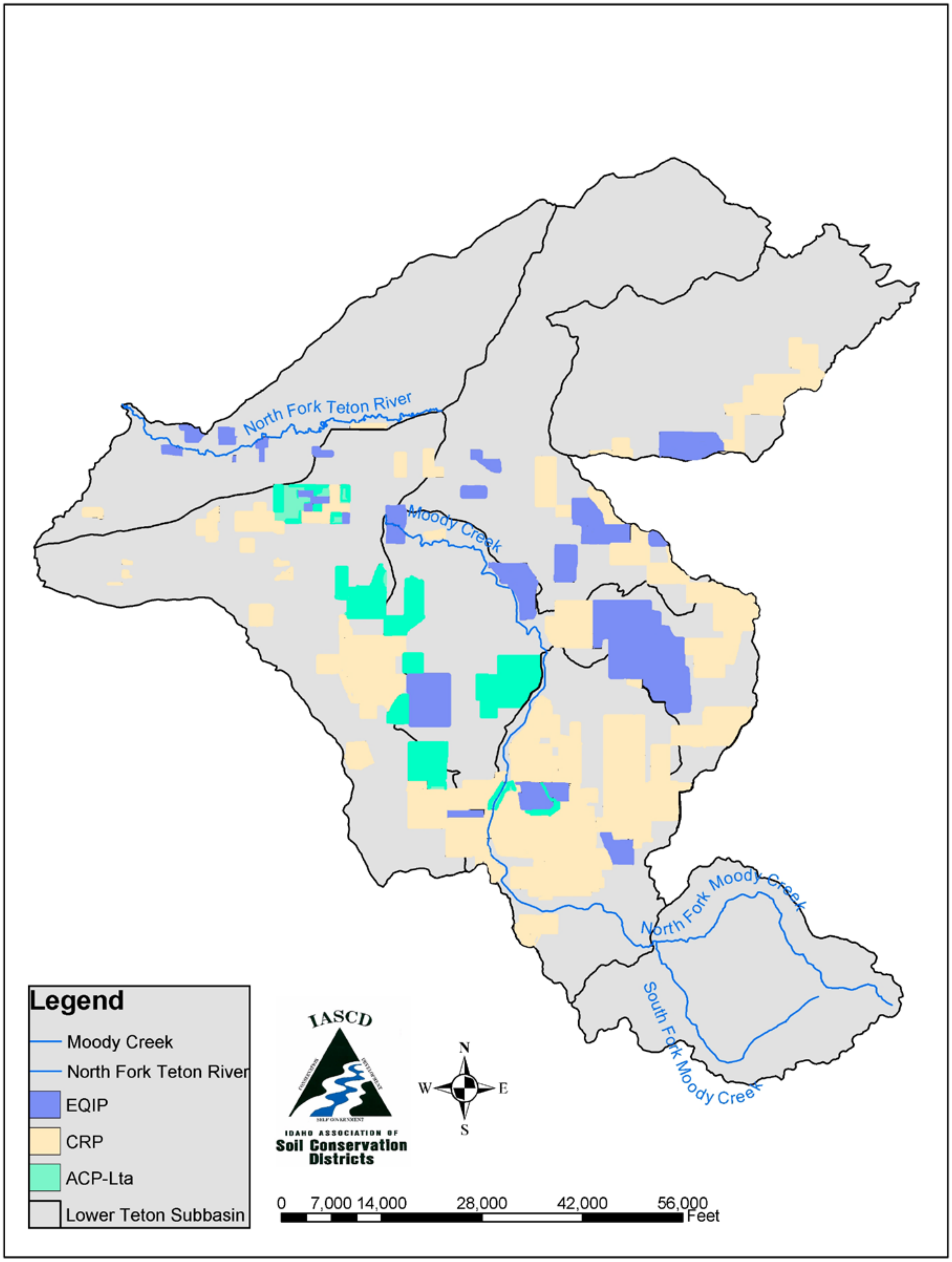

Figure 3. Conservation Programs implemented in the Lower Teton River Subbasin

(This figure was modified by SWCC in January 2014 to obtain compliance with Farm Bill Section 1619)

Problem Identification

Teton River Subbasin Assessment and 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 River Subbasin Assessment and TMDL on February 24th, 2003. This TMDL Implementation Plan addresses two segments; Moody Creek and North Fork Teton River.

Beneficial Use Status

In order to meet the requirements of the Clean Water Act, the State of Idaho (IDEQ) designated beneficial uses, shown on Table 7, for rivers, creeks, lakes, and reservoirs. Two water quality limited segments in the Lower Teton River Subbasin were on the 1998 State of Idaho §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 Lower Teton River Subbasin; cold-water aquatic life, salmonid spawning, secondary contact recreation, agricultural water supply, industrial water supply, wildlife habitat, and aesthetics (IDEQ 2003).

Moody Creek and the North Fork Teton River's beneficial uses are not fully supported due to sediment and nutrients. 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 to regulate 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 7 summarizes the pollutants of concern and status of each beneficial use by stream and Table 8 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 7. Beneficial Use Support Status of Water Quality Limited Segments (IDEQ 2003)

Stream	WQLS #	Pollutant	Support Status	Concerns
Moody Creek	2119	Nutrients	Not Supporting	Sediment
North Fork Teton River	2113	Sediment, Nutrients	Not Supporting	Streambank erosion, Lack of riparian vegetation

Table 8. Beneficial Uses by Stream in the Lower Teton River Subbasin (IDEQ 2002)

Stream	Aquatic Life		Recreation		Water Supply					
	Cold	SS	PCR	SCR	DWS	AWS	IWS	WH	Aesthetics	SRW
Moody Creek	Cold	SS				AWS	IWS	WH	Aesthetics	
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).

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 Lower Teton River Subbasin: nutrients and sediment.

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 Lower Teton River Subbasin but none discharge into §303(d) listed stream segments. There are municipal wastewater treatment plants (WWTP) in Rexburg, Rigby, and St. Anthony, the nearest cities. The outfall from the Rexburg WWTP is the Rexburg Canal and the South Fork Teton River (http://yosemite.epa.gov).

Identified Problems

Current land use practices and structures in the Lower Teton River Subbasin are contributing factors to the degradation of beneficial uses. Staff from IASCD, IDEQ, ISCC, and NRCS conducted stream visual assessments on the North Fork Teton River and Moody Creek. For the North Fork Teton River, channel condition, hydrologic alteration, riparian habitat, pool number, and canopy cover scored low because of extensive channelization and confinement by levees and also withdrawal of water resulting in loss of riparian habitat (Pappani 2005). For Moody Creek, the reaches of the creek that were problematic had limited riparian habitat (abundance and canopy cover) and unstable and erosive banks due to livestock and wildlife activity. The lack of vegetation and lack of canopy cover as well as grazing and concentrated animal feeding and watering areas are underlying factors contributing to water quality problems. Diversions and other structures were a significant problem in only one reach (Pappani 2006). Table 10 summarizes the results of the stream visual assessments by eroding bank percentage, Stream Visual Assessment Protocol rating, and Stream Erosion Condition Index rating. Figures 6 displays the SVAP rating for the Moody Creek reaches. Figure 7 displays the N.F. Teton River reaches. In addition to streambank erosion inventories, IASCD has gathered water quality monitoring data to help quantify and identify the pollutant(s) of concern for Moody Creek (Table 9).

Physical habitat surveys demonstrated that the poor reaches of the N. Fork Moody Creek, S. Fork Moody Creek, and the mainstem Moody Creek were impacted heavily by cattle grazing and recreation, such as camp sites and ATV vehicles (CTNF 2000).

Nitrate Priority Areas (Groundwater Pollutant)

The Idaho DEQ has designated nitrate priority areas, regions where nitrate levels exceed allowable limits in groundwater well sites, throughout the state of Idaho. Two areas, Ashton/Drummond/Teton River and Hibbard, lie within the Lower Teton River Subbasin. One other area, St. Anthony, lies on the outskirts of the subbasin boundary (Figure 4).

Bacteria (Surface Water Pollutant)

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.

Nutrients (Surface Water Pollutant)

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 TMDL estimated that 7,144 tons/year of sediment was derived from streambank erosion (IDEQ 2003), therefore approximately 21,432 pounds of nitrogen was delivered to the North Fork Teton River. 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.

Water samples collected by the USGS at gage station 13055000, *Teton River near St. Anthony*, (upstream of the N.F. Teton River) were analyzed for nutrients. Water quality data from the gage station indicated that nitrate plus nitrite monthly values exceeded 0.3 mg/L. Total phosphorus concentrations were less than the recommended EPA value of 0.1 mg/L (http://nwis.waterdata.usgs.gov/nwis/qwdata?site_no=13055000).

In contrast, IASCD water quality data showed that total phosphorus exceeded the target concentration of 0.1 mg/L approximately fifteen to twenty-four percent of the time for Moody Creek sites 1,3, and 4. However, the Upper Moody Creek site did not exceed the target concentration for total phosphorus on any sampling date from 2002 to 2004. Total nitrate and nitrite ($NO_2 + NO_3$) for Moody Creek regularly exceeded the target concentration of 0.3 mg/L, exceeding the target concentration approximately fifty percent of the time for Moody Creek sites 1, 3, and 4. The Upper Moody Creek site exceeded the total nitrate and nitrite target concentration of 0.3 mg/L on every sampling date except for one (Figure 5 and Table 9) (Jenkins 2005).

The Teton River Subbasin Assessment and TMDL reported that recent total Kjeldahl nitrogen and nitrate data were typically less than 0.3 mg/L for Moody Creek, with two exceptions, and less than or equal to 0.3 mg/L for the North Fork Teton River (IDEQ 2003). The Supplement to the Teton River TMDL-Moody, Fox, and Spring Creeks (IDEQ 2003) reported (for Moody Creek) that the "total phosphorus loading capacity at a 0.1 mg/L target varies from 5lbs/day at 10 cfs to 270 lbs/day at 500 cfs." Likewise, nitrogen loading capacity at the 0.3 mg/L target varies from 16lbs/day to 809 lbs/day at 10 cfs and 500 cfs, respectively."

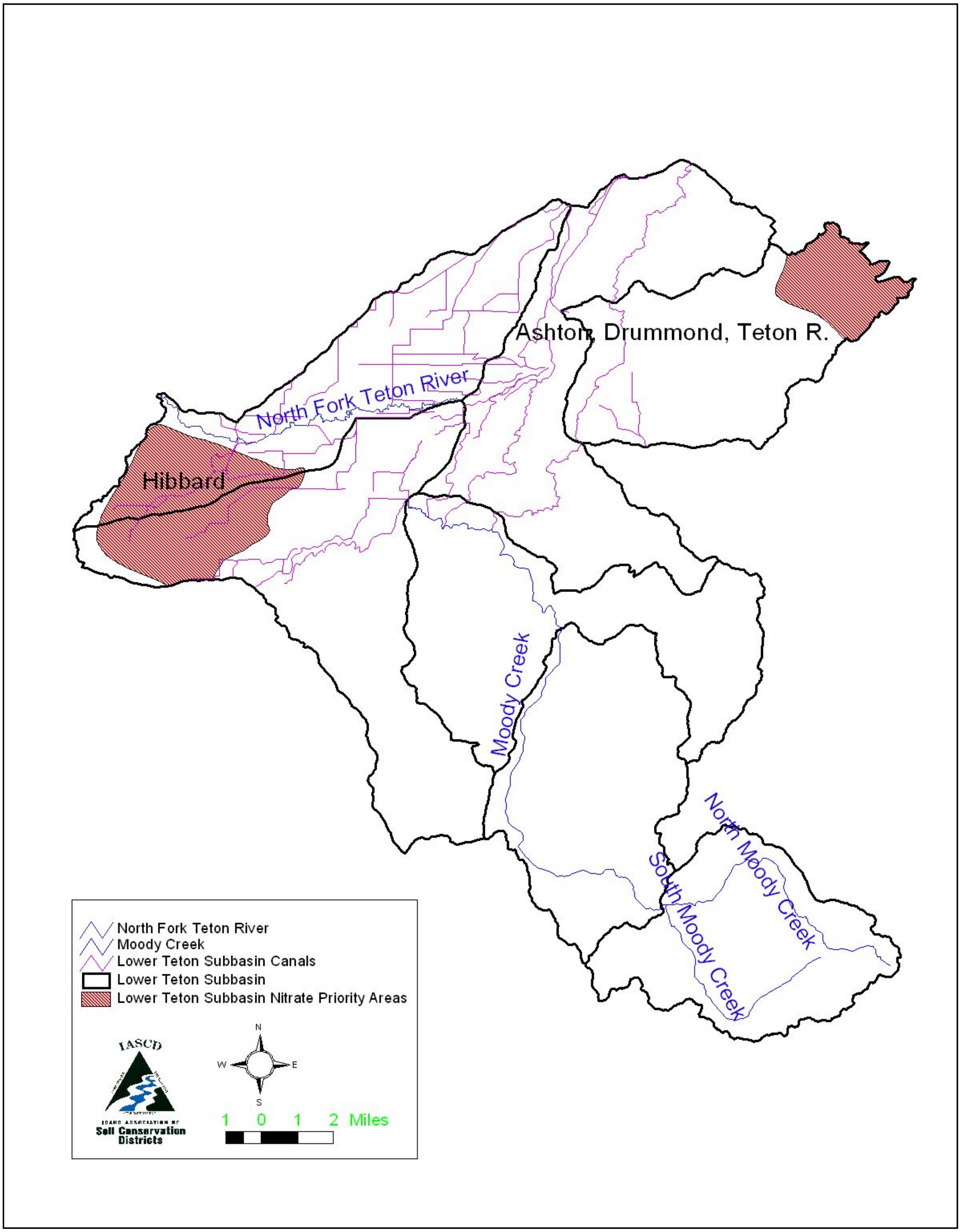

Figure 4. Groundwater pollutant areas and §303(d) listed stream segments in the Lower Teton River Subbasin.

Table 9. Mean values generated for IASCD water quality data from 2001 through 2004

303(d) listed stream	Status	Total Nitrate and Nitrite (mg/L)	Total Suspended Solids (mg/L)	Total Phosphorus (mg/L)	Number of days sampled
Moody Creek Site 1	Mean	0.39	26.7	0.07	
	# of Target Exceedances	20	3	7	46
Moody Creek Site 3	Mean	0.42	62.2	0.09	
	# of Target Exceedances	24	12	12	51
Moody Creek Site 4	Mean	0.43	43.7	0.07	
	# of Target Exceedances	30	11	12	58
Moody Creek Upper Site	Mean	0.81	14.3	0.05	
	# of Target Exceedances	21	0	0	22

Table 10. Stream Inventory Summary for Moody Creek and North Fork Teton River

Stream	Reach	Length (miles)	Eroding Bank (%)	SVAP Rating	SECI Condition
Moody Creek	MC0	1.5	5	Poor	Slight
Moody Creek	MC1	2.0	7	Fair	Slight
Moody Creek	MC2	1.2	8	Good	Slight
Moody Creek	MC3	0.4	31	Poor	Moderate
Moody Creek	MC4	0.5	0	Good	Slight
Moody Creek	MC5	1.3	2	Excellent	Slight
Moody Creek	MC6	0.7	70	Fair	Moderate
Moody Creek	MC7	0.6	8	Excellent	Slight
North Fork Teton River	NF1	0.8	18	Poor	Moderate
North Fork Teton River	NF2	0.3	24	Poor	Moderate
North Fork Teton River	NF3	0.5	21	Poor	Moderate
North Fork Teton River	NF4	0.3	21	Poor	Slight
North Fork Teton River	NF5	0.7	36	Poor	Moderate
North Fork Teton River	NF6	0.8	38	Fair	Moderate
North Fork Teton River	NF7	0.6	26	Poor	Slight
North Fork Teton River	NF8	1.3	13	Poor	Moderate
North Fork Teton River	NF9	0.5	28	Poor	Moderate
North Fork Teton River	NF10	1.0	33	Poor	Moderate
North Fork Teton River	NF11	0.8	38	Poor	Severe
North Fork Teton River	NF12	0.4	10	Poor	Slight
North Fork Teton River	NF13	0.3	7	Poor	Slight
North Fork Teton River	NF14	0.9	16	Poor	Moderate
North Fork Teton River	NF15	0.5	63	Poor	Moderate
North Fork Teton River	NF16	1.1	6	Poor	Slight
North Fork Teton River	NF17	1.7	33	Poor	Severe

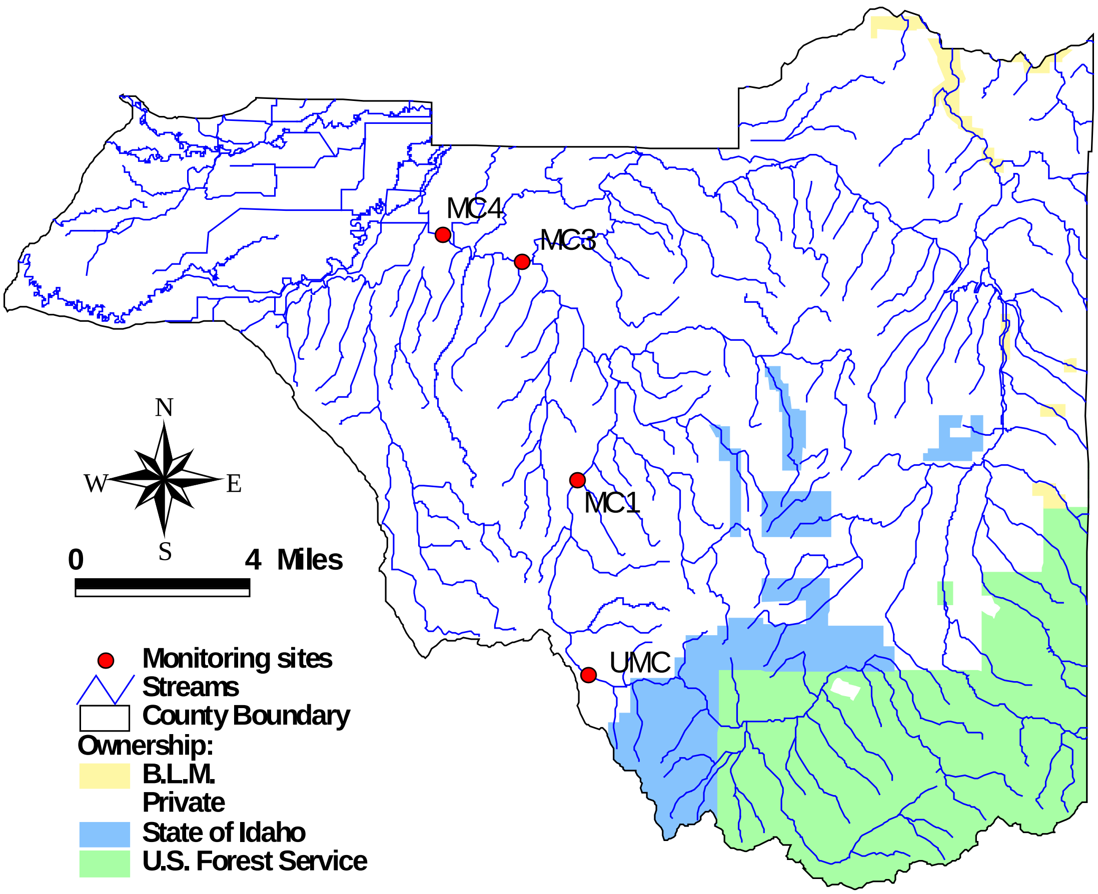

Figure 5. Water Quality Monitoring Sites in the Lower Teton River Subbasin

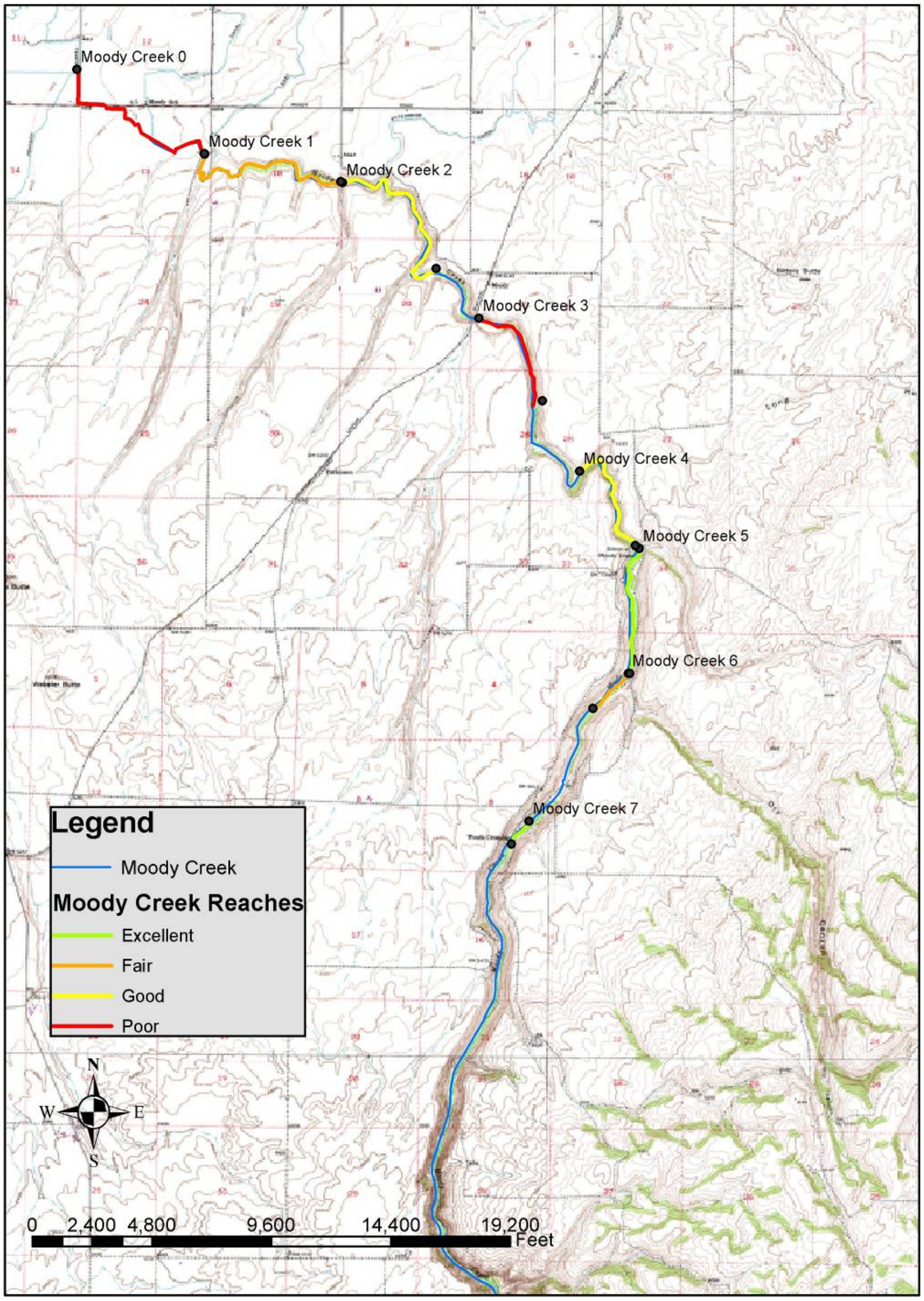

Figure 6. SVAP Ratings for Moody Creek Reaches

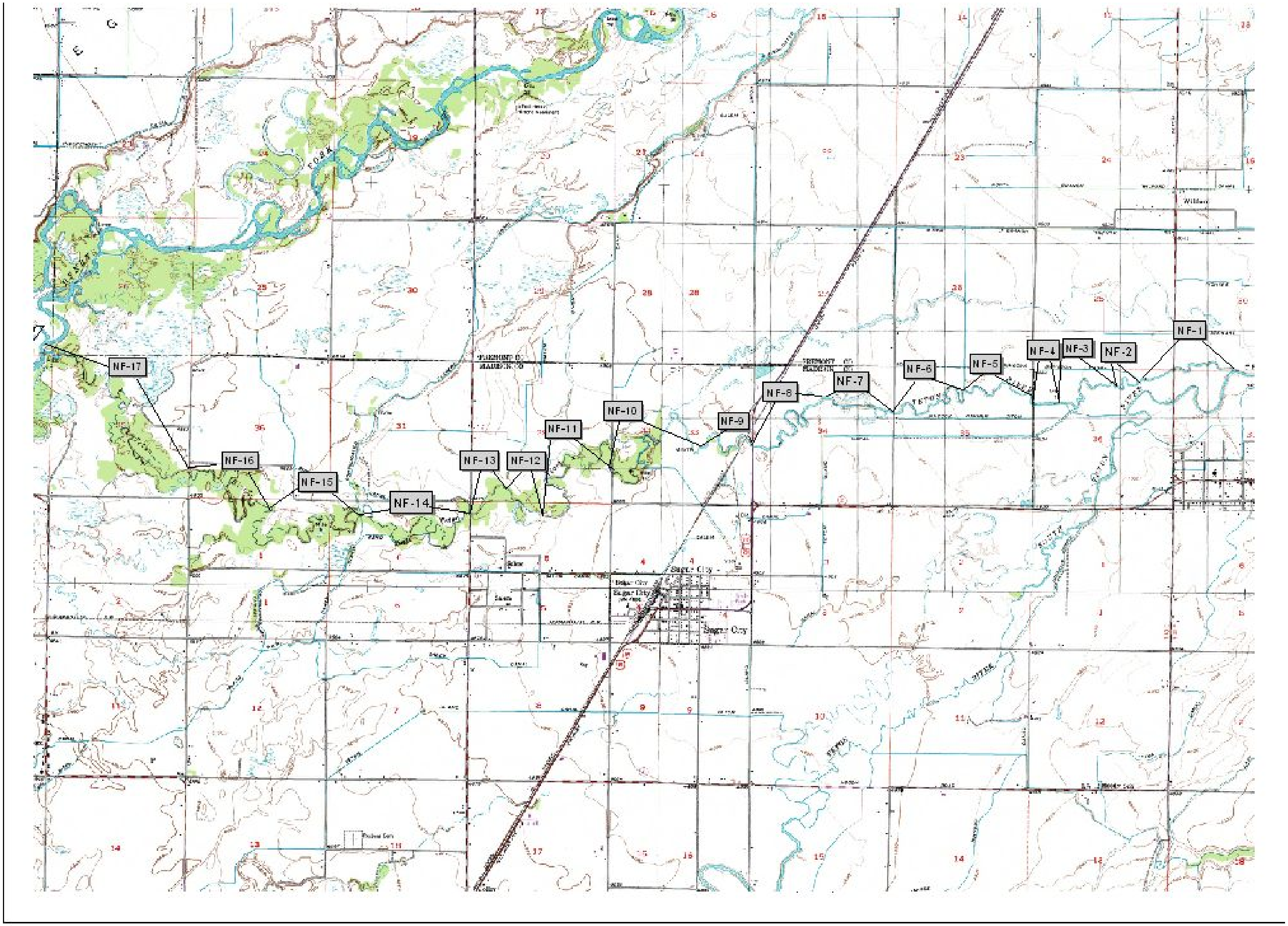

Figure 7. North Fork Teton River Reaches

Sediment (Surface Water Pollutant)

IASCD water quality data showed three exceedances of total suspended solids above the 80 mg/L target concentration for Site 1, twelve exceedances for Site 2, eleven exceedances for Site 3, and zero exceedances for the Upper Moody Creek site (Jenkins 2005). The sediment loads and the number of target exceedances for Moody Creek are listed in Table 9.

IASCD did not collect water quality data for the North Fork Teton River.

IDEQ sampled one location on the mainstem of Moody Creek near Woods Crossing, where bank stability was determined to be 85% on the left bank and 88% on the right bank and percentage of fine particles was 20%. Total suspended solids data were collected at four locations, where the values were less than the 80 mg/L target. Total suspended solids for the N.F. Teton River were less than the 80 mg/L target (IDEQ 2003).

Sediment loads and sediment reductions were defined in the Teton River Subbasin TMDL (IDEQ 2003). Load reductions needed to meet target levels of nitrogen and phosphorous are listed in Table 11 for the N. F. Teton River. Because of the relationship between nutrient and sediment additions from land use activities, it is assumed that methods used to reduce sediment pollution will likewise reduce nutrient pollution (IDEQ 2003).

Table 11. 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%

[1]Water quality limited segment

AFOs/CAFOs

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." There are approximately three of these operations along Moody Creek and the North Fork Teton River (Mortensen 2006).

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 four dairies in the Lower Teton River Subbasin, all of which are located in the North Fork Teton River subwatershed (http://www.idwr.state.id.us/gisdata/tis_data-new.htm). All four of these dairies have submitted their nutrient management plans to ISDA (Griffin 2006).

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).

Noxious Weeds

Noxious weeds are not typically addressed in implementation plans. However, noxious weeds are such an obvious problem in the Lower Teton River Subbasin, particularly along the streambanks and adjacent rangelands of Moody Creek that this resource concern needs to be addressed. Leafy spurge is the predominant noxious weed in the area, however, Canada thistle, hounds tongue, spotted knapweed, yellow toadflax, and musk thistle can also be found along Moody Creek and the N.F. Teton River.

Partners in the Upper Snake River Cooperative Weed Management Area (CWMA) are coordinating efforts to attack noxious weeds through public education, noxious weed mapping, establishing species specific bio-control methods, and cost-sharing on projects with private landowners to control weeds.

As a result the CWMA has released over 130 colonies of bio-control agents in the Moody Creek watershed targeting leafy spurge and Canada thistle (Table 12). In some locations insectaries have become well established allowing leafy spurge flea beetles to be collected and redistributed within the Lower Teton River Subbasin. A bio-agent is well established in musk thistle populations throughout the subbasin.

Tamarisk has become established near the old Teton Dam site. The CWMA has implemented an information campaign to alert landowners along the Lower Teton River about the danger of this aggressive invader (personal communication Steve Smart, RC&D). Table 12 highlights the type of insect or biological control agent released and the target weed or host plant.

Table 12. Biological agents and host plants

Target Weed	Biological Control Agent Previously Established (scientific name)	Biological Control Agent (common name)
Leafy spurge	*Hyles euphorbiae*	Defoliating moth
Musk thistle	*Rhinocyllus conicus*	Seed head weevil
	Biological Control Agent Introduced	
Leafy spurge	*Aphthona nigriscutis*	Root/defoliating flea beetle
Leafy spurge	*Aphthona lacertosa*	Root/defoliating flea beetle
Leafy spurge	*Aphthona flava*	Root/defoliating flea beetle
Leafy spurge	*Aphthona species mix*	Root/defoliating flea beetle
Leafy spurge	*Spurgia esulae*	Shoot tip gall midge
Canada thistle	*Ceutorhynchus litura*	Crown root weevil
Canada thistle	*Cassida rubiginosa*	Defoliating beetle

Threatened and Endangered Species

The threatened and candidate species that occur in Madison and Fremont Counties include: bald eagle (*Haliaeetus leucocephalus*, yellow-billed cuckoo (*Coccyzus americanus*), lynz (*Lynx canadensis*), grizzly bear (*Ursus arctos*), and Ute ladies' tresses (*Spiranthes diluvialis*) (http://fishandgame.idaho.gov/cms/tech/CDC/). Other species with special status listing include the northern goshawk, western toad, ferruginous hawk, trumpeter swan, north American wolverine, california myotis, yellowstone cutthroat trout, common grackle, northern leopard frog, and the great grey owl. Leopard spotted frogs have been observed along Moody Creek (personal observation, IASCD 2005 and 2006).

Yellowstone cutthroat trout (*Onchorhynchus clarki bouvieri*) 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.). However, there is one dam site, Webster Dam located on Moody Creek on state land near the N. F. and S. F. Moody Creek confluence, which prevents fish migration upstream. Fish distribution surveys in Moody Creek and N. F. Moody Creek found that Yellowstone cutthroat trout were present, but that brook trout appeared to by displacing Yellowstone cutthroat trout (CTNF 2001, Wehnke 2000(a,b), Wenhnke and Capurso 2000). In addition, the Idaho Department of Fish and Game determined that brook trout were more widespread than Yellowstone cutthroat trout in N. Fork Moody Creek and S. Fork Moody Creek (IDFG 2000, https://research.idfg.idaho.gov).

Fisheries assessments indicate that the number of cutthroat trout in the N.F. Teton River have declined since the Teton Dam collapse, primarily due to channel alteration and diversions (Schrader 2004).

Implementation Priority

Subwatersheds for Treatment

The Lower Teton River Subbasin totals 170,343 acres (Figure 1). For the purposes of this agricultural implementation plan, the Middle Teton River, Teton River, and South Fork Teton River subwatersheds will be excluded since they do not contain any §303(d) listed stream segments. This implementation plan considers 70,156 acres, which includes four proposed subwatersheds, Dry Canyon, Long Hollow, Parkinson, and North Fork Teton River as shown in Table 13 and Figure 8.

Table 13. Subwatersheds and Acreages

Subatershed Name	Acres
Dry Canyon	22,616
Long Hollow	11,786
Parkinson	12,809
North Fork Teton River	22,945
Total	**70,156**

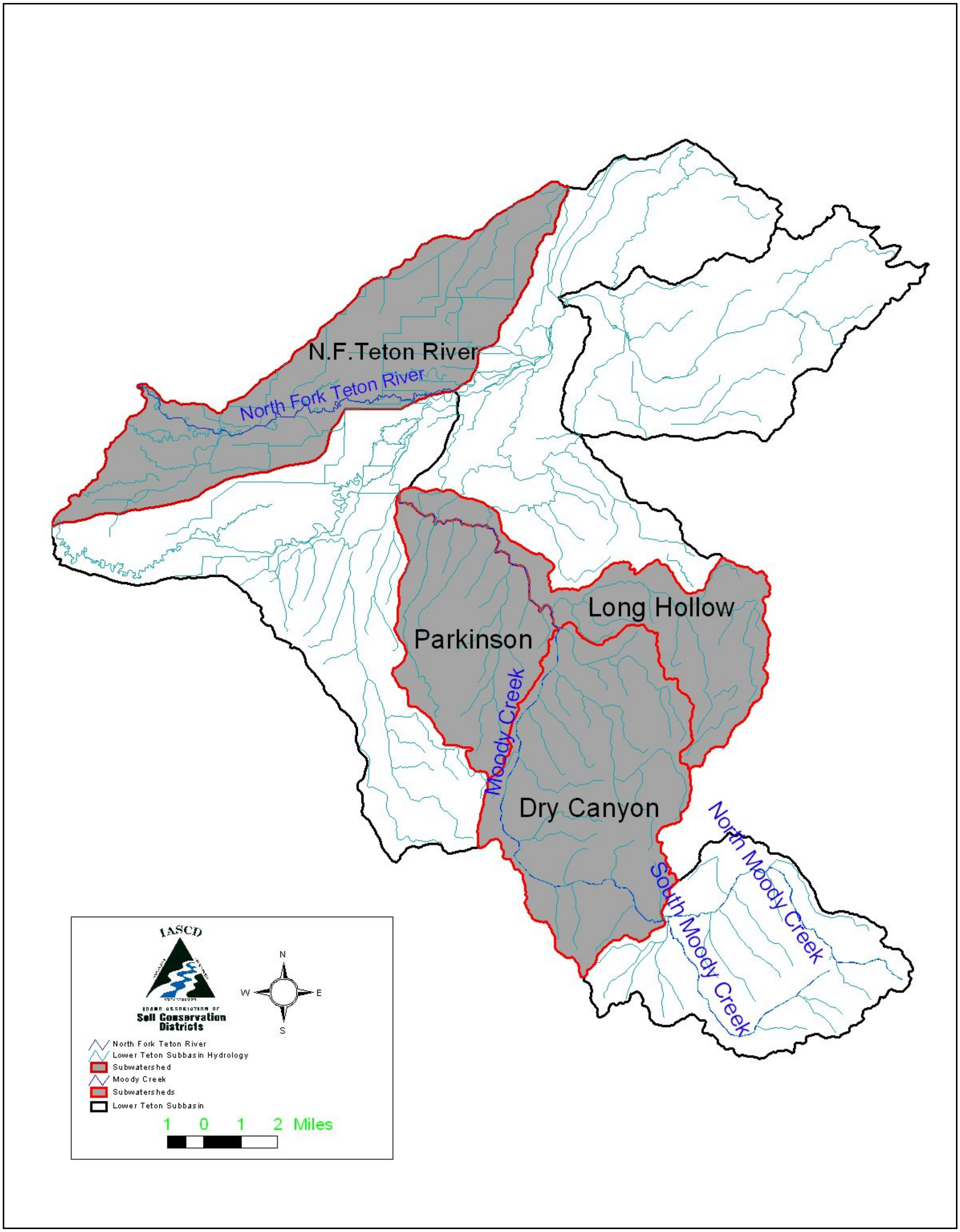

Figure 8. Proposed subwatersheds for agricultural implementation in the Lower Teton River Subbasin.

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 rangelands, unstable irrigation diversion structures, areas of channelization or vegetation removal, and animal feed operations adjacent to stream corridors. Acres of critical areas that need to be treated directly relate to the following treatment unit acreages.

Proposed Treatment Units (TUs)

The following TUs describe critical areas with similar land uses, productivity, resource concerns, and treatment needs in the Lower Teton River Subbasin (SCS 1981, http://ias.sc.egov.usda.gov/auth/CSG/CSGReporteFOTG.aspx). 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 - Riparian Corridors-Streambanks

Acres	Description	Resource Problems
214	**Unstable and erosive streambanks and riparian areas adjacent to the creek or river that have a direct and substantial influence on the creek or river.** **(SVAP Rating Fair to Poor)** Annis silty clay loam, Blackfoot silt loam, Haplaquolls, Labenzo silt loam, Rexburg silt loam, and Withers silty clay loam Generally poorly to moderately drained soils of river terraces and floodplains, silt loam to clay over sand to gravel, slopes 0-1%	Sedimentation from unstable streambanks, loss of riparian vegetation, noxious weed proliferation, loss of domestic and wildlife habitat, reduced ecological condition and habitat diversity, dewatering from irrigation diversions, channel alteration or hydrologic modification, straightened stream channel (N.F. Teton River)

Treatment Unit #2 – Riparian Corridors/Rangelands

Acres	Description	Resource Problems
96	**Riparian corridors and rangelands that are unstable and erosive as a result of grazing impacts.** Annis silty clay loam, Blackfoot silt loam, Haplaquolls, Labenzo silt loam, Rexburg silt loam, and Withers silty clay loam Generally poorly to moderately drained soils of river terraces and floodplains, silt loam to clay over sand to gravel, slopes 0-1%	Sedimentation from unstable streambanks due to overgrazing and animal access points, loss of riparian vegetation, noxious weed proliferation, loss of domestic and wildlife habitat, reduced ecological condition and habitat diversity

Treatment Unit #3 – Riparian and Upland- Noxious Weeds

Acres	Description	Resource Problems
392	**Riparian corridors and rangelands (upland areas along stream corridors) that have substantial noxious weed impacts.** Annis silty clay loam, Blackfoot silt loam, Haplaquolls, Labenzo silt loam, Rexburg silt loam, and Withers silty clay loam Generally poorly to moderately drained soils of river terraces and floodplains, silt loam to clay over sand to gravel, slope 0-1%. Swanner-Rock outcrop complex Shallow, well-drained soil, low water holding capacity, high runoff and erosion potential	Noxious weed proliferation, deterioration of range condition resulting in invasion by exotic plant species, loss of domestic and wildlife habitat and forage, reduced ecological condition and habitat diversity, decreased crop production

Treatment Unit #4 - Irrigated Cropland-HEL-Rotation 1

Acres	Description	Resource Problems
9,042 Total	**Irrigated cropland and pasture that is highly erodible with a potato-grain rotation.** Labenzo silt loam, Withers silty clay loam Soils are wind-deposited silt loams, moderately drained soils, slope 0 to 1%.	Irrigation induced erosion as well as natural water and wind erosion, sediment and nutrient (fertilizer) transport from cropland during runoff, sediment and nutrient transport into streams from canal point sources, nutrient leaching into groundwater sources

Treatment Unit #5 – Irrigated Cropland-HEL-Rotation 2

Acres	Description	Resource Problems
Included in TU#4	**Irrigated cropland and pasture that is highly erodible with a potato-grain-grain rotation.** Labenzo silt loam, Withers silty clay loam Soils are wind-deposited silt loams, moderately drained soils, slope 0 to 1%.	Irrigation induced erosion as well as natural water and wind erosion, sediment and nutrient (fertilizer) transport from cropland during runoff, sediment and nutrient transport into streams from canal point sources, nutrient leaching into groundwater sources

Treatment Unit #6 – Irrigated Cropland-HEL-Rotation 3

Acres	Description	Resource Problems
Included in TU#4	**Irrigated cropland and pasture that is highly erodible with a potato-grain-grain-grain rotation.** Labenzo silt loam, Withers silty clay loam Soils are wind-deposited silt loams, moderately drained soils, slope 0 to 1%.	Irrigation induced erosion as well as natural water and wind erosion, sediment and nutrient (fertilizer) transport from cropland during runoff, sediment and nutrient transport into streams from canal point sources, nutrient leaching into groundwater sources

Treatment Unit #7 - Dry Cropland-HEL

Acres	Description	Resource Problems
8,912	**Dry cropland and pasture that is highly erodible with an annual grain rotation.** Rexburg silt loam Soils are deep, wind-deposited silt loams with flat to sloping uplands, slope 1-4%.	Sheet, rill, ephemeral gully, and gully erosion, sediment and nutrient transport during runoff

Treatment Unit #8 – Animal Facilities

No.	Description	Resource Problems
3	**Domestic and wildlife animal facilities located along streambanks.** See soils described under Treatment Unit #1.	Bacteria, sediment, and nutrient transport into streams, loss of riparian vegetation, loss of domestic and wildlife habitat for shade, etc., lack of drinking water sources

Treatment

Summary of Madison SWCD Priorities (ISCC 2006)

Madison County SWCD fiscal year 2007 priorities are as follows:

1. Water Quality
2. Water Resources
3. Riparian, Wetlands
4. Animal Waste Management
5. Vegetative Management
6. Information & Education
7. Cropland

Summary of Yellowstone SCD Priorities (ISCC 2006)

Yellowstone County SWCD fiscal year 2007 priorities are as follows:

1. Water Quality
2. District Operations
3. Soils
4. Information & Education
5. Rangeland

Conservation Planning

Past implementation efforts and a long history of conservation in the subbasin 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 based on cost, difficulty, maintenance, and durability. Contracts are created to schedule BMP installation after the contract has been finalized.

Description of Alternatives

The basic consideration for developing alternative methods of treatment was to maintain or enhance the water quality of Moody Creek and N.F. Teton River and its tributaries by reducing the amount of nutrients and sediment entering the system.

Implementation alternatives were developed that focused on the identified treatment units. Three alternatives have been outlined in this implementation plan for application on private land:

1. No Action - Future without Project Action-no new projects, maintain existing projects
2. Non-structural - Future with Project Action-technical assistance
3. Structural and Non-structural - Future with Project Action-technical and financial aid

The goals of these alternatives are to address agricultural nonpoint source pollution control on critical acres.

Alternative Selection/Priority Ranking

The eight treatment units, described above, will be used to implement BMPs. This agricultural implementation plan recommends using alternative 3, structural and non-structural methods, to address the resource concerns in the proposed subwatersheds.

Critical areas with the potential for more direct effects on §303(d) listed streams should be considered the highest priority. Therefore, treatment units #1-#3 and #8 should be addressed first. As shown by the MSWCD and YSCD priorities, water quality ranks as the highest concern for both of these districts. Addressing resource concerns in the above treatment units should have the most immediate impacts on water quality. Although irrigated cropland and dry cropland comprise a larger portion of the watershed, a considerable amount of the land, 36% and 35%, has already been enrolled in CRP and EQIP programs in these treatment units (#4-#7). Conservation efforts, such as conservation cover, irrigation efficiency measures, and water and sediment control basins should be continued and expanded upon whenever possible. Potential sources of erosion and runoff from irrigated and dryland cropland should be identified and treated.

BMP Implementation

The proposed treatment for nutrient and sediment reduction is to implement BMPs through Resource Management System (RMS) conservation plans in treatment units within each subwatershed. Table 14 provides examples of BMPs that may be used as well as each BMPs effect on resources.

Table 14. 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
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
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
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

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. The following programs may be available to assist landowners and local organizations with technical and financial assistance. Many of these programs could be used in combination with each other to implement BMPs

CWA 319 projects refer to section 319 of the Clean Water Act. These are Environmental Protection Agency funds that are allocated to states. The Idaho Department of Environmental Quality has primacy to administer the Clean Water Act §319 Non-point Source Management Program. Funds focus on projects to improve water quality and are usually related to the TMDL process. Source: Idaho Department of Environmental Quality.

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

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

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

Agricultural Management Assistance (AMA): AMA provides cost-share assistance to agricultural producers for constructing or improving water management structures or irrigation structures; planting trees for windbreaks or to improve water quality; and mitigating risk through production diversification or resource conservation practices, including soil erosion control, integrated pest management, or transition to organic farming. Administered by the NRCS. http://www.nrcs.usda.gov/programs/ama/

Conservation Reserve Program (CRP): CRP is a land retirement program for blocks of land or strips of land that protect the soil and water resources, such as buffers and grassed waterways. Administered by the NRCS. http://www.nrcs.usda.gov/programs/crp/

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

Environmental Quality Incentives Program (EQIP): EQIP offers cost-share and incentive payments and technical help to assist eligible participants in installing or implementing structural and management practices on eligible agricultural land. Administered by the NRCS. http://www.nrcs.usda.gov/programs/eqip/

Wetlands Reserve Program (WRP): WRP is a voluntary program offering landowners the opportunity to protect, restore, and enhance wetlands on their property. Easements and restoration payments are offered as part of the program. Administered by the NRCS. http://www.nrcs.usda.gov/programs/wrp/

Wildlife Habitat Incentives Program (WHIP): WHIP is a voluntary program for people who want to develop and improve wildlife habitat primarily on private land. Cost-share payments for construction or re-establishment of wetlands may be included. Administered by the NRCS. http://www.nrcs.usda.gov/programs/whip/

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

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

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

GLCI Grazing Land Conservation Initiative mission is to provide high quality technical assistance on privately owned grazing lands on a voluntary basis and to increase the awareness of the importance of grazing land resources. http://www.glci.org/

Stewardship projects The U.S. Army Corps of Engineers conducts these projects to improve wildlife habitat. Source: US Army Corps of Engineers.

NOAA Restoration Center Community-Based Restoration Funding source for habitat restoration for listed species. Source: NOAA

Research/supplementation Idaho Department of Fish and Game, and U.S. Fish and Wildlife Service work. Source: Bonneville Power Administration.

New RME Estimated for actions to address data gaps and research needs. Source: Idaho Department of Fish and Game.

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 $9,833,441 million for the Lower Teton River Subbasin. This estimate is based on the critical acres in each watershed listed in Table 13 and then applied to BMP cost-share lists (NRCS 2006). Estimated BMP installation costs were compiled from each watershed listed in the appendices. The figures presented in Table 15 were derived by summing the implementation, administrative, and technical costs for each watershed (Appendices A and B).

Table 15. Estimated Costs for TMDL Agricultural BMPs in the Lower Teton River Subbasin

Watershed or Subwatershed	TU #1 Riparian Corridors-Streambank Cost	TU #2 Riparian Corridors / Rangelands Cost	TU #3 Riparian and Upland Areas Cost	TU#4-#6 Irrigated Cropland Cost	TU #7 Dry Cropland Cost	TU #8 Animal Facilities Cost	Watershed or Subwatershed Total Cost
Moody Creek	$15,022	$102,185	$28,820	$6,099,021	$209,048	$31,601	$6,485,697
North Fork Teton River	$938,460	$549,721	$3,900	$185,155	$0	$31,601	$1,708,837
BMP Subtotal	$953,482	$651,906	$32,720	$6,284,176	$209,048	$63,202	$8,194,534
Administration & Technical (20% of BMPs)	$190,696	$130,381	$6,544	$1,256,835	$41,810	$12,640	$1,638,907
Lower Teton River Subbasin Total	$1,144,178	$782,287	$39,264	$7,541,011	$250,858	$75,842	$9,833,441

Information and Outreach

The conservation partnership (MSWCD, YSC, 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 collected water quality samples in the Lower Teton River Subbasin from April 2001 to December 2004. Most samples were taken biweekly throughout the growing season (April to October) and monthly through the rest of the year (November to March) (Fischer 2004). The water quality monitoring sites located on Moody Creek (Figure 5) were selected with the assistance of the NRCS and the Madison Soil and Water Conservation District. The sites were chosen to best identify the general impacts to Moody Creek. 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, water temperature, total dissolved solids, and stream flow was measured. In addition, water samples were collected and analyzed for total suspended solids, total nitrate and nitrite, and total phosphorus at each monitoring site. For more detailed information regarding the IASCD water quality monitoring program reference the Final Moody Creek Water Quality Monitoring Report 2004 (Jenkins 2005).

Monitoring of the Lower Teton River Subbasin involved many different agencies. The Madison SWCD, 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:

- Evaluate the impact of agricultural activities and rangeland on Moody Creek
- Evaluate the water quality and discharge rates within Moody Creek below the TNF boundary
- Identify areas of concern for implementation of best management practices
- Use this data to increase public awareness

BMP Operation and Maintenance

After contracted BMPs have been installed, MSWCD, YSCD, 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 Effectiveness 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.

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APPENDIX A

Moody 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 Moody Creek.

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 nutrient (total phosphorus and nitrogen) loading to Moody Creek.

Project Setting

For the purpose of this implementation plan, the Moody Creek watershed will be divided into four subwatersheds (Figure A-1), Dry Canyon (central), Long Hollow (east), Parkinson (west), and South Fork Moody Creek (south). Dry Canyon, Long Hollow, and Parkinson subwatersheds will be used for implementation of BMPs. The South Fork Moody Creek subwatershed will be excluded from the remainder of the agricultural implementation plan since it does not contain private land. The Moody Creek watershed encompasses 47,211 acres or 76 square miles in Idaho. There are 37,611 acres of private land, 11,816 acres managed by the IDL, and 16,531 acres managed by the CTNF. Cropland is the major private land use in the watershed totaling 57 % of the acres as shown in Table A-1.

The watershed is in the western part of the Lower Teton River Subbasin as shown in Figure 6. The watershed is bounded on the east and south by the Big Hole Mountains, on the north by the Teton River and Fremont County, and on the west by the Henry's Fork and Snake River. Elevations in Moody Creek range from 5,500 feet near the confluence of the North and South Forks of Moody Creek to 4,920 feet near the start of the stream at the Woodmansee Johnson Canal. The North and South Forks of Moody Creek are the located in the CTNF and have several tributaries. Dry Canyon and Long Hollow are the main intermittent drainages that enter Moody Creek. Moody Creek is confined in a steep walled basalt canyon for a majority of its length. There is very limited access to the creek from the confluence of the N. and S. Forks Moody Creek to Woods Crossing.

Table A-1. Private Land Uses in the Moody Creek watershed

Land Use	Acres	Percent of Total
Cropland and Pasture	31,685	82
Forest	1,130	3
Rangeland	3,693	10
Riparian	656	2
Roads	1,258	3
Total	**38,422**	**100**

Problem Statement

Beneficial Use Status

IDEQ designated beneficial uses on rivers, creeks, lakes and reservoirs to meet the requirements of the federal Clean Water Act. Moody Creek is on the state of Idaho's §303(d) list of water quality impaired water bodies (IDEQ, 1998) and it is listed for nutrients from confluence of the

North and South Forks of Moody Creek to the confluence with the Woodmansee Johnson Canal before it enters the South Fork Teton River, which is approximately 20 miles in length. The 2003 Subbasin Assesment and TMDL states that the pollutants, sediment and temperature, will be added to Idaho's 2002 §303(d) list. Other agencies also agree that sediment is a pollutant of concern for Moody Creek (IASCD 2006, IDFG 2000). Beneficial uses that are designated for Moody Creek include cold water aquatic life, salmonid spawning, agricultural water supply, industrial water supply, and wildlife habitat. These beneficial uses are not fully supported (IDEQ 2003).

Pollutants of Concern

The Teton Subbasin Assessment and TMDL specified that nutrients were the pollutant(s) of concern in Moody Creek.

Identified Problems

AFO/CAFO operations, irrigation return flow, and heavy animal use areas are contributing nutrients to Moody Creek and may be treated for sediment and nutrients to work towards meeting TMDL requirements. AFO/CAFO operations in the Parkinson subwatershed are contributing sediment and nutrients to Moody Creek. Grazed rangeland and riparian corridors in the Dry Canyon subwatershed are contributing sediment and nutrients to Moody Creek. A 50-100 ft section of eroded bank at the confluence of the Enterprise Canal and Moody Creek, is contributing sediment to Moody Creek (personal observation, Pappani 2006).

Water Quality Monitoring Results

IASCD, in cooperation with MSWCD and ISDA, conducted integrated water quality sampling on Moody Creek at fixed intervals during the 2001, 2002, 2003, and 2004 field seasons. Monitoring data from these four field seasons indicated that Moody Creek exceeded the TMDL target for total suspended solids (TSS), total nitrate and nitrite, and total phosphorus as shown in Table A-4 (Jenkins 2005). Calculated target load values were used to determine the following percent reduction required for total suspended solids and nutrients to meet the TMDL target.

Table A-4. TSS Loads for Moody Creek

Monitoring Site	Average TSS Load (tons/day)	Average TSS Load @ TSS^{50} Target (tons/day)	Average TSS %Reduction	TSS Target Exceedance
Moody Creek Site 1	1.438	1.081	25	3
Moody Creek Site 3	5.732	1.847	68	12
Moody Creek Site 4	3.208	1.416	56	11
Moody Creek Site Upper	0.874	0.874	0	0

Table A-5. Total Nitrate and Nitrite Loads for Moody Creek

Monitoring Site	Average NO^2+NO^3 Load (lbs/day)	Average NO^2+NO^3 Load @ NO^2+NO^3 Target (lbs/day)	Average NO^2+NO^3 Reduction	NO^2+NO^3 Target Exceedance
Moody Creek Site 1	31.775	10.536	67	20
Moody Creek Site 3	44.082	15.357	65	24

Moody Creek Site 4	50.108	18.488	63	30
Upper Moody Creek Site	47.531	16.261	66	21

Table A-6. Total Phosphorus Loads for Moody Creek

Monitoring Site	Average TP Load (lbs/day)	Average TP Load @ TP^{50} Target (lbs/day)	Average TP Reduction	TP Target Exceedance
Moody Creek Site 1	4.825	4.367	9	7
Moody Creek Site 3	12.278	6.467	47	12
Moody Creek Site 4	8.524	5.557	35	12
Upper Moody Creek Site	3.957	3.957	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. Critical acres in the Moody Creek watershed total 15,874 acres and are defined as private land minus all treated acres and excluding urban development and roads. In order to allocate available resources more effectively, implementation should be focused toward the treatment units shown in Table A-7.

Table A-7. Critical Acres in the Moody Creek watershed

Watershed or Subwatershed	TU #1 Riparian Corridors-Streambank	TU #2 Riparian Corridors / Rangelands	TU #3 Riparian and Upland Areas	TU#4-#6 Irrigated Cropland	TU #7 Dry Cropland	TU #8 Animal Facilities	Watershed or Subwatershed Total Acres
Dry Canyon	0	9	91	391	5,982	0	**6,473**
Long Hollow	0	0	0	1,023	2,654	0	**3,677**
Parkinson	57	15	171	5,205	276	1 no.	**5,724**
TU Total Acres	**57**	**24**	**262**	**6,619**	**8,912**	**1 no.**	**15,874**

Estimated BMP Implementation Costs

The proposed treatment for agricultural pollutant reduction will be to implement BMPs through conservation plans. Table A-8 lists the costs to install BMPs that may be used to restore beneficial uses for Moody Creek.

Table A-8. Estimated BMP Installation Costs for the Moody Creek Watershed

Treatment Unit	C/S Funds	Participant Funds	Total Funds
Treatment Unit # 1 Riparian Corridors-Streambanks	$7,511	$7,511	$15,022
Treatment Unit # 2 Riparian Corridors/ Rangelands	$56,713	$45,472	$102,185
Treatment Unit # 3 Riparian and Upland Areas	$18,340	$10,480	$28,820
Treatment Unit # 4-#6 Irrigated Cropland	$3,430,218	$2,668,803	$6,099,021
Treatment Unit # 7 Dry Cropland	$136,743	$72,305	$209,048
Treatment Unit #8 Animal Facilities	$18,385	$13,216	$31,601

APPENDIX B

North Fork Teton River 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 North Fork Teton River.

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 nutrients (total phosphorus and nitrate) to the North Fork Teton River.

Project Setting

For the purpose of this implementation plan, the North Fork Teton River watershed encompasses the 12^{th} level HUC watershed, Lower Teton River. The North Fork Teton River watershed covers 22,945 acres or approximately 37 square miles in Idaho. There are 22,941 acres of private land and 4 acres managed by BLM. Cropland is the major private land use in the watershed totaling 92 % of the private land acres shown in Table B-1. Crops grown in this watershed include hay-grain-pasture rotations with only a few potato operations below the city of Teton (NRCS, personal communication Cleve Bagley and Ken Beckman 2006).

The watershed is in the northeastern part of the Lower Teton River Subbasin as shown in Figure 6. The watershed is bounded on the east by Moody Creek, on the north and west by the Henry's Fork, and on the south by the S. Fork Teton River. The North Fork Teton River and South Fork Teton River split from the mainstem Teton River north of the city of Teton and flow into the Henrys Fork River. A majority of the N.F. Teton River is channelized with several diversions for irrigation. Elevations in N. Fork Teton River watershed range from 4,940 feet near the confluence of the N. F. and S. F. Teton River and 4,850 feet near the confluence of the N. F. Teton River and the Henry's Fork.

Table B-1. Private Land Uses in the North Fork Teton River Watershed

Land Use	Acres	Percent of Total
Cropland and Pasture	21,214	92.4
Forest	26	0.1
Mines & Gravel Pits	166	0.7
Riparian	229	1
Roads	605	2.6
Urban	620	2.7
Water	35	0.2
Wetland	79	0.3
Total	**22,974**	**100**

Problem Statement

Beneficial Use Status

IDEQ designated beneficial uses on rivers, creeks, lakes and reservoirs to meet the requirements of the federal Clean Water Act. The N. F. Teton River is on the State of Idaho 1998 §303(d) list of water quality impaired water bodies (IDEQ 1998) and is listed for sediment and nutrients from the Forks to Henrys Fork of the Snake River, which is approximately 9 miles in length.

Beneficial uses that are designated for N. F. Teton River include cold water aquatic life, salmonid spawning, secondary contact recreation, agricultural water supply, industrial water supply, and wildlife habitat.

Pollutants of Concern

The Teton Subbasin Assessment and TMDL specified that sediment and nutrients were the pollutants of concern in the North Fork Teton River. Current sediment loading is estimated at 3,336 tons per year (USDA 1992). A recommended reduction in sediment loading using Alternative 3 would theoretically yield 949 tons per year (72 % reduction) for the N. F. Teton River (USDA 1992).

Identified Problems

Streambank restoration occurred on the N. F. Teton River after the Teton Dam collapse and subsequent flood, however, streambank protection, such as rock and riparian woody vegetation is still the main priority for this watershed. A couple of AFO/CAFO operations exist along the N.F. Teton River and are contributing nutrients and sediment to the stream.

Water Quality Monitoring Results

IASCD did not conduct water quality monitoring on the N. F. Teton River.

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. Critical acres in the North Fork Teton River watershed total 2,782 acres and are defined as private land minus all treated acres and excluding urban development, mines and gravel pits, and roads. In order to allocate available resources more effectively, implementation should be focused toward the treatment units shown in Table B-7.

Table B-7. Critical Areas in the North Fork Teton River watershed

Watershed or Subwatershed	TU #1 Riparian Corridors-Streambank	TU #2 Riparian Corridors / Rangelands	TU #3 Riparian and Upland Areas	TU#4-#6 Irrigated Cropland	TU #7 Dry Cropland	TU #8 Animal Facilities	Watershed or Subwatershed Total Acres
North Fork Teton River	157	72	130	2,423	0	2 no.	**2,782**

Estimated BMP Implementation Costs

The proposed treatment for pollutant reduction will be to implement BMPs through conservation plans. Table B-8 lists the costs to install BMPs that may be used to restore beneficial uses in the N. Fork Teton River watershed.

Table B-8. Estimated BMP Installation Costs for the North Fork Teton River watershed

Treatment Unit	C/S Funds	Participant Funds	Total Funds
Treatment Unit # 1 Riparian Corridors-Streambanks	$469,230	$469,230	$938,460
Treatment Unit # 2 Riparian Corridors/ Rangelands	$329,851	$219,870	$549,721
Treatment Unit # 3 Riparian and Upland Areas	$3,900	$0	$3,900
Treatment Unit #4-#6 Irrigated Cropland	$175,155	$10,000	$185,155
Treatment Unit # 7 Dry Cropland/Pasture-	$0	$0	$0
Treatment Unit #8 Animal Facilities	$18,385	$13,216	$31,601