Lower Bear / Malad Subbasin

(Malad)

Agricultural TMDL Implementation Plan

Developed for the

Idaho Department of Environmental Quality

Prepared by

Steven Smith

Idaho Soil Conservation Commission

In Cooperation with the

Oneida Soil and Water Conservation District

USDA-Natural Resources Conservation Service

May 2010

INTRODUCTION **3**
PURPOSE 3
GOALS AND OBJECTIVES 3
BACKGROUND **3**
PROJECT SETTING 3
WATERSHEDS 4
TOPOGRAPHY 4
CLIMATE 4
LAND OWNERSHIP 8
LAND USE 8
WATER USE 11
ACCOMPLISHMENTS 11
WATER QUALITY PROBLEMS **12**
BENEFICIAL USE STATUS 12
POLLUTANTS OF CONCERN 12
PAST WATER QUALITY MONITORING 13
IDENTIFIED PROBLEMS 13
AGRICULTURAL WATER QUALITY MONITORING AND EVALUATION **13**
RIPARIAN 13
CROP AND PASTURE LANDS 13
RANGE LAND 14
ANIMAL FACILITY WASTE MANAGEMENT 15
THREATENED AND ENDANGERED SPECIES 15
TREATMENT **16**
CRITICAL AREAS 16
TIERS 16
TREATMENT UNITS 16
RIPARIAN 16
CROPLAND 16
RANGELAND 17
ANIMAL FACILITY WASTE MANAGEMENT 17
IMPLEMENTATION PRIORITY **17**
IMPLEMENTATION ALTERNATIVES 17
DESCRIPTION OF ALTERNATIVES 17
ALTERNATIVE SELECTION 18
ESTIMATED BMP IMPLEMENTATION COSTS 18
FUNDING **19**
OUTREACH **21**
MONITORING AND EVALUATION **22**
FIELD LEVEL 22
WATERSHED LEVEL 22
REFERENCES **23**
ABBREVIATIONS **24**

Introduction

Purpose

The purpose of this plan is to recommend Best Management Practices (BMPs) that would improve or restore physical and biological functions of Deep Creek, Devil Creek, Elkhorn Creek, Little Malad River, Malad River, and Samaria Creek (Figure 1).

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

Goals and Objectives

The goal of this implementation plan is to restore beneficial uses on §303(d) listed stream segments of Deep Creek, Devil Creek, Elkhorn Creek, Little Malad River, Malad River, and Samaria Creek (Table 1). The objectives of this plan are to identify critical areas along the listed stream segments and to recommend BMPs for reducing sediment and nutrient loading into §303(d) listed water bodies.

Background

Project Setting

The Agriculture TMDL Implementation Plan for the Lower Bear – Malad subbasin, HUC 16010204, (Figure 1) has been divided into two sections due to local similarities; these are the Upper Daniels and Malad. The Upper Daniels is shown on the map for location purposes only. The Upper Daniels Implementation Plan, which includes Dairy Creek, Indian Mill Creek, Hill Creek, Little Malad River, and Wrights Creek was written (Evans, B., 2007) and submitted separately. Streams listed in the Upper Daniels Implementation Plan flow into Daniels Reservoir and the OSWCD has implemented State Agriculture Water Quality Program (SAWQP) projects in these watersheds above Daniels Reservoir.

This implementation plan will cover the remaining §303(d) listed streams in the Lower Bear / Malad subbasin. This plan covers that area of the Lower Bear – Malad subbasin between Daniels Reservoir and the Utah state line. These streams include the Deep Creek, Devil Creek, Elkhorn Creek, Little Malad River, Malad River, and Samaria Creek (Table 1).

These streams provide a great economic benefit to the people of Oneida County, by providing recreation, irrigation water and scenic beauty to the area.

For more background information regarding historical and physical characteristics of this subbasin, please consult the Bear River/Malad River Subbasin Assessment (SBA) and Total Maximum Daily Load (TMDL) (IDEQ 2006).

Table 1. §303(d) listed streams in the Lower Bear / Malad Subbasin.

Stream Name	Description	Listed Pollutants
Deep Creek	Headwaters to mouth	Unknown
Devil Creek	Devil Creek Reservoir to Malad River	Nutrients, Sediment
Elkhorn Creek	U.S. Forest Service boundary to Little Malad River	Unknown
Little Malad River	Headwaters to Malad River	Sediment
Malad River	Headwaters to Utah state line	Sediment
Samaria Creek	Headwaters to Malad River	Nutrients, Sediment

Watersheds

This agriculture TMDL implementation plan for the Lower Bear / Malad subbasin will be divided into 6 watersheds (Figure 2). Each of these watersheds will be planned around a §303d listed stream segment. Thus the watershed and the stream have the same name; this will simplify the planning for each stream. It will also allow for planning and implementation to be documented and associated with a particular stream.

Topography

Deep Creek, Devil Creek, Elkhorn Creek, Little Malad River, Malad River, and Samaria Creek watersheds have a varied topography including: mountains, foothills, stream terraces, alluvial fans, and valley plains. The mountains surrounding the Malad Valley are the Malad Range, Bannock Range, Pleasantview Hills, and Samaria Mountains. The Malad Range comprises the eastern portion, with the Bannock Range to the north and northeast. The western edge includes the Pleasantview Hills and the Samaria Hills. Most of the perennial streams in the Lower Bear / Malad subbasin originate in the Bannock Range. Intermittent streams are found in the other ranges and hills. With so many intermittent streams in the HUC, there is likely underground flow which could account for the many springs in the valley bottoms. An interesting feature in the Malad Valley is the many artesian wells throughout the valley floor.

Climate

The watersheds are located in the Intermountain Region of the Rocky Mountains that is characterized by cold, snowy winters and hot, dry summers. Average annual precipitation, most of which accumulates as snow during the winter, ranges from about 8 inches in the valleys to over 35 inches in the mountains (Figure 3). The frost-free period varies from 70 to 140 days (NRCS, 2007). The last frost in the spring can occur as late as May and the first frost can be as early as September. Temperatures range from minus 10°F in winter to 90°F in summer (City-Data, 2008).

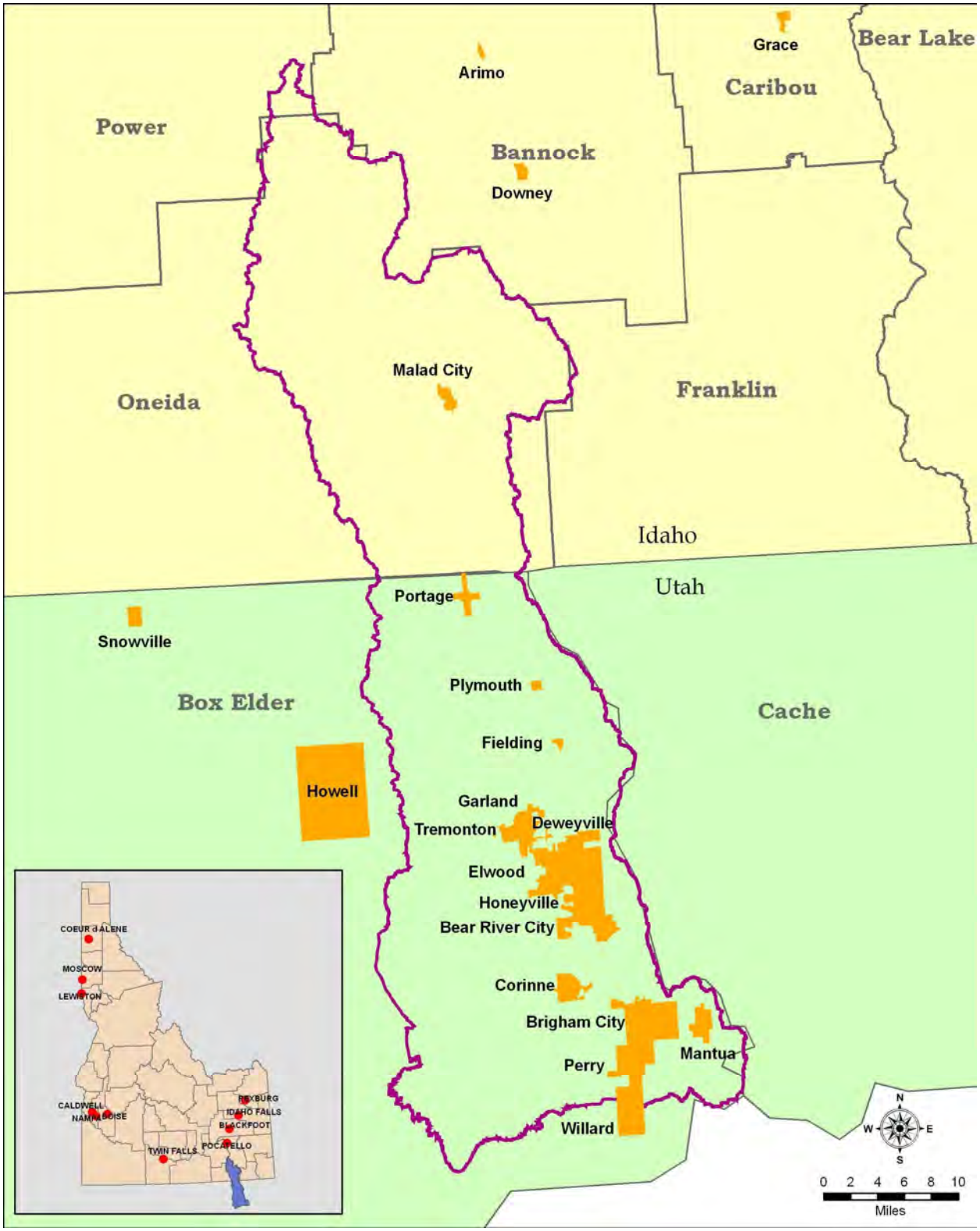

Figure 1. General location of the Lower Bear / Malad Subbasin (NRCS 2007).

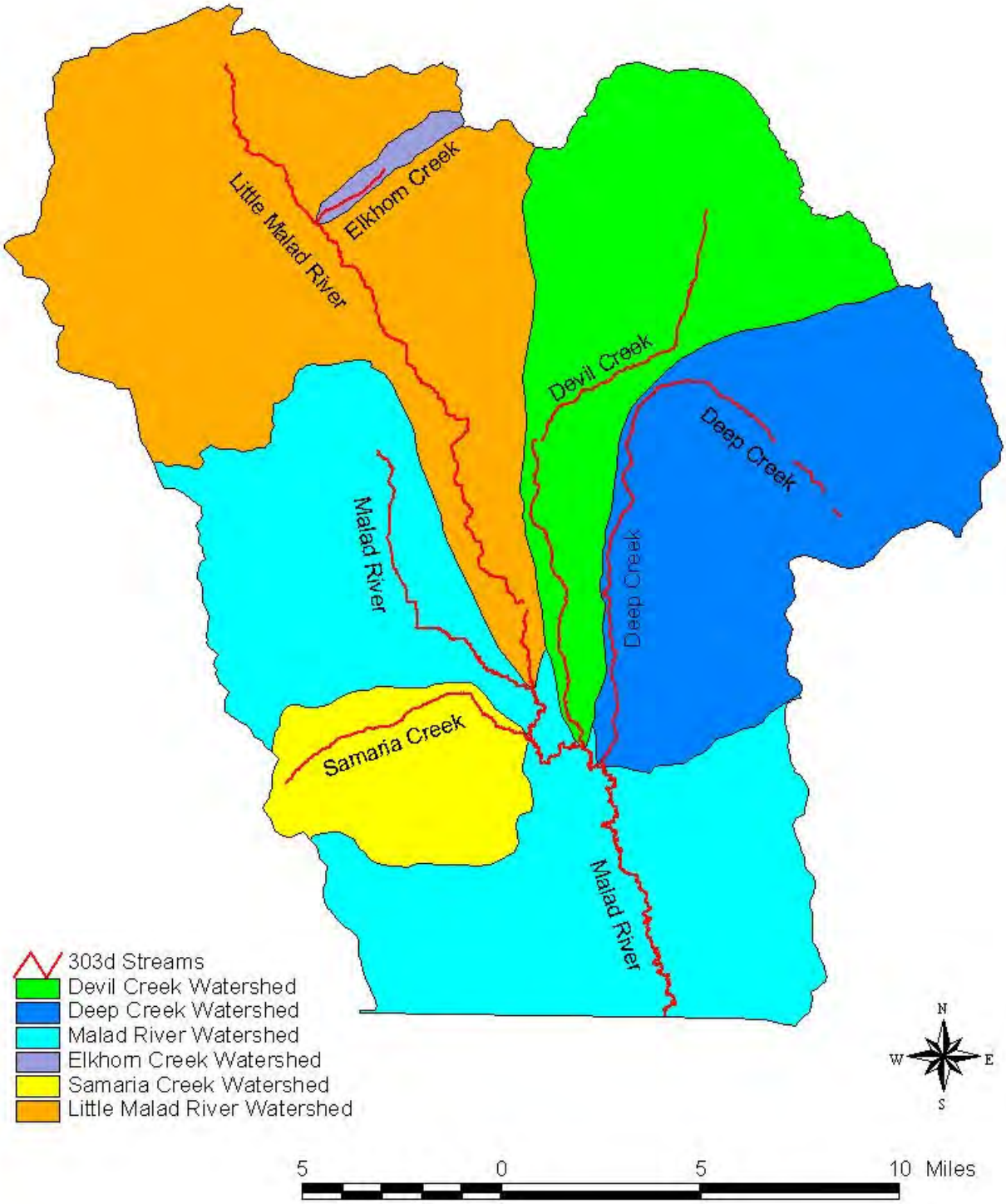

Figure 2. Watersheds in the Lower Bear / Malad Subbasin

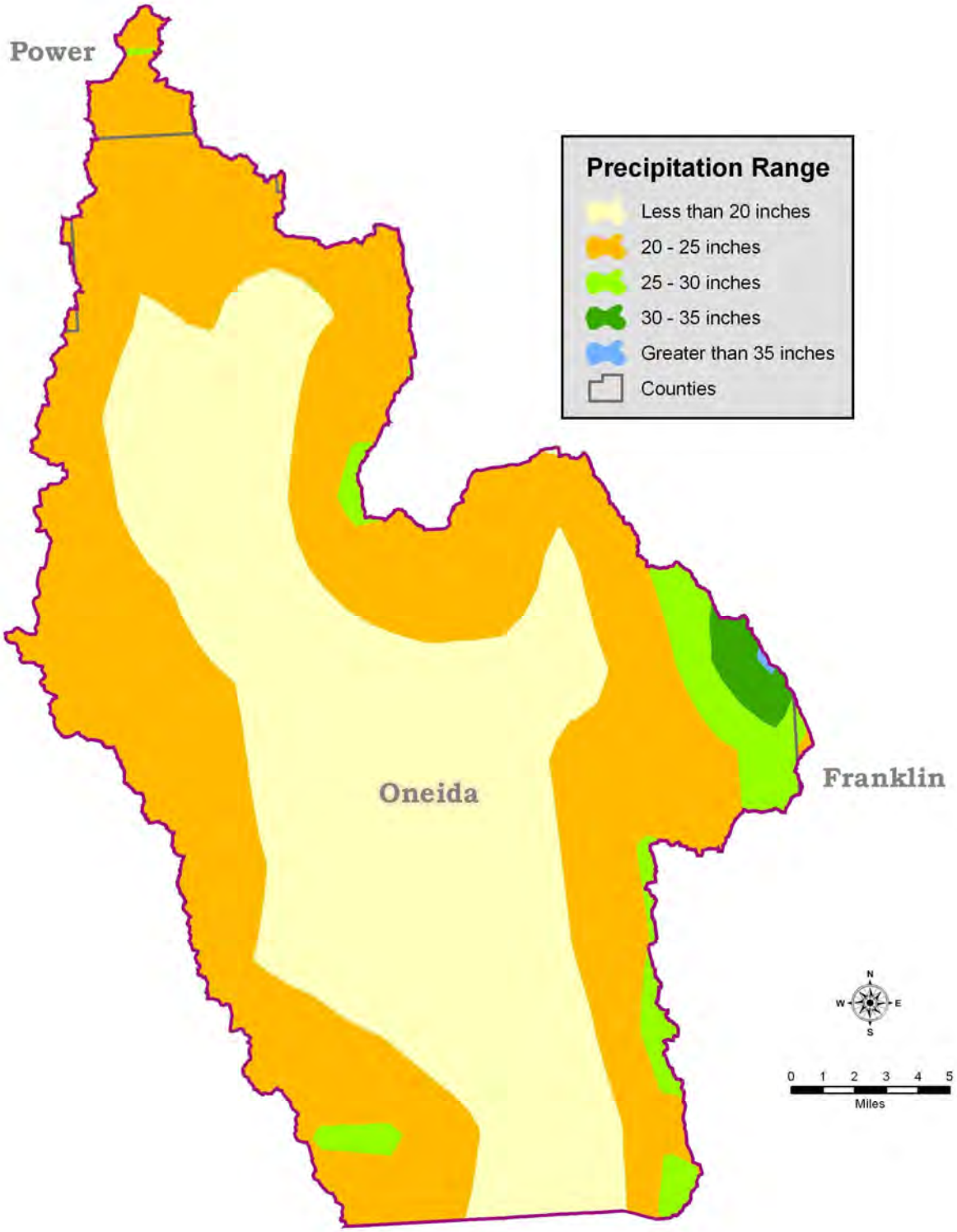

Figure 3. Precipitation in the Lower Bear / Malad Subbasin (NRCS 2007).

Land Ownership

There are approximately 139,727 acres of private land (Table 2) and 115,501 acres of land managed by Idaho Department of Lands (IDL), Bureau Land Management (BLM), and Caribou Targhee National Forest (CTNF). 522 acres of open water exist in the Lower Bear / Malad subbasin (Figure 4).

Table 2. Land Ownership

Land Owners / Managers	Acres	% of Subbasin
Private Land	139,727	54.6
State of Idaho	6,074	2.4
Open water	522	0.2
B.L.M.	57,693	22.6
U.S. Forest Service	51,734	20.2
Total	255,750	100

Land Use

Land use in the Lower Bear / Malad subbasin is widely varied from recreation, urban, rangeland, dry and irrigated cropland, irrigated pastures, and summer homes or ranchettes (Table 3). Recreation is centered on and around the reservoirs and streams and the adjacent mountain ranges. Ranchettes are becoming very common along Deep Creek, Devil Creek, Little Malad River, and Malad River.

Dry cropland is located in the uplands above the irrigation canal systems with typical crops of hay and small grain. Irrigated cropland is located between the irrigation canals and the streams in flat areas these have hay, grain or grass pasture in the rotations (Figure 5).

Table 3. Private Land Uses in the Lower Bear / Malad Subbasin

Land Use	Acres	% of Subbasin
Irrigated Cropland	33,280	23.8
Dry Cropland	44,994	32.2
Range Land	54,758	39.2
Roads / Urban	6,014	4.3
Rivers & Creeks / Riparian	681	0.5
Total	139,727	100

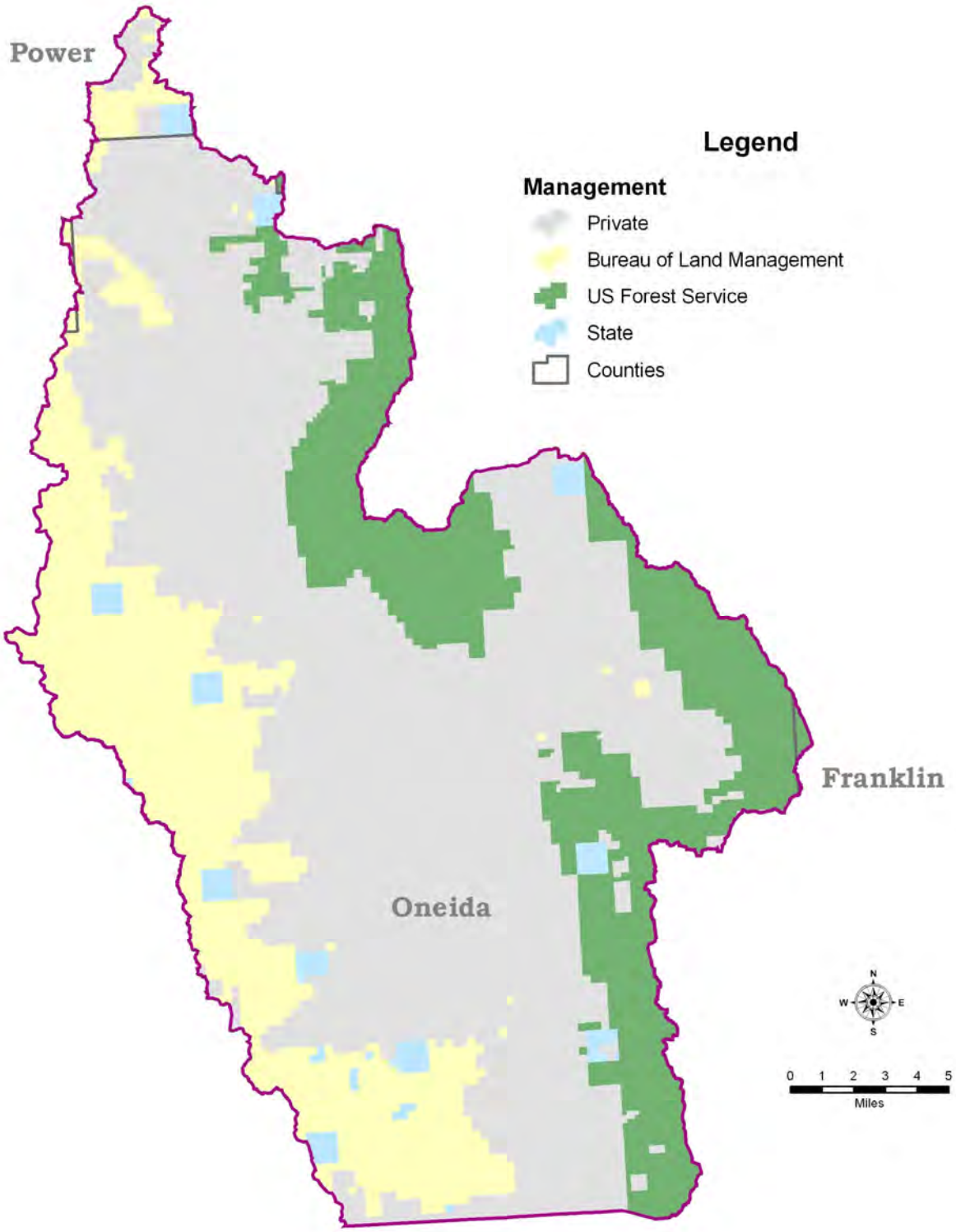

Figure 4. Land Ownership in the Lower Bear / Malad Subbasin (NRCS 2007).

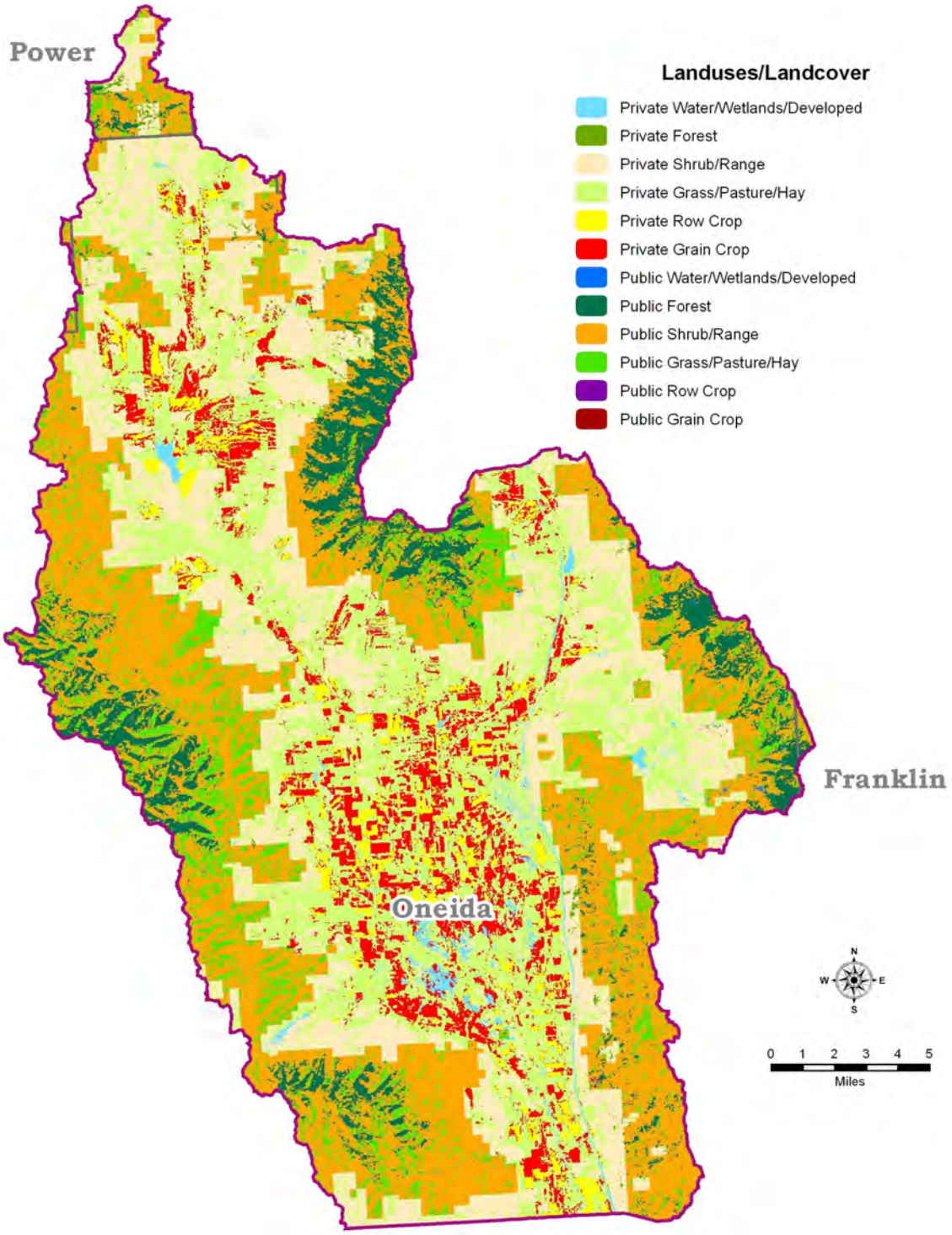

Figure 5. Land use in the Lower Bear / Malad Subbasin (NRCS 2007).

Water Use

There are four irrigation systems which cover the majority of the Malad Valley: Deep Creek Irrigation serving about 3,000 acres, Malad Valley Irrigation serving about 4,370 acres, Samaria Water Irrigation serving about 2,400 acres, and St. John Irrigation serving 3,685 acres. There are four other small irrigation companies which combined serve about 1,536 acres of the watershed.

All of the major irrigation companies have water storage reservoirs which allow them to irrigate throughout the summer. These storage reservoirs are Daniels, Deep Creek, Devil Creek, and Pleasantview. Daniels Reservoir supplies water to the St. John Irrigation system via the little Malad River channel. Deep Creek Reservoir stores water from Deep Creek which is then released throughout the irrigation season. This system was one of the first in Idaho to convert all the canals to a gravity pipe system. Throughout the years it has paid for its self by allowing the irrigators to reduce the water loss in the canals this has allowed longer irrigation seasons resulting in better crops. Devil Creek Reservoir supplies water to the Malad Valley Irrigation Company which covers the area west of Deep Creek and east of St. John Irrigation.

Accomplishments

The OSWCD has used the Conservation Improvement Grant (CIG) funded by the ISCC to implement containment of animal feed operations and improve irrigation systems. The Natural Resource Conservation Service (NRCS) has used the Environmental Quality Incentives Program (EQIP) and other programs to implement projects along Deep Creek, Devil Creek, Elkhorn Creek, Little Malad River, Malad River, and Samaria Creek. The practices administered by NRCS for fiscal years 2004, 2005, and 2006 are summarized in a Rapid Watershed Assessment for the Lower Bear / Malad subbasin (NRCS, 2007). The practices administrated by the OSWCD from 2000 to 2008 are summarized in Table 4.

Table 4. Completed BMPs and Costs in the Lower Bear - Malad Subbasin

Program	Practice	Amount	Cost Share	Land Owner	Other Monies	Total
CIG	Fence	1,152 ft	$10,276	$8,611	$0	$18,887
CIG	Pipeline	4,800 ft	$4,288	$3,658	$1,641	$9,588
CIG	Pumping Plant	4 ea	$11,947	$11,940	$3,505	$27,392
CIG	Watering facility (Troughs)	12 ea	$18,957	$27,371	$9,215	$55,544
CIG	Well	1,540 ft	$13,418	$13,456	$21,421	$48,295
CIG	Heavy Use Protection area	2 ea	$0	$3,620	$0	$3,620
CIG	Waste Storage Facility	1 ea	$1,000	$2,490	$10,469	$13,959
CIG	Irrigation High Pressure Pipeline	12,185 ft	$1,500	$18,389	$60,365	$80,255
CIG	Irrigation Low Pressure Pipeline	7,810 ft	$21,043	$20,969	$39,375	$81,387
CIG	Structure for Water Control	6 ea	$6,087	$6,087	$4,935	$17,109
CIG	Irrigation System, Sprinkler	362 ac	$39,437	$67,485	$134,279	$241,200
		Total	$127,953	$184,076	$285,205	$597,234

Water Quality Problems

Beneficial Use Status

The Idaho Department of Environmental Quality (IDEQ) designates beneficial uses on rivers, creeks, lakes, and reservoirs to meet the requirements of the Federal Clean Water Act. Deep Creek, Devil Creek, Elkhorn Creek, Little Malad River, Malad River, and Samaria Creek (Table 5) are listed on the State of Idaho's §303(d) list of water quality impaired water bodies (IDEQ, 1998). Samaria Creek had less than one cfs when the BURP crew attempted to assess the stream; this was due to natural conditions. Because BURP is designed for perennial flowing streams with greater than one cfs, beneficial uses could not be determined and Samaria Creek is recommended to be delisted for nutrients and sediment (IDEQ, 2006).

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

	Beneficial Uses								
Stream	CWAL	SS	PCR	SCR	DWS	AWS	IWS	WH	AESTHETICS
Deep Creek	Impaired	n/a	n/a	X	n/a	X	X	X	X
Devil Creek	Impaired	n/a	n/a	X	n/a	X	X	X	X
Elkhorn Creek	Impaired	n/a	n/a	X	n/a	X	X	X	X
Little Malad River	Impaired	n/a	X	n/a	n/a	X	X	X	X
Malad River	Impaired	n/a	X	n/a	X	X	X	X	X
Samaria Creek	n/a(1)	n/a	n/a	X	n/a	X	X	X	X

X = stream is meeting beneficial uses, n/a = not a beneficial use for this stream,
n/a (1) intermittent stream so cold water aquatic life does not apply (IDEQ, 2006).
CWAL-Cold Water Aquatic Life, SS-Salmonid Spawning, PCR-Primary Contact Recreation, SCR-Secondary Contact Recreation, DWS-Domestic Water Supply, AWS-Agricultural Water Supply, IWS-Industrial Water Supply, WH-Wildlife Habitat, Ae-Aesthetics

Pollutants of Concern

The SBA-TMDL for the Bear River / Malad subbasin specified that streams listed for sediment are Devil Creek, Little Malad River, Malad River, and Samaria Creek. Streams listed for nutrients are Devil Creek and Samaria Creek. Streams listed for unknown pollutants are Deep Creek and Elkhorn Creek (IDEQ, 2006). Table 6 summarizes the streams and the required load reductions to meet the TMDL. These pollutants are degrading the water quality and the wildlife habitat in and along these §303(d) listed stream reaches.

Table 6. Identified Pollutants and Required Reductions for Impaired Streams

Water Body	§303(d) Listed Pollutants	Required Reduction to meet TMDL
Deep Creek	Unknown pollutants	0.0 lbs TP per yr 0.0 lbs TSS per yr
Devil Creek	Nutrients Sediment	68 lbs TP per yr 0.0 lbs. TSS pr yr
Elkhorn Creek	Unknown pollutants	0.0 lbs TP per yr 0.0 lbs TSS per yr
Little Malad River	Sediment	293 lbs TP per yr 0.0 lbs TSS per yr
Malad River	Sediment	99 to 24,180 lbs TP per yr 2,711,324 to 23,305,616 lbs TSS
Samaria Creek	Nutrients Sediment	No Load Reduction set-It is proposed to be de-listed because the stream is intermittent.

Past Water Quality Monitoring

The streams in the Lower Bear / Malad subbasin were monitored from 1999 to 2000 by IDEQ. This data is summarized in the Bear River/Malad River SBA-TMDL and shows that most of the streams exceed the phosphorus level of 0.075 mg/l, mainly during winter base flow. Total suspended sediments exceedances primarily occurred in the Malad River (IDEQ, 2006).

IASCD monitored Elkhorn Creek as well as other streams that fall outside of the Lower Bear River / Malad subbasin boundaries from March 2005 to November 2006. Results showed that target suspended sediment, nitrogen, and total phosphorus concentrations were exceeded in Elkhorn Creek (Jenkins 2007).

Identified Problems

Based on all the available water quality monitoring data the OSWCD identified the following problems in the watersheds. These include stream bank modifications, confined animal feeding operations, over utilized pastures, freeze/thaw cycles of streambanks, sheet and rill erosion, classic and ephemeral gully erosion, irrigation induced erosion, and streambank erosion (OSWCD, 2009).

Agricultural Water Quality Monitoring and Evaluation

Riparian

Introduction – The Malad River and its tributaries have varied adjacent land uses which affect the riparian vegetation diversity and density. Some stream reaches are used by irrigation companies to deliver water to share holders. Some of these areas are adjusting to the increased flows and the long duration of the flows. Stream bank erosion, lack of woody vegetation, and livestock watering are some of the concerns the OSWCD have on these steams.

Current Condition – The streams were evaluated from naip imagery and from ground truthing representative locations. It was determined that about 12% of the stream miles are in poor condition, 40% in fair condition, and the remaining 28% in good condition. Stream Visual Assessment Protocol (SVAP) was used as the ground truthing tool to rate each stream reach. This stream rating will be used by the OSWCD to prioritize potential projects in the Malad area.

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

Crop and Pasture Lands

Irrigated Cropland and Pastureland – There are 33,280 acres of irrigated cropland and irrigated pasture. The irrigated crop and irrigated pasture were planned together because they have similar management. This management requires the addition of fertilizer and irrigation water to supplement the nutrient and water requirements of the crops. The addition of irrigation water can produce some problems by increasing sheet and rill erosion and causing deep percolation of nutrients into ground water. Irrigation water management plans and nutrient management plans

are practices that may be used to reduce the deep percolation of nutrients into groundwater. Crop rotations on irrigated lands include wheat, barley, oats, corn, alfalfa, and grass pasture.

Dry Cropland – There are 44,994 acres of dry cropland in the Lower Bear / Malad subbasin planning area. The non-irrigated land is typically winter wheat or barley with some fallowed fields; annually cropped spring wheat or barley; and some dry land alfalfa. Some of the non-irrigated fields with highly erodible soil have been enrolled in CRP which requires the field to be planted to permanent cover, typically introduced grasses with some type of legume and shrub. There has been a movement to plant native grasses, but they have been very difficult to get established.

Rangeland

Common Resource Areas (NRCS, 2004)
Great Salt Lake – Sagebrush Basins and Slopes & Woodland and Shrub-Covered Low Mountains & Northern Agriculture Valleys (CRA 28A.1, 28A.2, 28A.5)
Eastern Idaho Plateaus – Sagebrush Steppe and Woodland Covered Hills and Low Mountains & High Elevation Forests and Shrublands (CRA 13.4, 13.5)

Resource Setting – Rangeland vegetation consists of sagebrush and perennial grasses. Precipitation is 14 to 28 inches, most of which falls as snow in winter and early spring. Elevations are from 4,370 feet at Utah State Line to 9,282 feet at Oxford Peak. Topography consists of steep slopes and high mountain valleys. Soils are loamy to gravelly. Frost free period ranges from 50 to 120 days. Fencing is generally an existing practice.

Rangeland Assessment – Rangeland Water Quality Indicators (WQI) worksheets were completed on multiple sites in each of the common resource areas in the Lower Bear / Malad subbasin. These worksheets provide a way to evaluate and score the condition of 8 factors on rangelands to determine water quality impacts and to rate the area in excellent, good, fair, or poor condition

Current Condition – Approximately 44,902 acres of the private rangeland assessed in the Lower Bear / Malad subbasin is in good and fair condition and has minimal impact on the water quality in Deep Creek, Devil Creek, Elkhorn Creek, Little Malad River, Malad River, and Samaria Creek. The remaining 9,856 acres are in poor condition and could have a negative impact on water quality. According to the results of the WQI, some sheet and rill erosion and classic gullies are evident on gravelly loam soils. Runoff potential is high to moderate in sagebrush steppe communities. Depending upon valley type and the location of the stream within that valley, natural vegetation buffers vary in width between 25 to 200 feet. Current grazing management results in 70 to 90 percent grass/shrub cover, with few bare areas. Grazing animals have unlimited access to creeks and springs with minimal sources of livestock watering facilities. Animal productivity and health has no apparent issues under current management schemes.

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

Resource Concerns – Existing grazing management may not meet NRCS resource quality criteria or landowner objectives. Facilitation practices may be needed for range improvement and livestock distribution. These concerns include plant productivity, health and vigor; noxious and invasive plants; plant establishment and growth; inadequate domestic stock water; inadequate quantity/quality of feed and forage for domestic animals; and inadequate cover/shelter for wildlife. All resource concerns will be evaluated on a site-specific basis in accordance with NRCS Conservation Planning Process.

Suggested BMPs on Rangelands in the Lower Bear / Malad subbasin – The most common rangeland problem is the lack of proper distribution of livestock grazing. The second most prolific problem is the lack of livestock watering facilities, which worsens the distribution problem. Drought periods and wildfires can cause problems with resulting forage shortages. Moreover, federal grazing allotment policy can create problems because additional private grazing must be secured or animals must stay longer on private rangelands. Consequently, the following BMPs are needed for rangelands in the Lower Bear / Malad subbasin: Prescribed Grazing (528A); Watering Facility (614); Water Well (642); Pumping Plant (533); Spring Development (574); Pipeline (516); Range Planting (550); Prescribed Burning (338); Brush Management (314); Fence (382); and Pest Management (595).

Animal Facility Waste Management

The Idaho Legislature enacted Idaho law, *I.C. §37-401, Title 37, Chapter 4, Sanitary Inspections of Dairy Products*, which requires sanitary inspections and nutrient management plans for all dairy farms. Existing dairy farms were required to submit a nutrient management plan for approval to ISDA on or before July 1, 2001. In 2000, the Idaho Legislature passed Idaho law, *I.C. §22-4906, Title 22, Chapter 49, Beef Cattle Environmental Control Act*. Beef cattle animal feed operations are required to submit a nutrient management plan to ISDA for approval no later than January 1, 2005.

Field inventories identified 24 sites which have a negative influence on the following streams: Deep Creek, Devil Creek, Elkhorn Creek, Little Malad River, Malad River, and Samaria Creek. Livestock at these animal facilities have a negative influence on these streams because they have no off stream water sources and these facilities have insufficient waste storage structures to contain corral or site runoff.

Threatened and Endangered Species

The threatened species present in Franklin and Oneida counties are Lynx, *Lynx canadensis*. There are no candidate species, proposed species, or designated/proposed critical habitat in these counties (http://www.fws.gov/idaho/agencies/Countybycounty.htm, NRCS 2008). There is one endemic aquatic species of concern, the Bonneville cutthroat trout (*Oncorhynchus clarki utah*) that has received special attention by many different agencies within the Bear River basin. Bonneville cutthroat trout may exist in Deep Creek and its tributaries within the Lower Bear / Malad subbasin (http://map.streamnet.org).

Treatment

Critical Areas

Those areas having the most significant impact on the water quality of the receiving water body are critical areas. These critical areas include pollutant source and transport areas. The watershed consists of approximately 139,727 acres of private land with the predominant private land uses being 33,280 acres of irrigated cropland, 44,994 acres of dry cropland, and 54,758 acres of rangeland.

Tiers

Critical areas adjacent to the Deep Creek, Devil Creek, Elkhorn Creek, Little Malad River, Malad River, and Samaria Creek in Tier 1 are considered highest priority for implementation due to their increased potential to directly impact surface water quality. There are three tiers delineated within the watershed. These tiers were determined by the proximity of the critical areas to the §303(d) listed stream segments.

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

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

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

Treatment Units

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

Riparian

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

Cropland

This treatment unit lies between the riparian and rangeland areas, ranging in elevation from 4,370 to 5,800 feet. This area has flat or rolling hills and has soil suitable for producing crops. This land varies from area to area in slope, elevation, soils, precipitation, management, and production. Major crops raised are alfalfa hay, barley, wheat, grass hay, and grass pasture. Irrigated land generally lies on flat to gently rolling foothills, on lower Lake Bonneville terraces. Non-irrigated cropland generally occurs on the upper Lake Bonneville terraces and foothills with steeper slopes.

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

Animal Facility Waste Management
Livestock production is a major industry in area; confined feeding operations exist throughout the project area. Most of the livestock sites are located on or adjacent to a natural or constructed drainage system. These sites represent all types of livestock operations at all levels of management and use. Dairies have been left out of this treatment unit because they all have regulations that require them to contain any waste.

Implementation Priority

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

1. No action
2. Land treatment with non-structural BMPs on crop and rangelands
3. Land treatment with structural and non-structural BMPs on crop and rangelands
4. Riparian and stream channel restoration
5. Animal Facility Waste Management

Description of Alternatives
Alternative 1 - No action
This alternative continues the existing conservation programs without additional project activities. The identified problems would continue to negatively impact beneficial uses in Deep Creek, Devil Creek, Elkhorn Creek, Little Malad River, Malad River, and Samaria Creek.

Alternative 2 - Land treatment with non-structural BMPs on crop and rangelands
This alternative would reduce accelerated sheet and rill, and gully erosion this will improve water quality in the watershed and reduce pollutant loading to the Deep Creek, Devil Creek, Elkhorn Creek, Little Malad River, Malad River, and Samaria Creek. Beneficial uses may be improved with implementation of this alternative. This alternative includes voluntary landowner participation.

Alternative 3 - Land treatment with structural and non-structural BMPs on crop and rangelands
This alternative would reduce accelerated sheet and rill, and gully erosion. It is anticipated this alternative will reduce soil erosion to the tolerable soil loss (T). This will improve water quality in the watershed and reduce pollutant loading to the Deep Creek, Devil Creek, Elkhorn Creek, Little Malad River, Malad River, and Samaria Creek. Beneficial uses would be improved or achieved with implementation of this alternative. This alternative includes voluntary landowner participation.

Alternative 4 – Riparian and stream channel restoration
This alternative would reduce accelerated streambank and bed erosion. This alternative would improve water quality, riparian vegetation, aquatic habitat, and fish passage in the watershed. Beneficial uses would be improved with implementation of this alternative. This alternative includes voluntary landowner participation.

Alternative 5 – Animal Facility Waste Management
This alternative would reduce sediment and nutrient runoff from animal facilities. This would improve water quality in the watershed and reduce pollutant loading to the Deep Creek, Devil Creek, Elkhorn Creek, Little Malad River, Malad River, and Samaria Creek. This alternative includes voluntary and mandatory landowner participation.

Alternative Selection

The OSWCD selected Alternatives 3, 4 and 5 for this watershed. These three alternatives together meet the objectives set forth in the OSWCD five year plan by improving water quality in the Deep Creek, Devil Creek, Elkhorn Creek, Little Malad River, Malad River, and Samaria Creek watersheds (OSWCD, 2006). Table 7 is an outline of the implementation of alternatives from planning to effectiveness monitoring.

Table 7. Estimated Timeline for TMDL Agricultural Implementation

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

Estimated BMP Implementation Costs

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

Table 8. Estimated BMP Installation Costs for the Lower Bear / Malad Subbasin

Treatment Unit	Best Management Practice	Unit Type	Unit Cost	Unit Amount	Total Funds
TU1 Stream Channels & Riparian 681 ac	Channel Vegetation	acre	$2,100	110	$231,000
	Conservation Cover	acre	$60	129	$7,740
	Critical Area Planting	acre	$250	76	$19,000
	Fence, 4-wire	ft.	$2	130,341	$260,682
	Heavy Use Area Protection	acre	$50	16	$800
	Pest Management	acre	$20	257	$5,140
	Prescribed Grazing	acre	$5	512	$2,560
	Riparian Forest Buffer	acre	$185	129	$23,865
	Stream Bank Protection	ft.	$20	13,035	$260,700
	Stream Channel Stabilization	ft.	$35	5,213	$182,455
	Tree/Shrub Establishment	acre	$290	103	$29,870
	Use Exclusion (Riparian)	acre	$100	129	$12,900
				Subtotal	**$1,036,712**
TU2 Croplands Irrigated 33,280 ac Dry Cropland 44,994 ac	Contour Farming	acre	$3	29,353	$88,059
	Conservation Crop Rotation	acre	$2	29,353	$58,706
	Field Border	acre	$88	5,870	$516,560
	Critical Area Planting	acre	$200	1,956	$391,200
	Deep Tillage	acre	$16	29,353	$469,648
	Drip Irrigation	No.	$1.70	31,680	$63,360
	Irrigation Water Management	acre	$1	12	$12
	Nutrient Management	acre	$3	39,136	$117,408
	Pasture & Hayland Planting	acre	$100	19,569	$1,956,900
	Pest Management	acre	$20	9,785	$195,700
	Residue Management	acre	$20	19,569	$391,380
	Terrace	ft.	$2	843	$1,686
	Water & Sediment Control Basin	No.	$800	1,956	$1,564,800
	Windbreak/Shelterbelt	ft.	$4	31,680	$126,720
				Subtotal	**$5,942,139**
TU3 Rangeland 54,758 ac	Brush Management	acre	$30	6,845	$205,350
	Fence, 4-wire	ft.	$2	120,459	$240,918
	Pest Management	acre	$20	4,108	$82,160
	Pipeline, PE 100 psi, 2.0"	ft.	$2	150,575	$301,150
	Prescribed Grazing	acre	$3	13,690	$41,070
	Pumping plant for water control	No.	$5,000	33	$165,000
	Range Planting	acre	$80	6,109	$488,720
	Spring Development	No.	$2,400	36	$86,400
	Structure For Water Control	No.	$3,000	3	$9,000
	Water Well	No.	$8,250	22	$181,500
	Watering Facility	No.	$1,150	115	$132,250
				Subtotal	**$1,933,518**
Tu4 Animal Facility 24 Facilities	Corral Fence	Ft.	$15	36,000	$540,000
	Nutrient Management	acre	$3	480	$1,440
	Pipeline	Ft.	$2	24,000	$48,000
	Pumping Plant for water Facility	No.	$3,000	24	$72,000
	Water Well	No.	$8,250	24	$198,000
	Waste Storage Facility	No.	$20,000	24	$480,000
				Subtotal	**$1,339,440**
				Total	**$10,251,809**

Funding

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

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

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

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

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

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

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

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

CRP: The Conservation Reserve Program (CRP) is a voluntary program for agricultural landowners. Through CRP, you can receive annual rental payments and cost-share assistance to establish long-term, resource-conserving covers on eligible farmland. FSA makes annual rental payments based on the agriculture rental value of the land, and it provides cost-share assistance for up to 50% of the participant's costs in establishing approved conservation practices. Participants enroll in CRP contracts for 10 to 15 years.
http://www.fsa.usda.gov/dafp/cepd/crp.htm

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

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

WRP: The Wetland Reserve Program is a voluntary program offering landowners the opportunity to protect, restore, and enhance wetlands on their property. The NRCS provides technical and financial support to help landowners with their wetland restoration efforts. WRP offers three enrollment options: Permanent easement, 30-year easement; and Restoration cost-share agreement. http://www.id.nrcs.usda.gov/programs/wrp/index.html

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

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

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

GLCI: The Grazing Land Conservation Initiative was established in 1991 by a coalition of livestock producer organizations, scientific and professional grazing resource organizations, conservation and environmental groups, and state and federal natural resource and agriculture agencies to provide high quality technical assistance on privately owned grazing lands on a voluntary basis and to increase the awareness of the importance of grazing land resources. http://www.glci.org/index.htm

Outreach

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

Monitoring and Evaluation

Field Level

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

RUSLE and SISL are models used to predict sheet and rill erosion on non-irrigated and irrigated lands. The Alutin method, Imhoff Cones and direct volume measurements are used to measure sheet and rill, irrigation-induced and gully erosion. SVAP and SECI are stream evaluation protocols used to assess aquatic habitat and streambank erosion and lateral recession rates. Idaho OnePlan, CAFO/AFO assessment worksheet is used to evaluate livestock waste, feeding, storage and application areas. The Water Quality Indicators Guide is utilized to assess nitrogen, phosphorus, sediment, and bacteria contamination from agricultural land.

Watershed Level

At the watershed to subbasin level, there were many government and private groups involved with water quality monitoring. In the past, the IDEQ used BURP to collect and measure key water quality variables that aid in determining the beneficial use support status of Idaho's water bodies. The determination will tell if a water body is in compliance with water quality standards and criteria.

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

References

City-data. October 10, 2008. Climate data website. http://www.city-data.com/city/Malad-City-Idaho.html

ERI, 2000. Cub River Watershed Improvement Plan. Logan, Utah : Bear River Resource Conservation and Development.

OSWCD, 2009. Five Year Plan. Oneida, Idaho : Oneida Soil & Water Conservation District

IDEQ, 1998. State of Idaho's 1998 §303(d) List. Boise, Idaho: Idaho department of Environmental Quality

IDEQ, 2006. Bear River Basin/Malad River Subbasin Assessment and TMDL plan. Submitted by IDEQ Pocatello, Idaho. Prepared by Ecosystems Research Institute, Inc. Logan, Utah

IDWR, 2000. Idaho GIS Data website. http://www.idwr.state.id.us/gisdata/gis_data.htm. Idaho State Department of Water Resources, Boise, Idaho.

ISCC, 2003. Idaho Agriculture Pollution Abatement Plan. Boise, Idaho : Idaho Soil Conservation Commission

ISDA, 2000. The Idaho Beef Cattle Environmental Control Memorandum of Understanding, 7pp. Boise, Idaho : Idaho Department of Agriculture

ISDA, 2000. Beef Cattle Animal Feeding Operation Program, 3pp. Boise, Idaho : Idaho Department of Agriculture

Jenkins, A. 2007. Little Malad Subbasin, Water Quality Monitoring Report, ARJ-LM-07. Idaho Association of Soil Conservation Districts. Pocatello, ID.

NRCS, 2004. Natural Resource Conservation Service. Idaho Common Resource Areas. http://www.id.nrcs.usda.gov/technical/soils/common_res_areas.html

NRCS, 2010. Threatened and Endangered Species, NRCS FOTG, Section I, Malad, Idaho: Natural Resource Conservation Service

NRCS, 2007. Lower Bear –Malad-16010204, Rapid Watershed Assessment, Boise, Idaho: Natural Resource Conservation Service

Stream Net. 2010. StreamNet Interactive Mapper-Fish Distribution for Lower Bear-Malad. http://map.streamnet.org

USGS. Data calculated from 24,000-scale stream hydrography and orthophoto quadrangles.

Abbreviations

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