Little Lost River Subbasin

TMDL 2015 Temperature Addendum

Implementation Plan for Agriculture

2020



Photo: Courtesy of Timothy Barnes

Prepared for the Idaho Department of Environmental Quality

By

The Idaho Soil and Water Conservation Commission with the assistance and support of the Butte Soil and Water Conservation District

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2020

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Abbreviations, Acronyms, and Symbols

§303(d) refers to section 303 subsection (d) of the Clean Water Act, or a list of impaired water bodies required by this section

§319 refers to Section 319 of the Clean Water Act established a grant program under which states, territories, and tribes may receive funds to support a wide variety of nonpoint source pollution management activities.

ºF degrees Fahrenheit

AFO animal feeding operation

AMA Agricultural Management Assistance

ACEP Agricultural Conservation Easement Program

AU assessment unit

BLM Bureau of Land Management

BMP best management practice

BURP Beneficial Use Reconnaissance Program

C Celsius

CFR Code of Federal Regulations

CAFO confined animal feeding operation

CTP Conservation Technical Assistance

CRP Conservation Reserve Program

CSP Conservation Security Program

CW cold water

CWA Clean Water Act

DEQ Department of Environmental Quality

E. coli *Escherichia coli*

EPA United States Environmental Protection Agency

EQIP Environmental Quality Incentive Program

GIS geographic information systems

GLCI Grazing Land Conservation Initiative

HIP Habitat Improvement Program

HUC hydrologic unit code

ICA Idaho Cattle Association

IDAPA Refers to citations of Idaho administrative rules

IR integrated report

ISDA Idaho State Department of Agriculture

MOU memorandum of understanding
NMP nutrient management plan
PCR primary contact recreation
PNV potential natural vegetation
PL public law
RCRDP Resource Conservation and Rangeland Development Program
RMS resource management system
RUSLE Revised Universal Soil Loss Equation
SGI Sage Grouse Initiative
SS salmonid spawning
SCR secondary contact recreation
SECI Streambank Erosion Condition Inventory
SISL Surface Irrigation Soil Loss
SVAP stream visual assessment protocol
SWCC Soil and Water Conservation Commission
SWCD Soil and Water Conservation District
TMDL total maximum daily load
TSS total suspended solids
TU treatment units
USFS United State Forest Service
WLFW Working Lands for Wildlife

Introduction

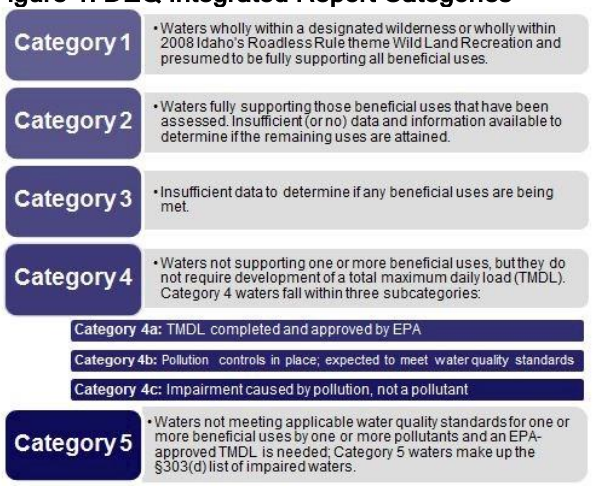
Purpose

Little Lost River Subbasin TMDL Five-Year Review Implementation Plan for Agriculture 2020 outlines an adaptive management approach for implementation of best management practices (BMPs) on agricultural lands to meet the requirements of the Little Lost River Subbasin TMDL Five-Year Review (DEQ 2015). The plan will compliment and support past conservation accomplishments made by the Butte Soil and Water Conservation District (BSWCD), the USDA Natural Resource Conservation Service (NRCS) and others. Best Management Practices outlined will assist or compliment other subbasin efforts in restoring and maintaining state water quality beneficial uses.

Goals and Objectives

The goal of this plan is to provide a strategy for agriculture to assist and/or complement other watershed efforts in restoring and protecting beneficial uses for water quality impaired streams in the Pahsimeroi Subbasin (HUC 17060202). These water quality impaired assessment units are identified in the Idaho Department of Environmental Quality (DEQ) Pahsimeroi River Subbasin Assessment and Total Maximum Daily Load 2013 Addendum and Five-Year Review.

Figure 1: DEQ Integrated Report Categories



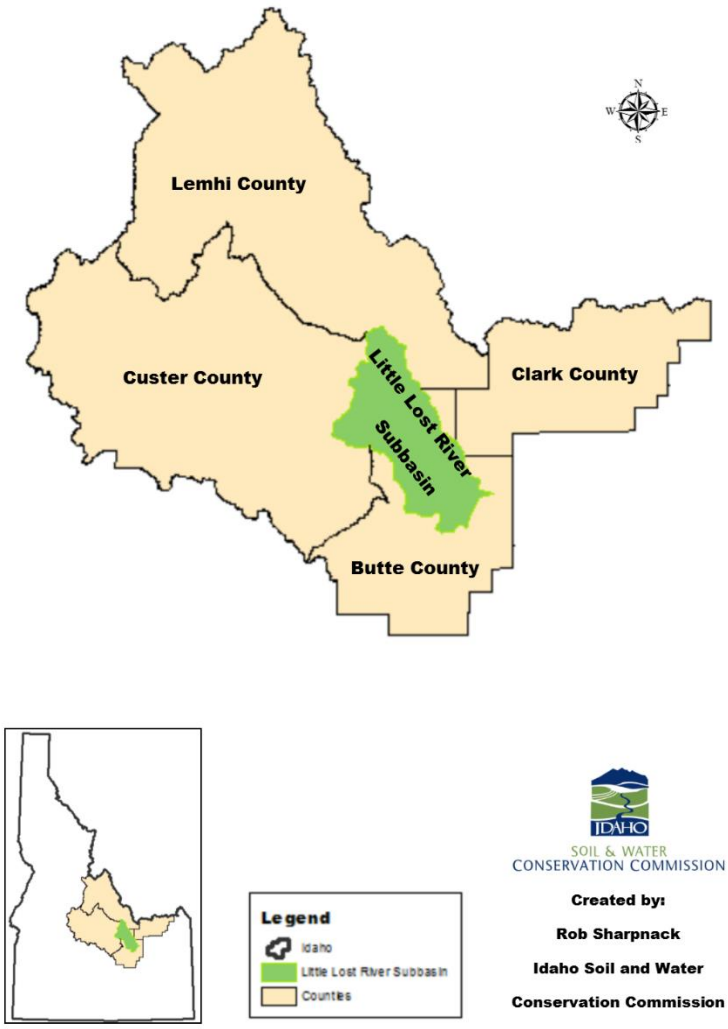
Source: DEQ website Jan 2020
http://www.deq.idaho.gov/water-quality/surface-water/monitoring-assessment/integrated-report/

The federal Clean Water Act requires states to conduct a biennial comprehensive analysis of state waters to determine if water bodies meet state water quality standards and thus support beneficial uses, or if additional pollution controls are needed. DEQ meets this requirement by preparing Idaho's Integrated Report. The report serves as a guide for developing and implementing water quality improvement plans (aka Total Maximum Daily Loads) to protect water quality and achieve federal and state water quality standards. DEQ categorizes state surface waters into 5 categories in their Integrated Report. (see Figure 1) Impaired surface waters are evaluated and a TMDL prepared outlining pollutant limits and to serve as a guide to management decisions.

DEQ divides streams and rivers into Assessment Units (AU) based on Strahler stream order and GIS information of land use designations from the National Land Cover

Database. AUs addressed in the Little Lost River Subbasin Assessment and Total Maximum Daily Load 2015 Temperature Addendum are summarized in Table 1.

Figure 2: The Little Lost River Subbasin in Idaho



Background

Project Setting

The Little Lost River subbasin is located in eastern Idaho on the northern margin of the Snake River plain. The subbasin is approximately 50 miles long by 20 miles wide (963 square miles). The valley floor averages 7 miles wide and is fairly consistent in width from the head of the valley to the mouth. Shaped like a long rectangle, the high-

elevation valley is flanked by the Lost River Range to the west and the Lemhi Range to the east. (DEQ Subbasin At a Glance http://deq.idaho.gov/water-quality/surface-water/tmdls/table-of-sbas-tmdls/little-lost-river-subbasin/)

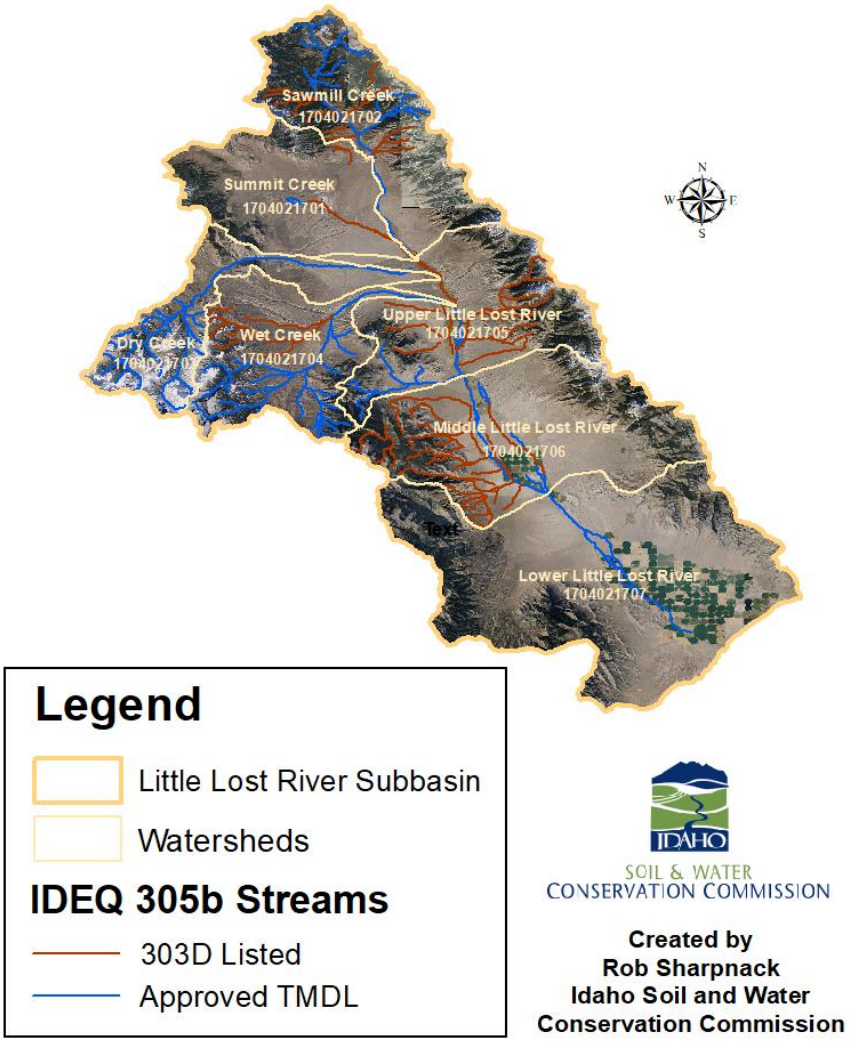
Subwatersheds

The Little Lost River Subbasin consists of seven watersheds. (see Figure 3 and Table 1) The Little Lost River valley consists of arid desert, with a flat broad valley surrounded by mountain peaks. Water percolates through broad, alluvial fans in the upper valley and frequently disappears lower down the valley. The Little Lost River flows down the center of this valley and is the focal point for farming and ranching activities in the valley.

Table 1: Area of Little Lost River Watersheds

Watershed	Name	Acres
1704021701	Summit Creek	63,156
1704021702	Sawmill Creek	73,350
1704021703	Dry Creek	49,313
1704021704	Wet Creek	64,730
1704021705	Upper Little Lost River	82,221
1704021706	Middle Little Lost River	107,499
1704021707	Lower Little Lost River	176,471

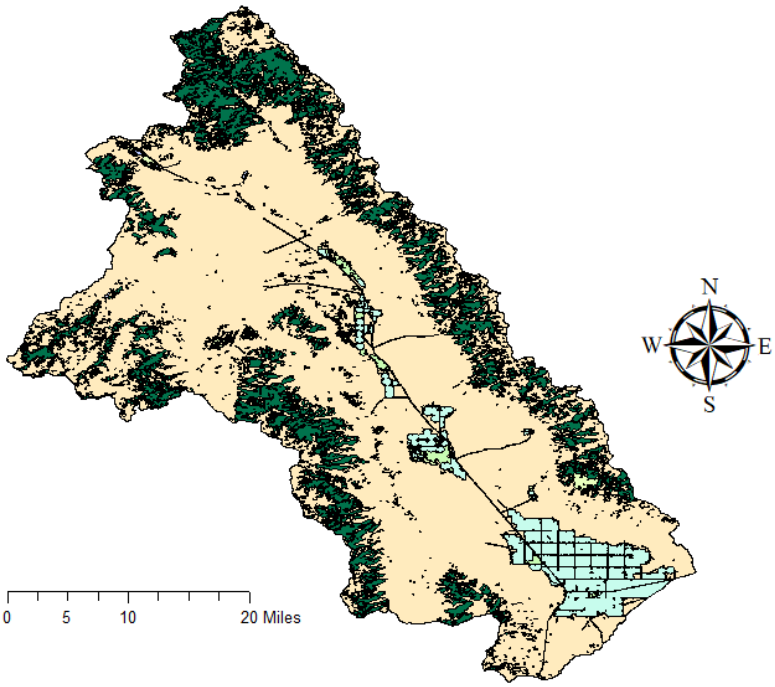
Figure 3: Little Lost River Subbasin with its 7 Watersheds and 303d Listed Streams



Land Use

The Little Lost Subbasin primarily consists of dry scrub/shrub on both US Forest Service and BLM managed lands making up 76.2% of the subbasin. Forested lands are the second largest land use at 15.7% of the total area. Irrigated agriculture occurs on private property on the valley floor while livestock grazing occurs throughout much of the rangeland areas on both private and public lands. The primary economic activity in the subbasin is agriculture, predominately cattle and hay. Some small grains are also produced in the valley. Irrigated farmland (both hay and grain) and pastureland make up only 5.4% of the valley low-lying areas.

Figure 4: National Landuse Classifications for the Little Lost River Subbasin.



National Landuse Classification Dataset Category 2016	Acres	Percent
Shrub/Scrub	470,110	76.2
Evergreen Forest	97,011	15.7
Cultivated Crops	33,279	5.4
Herbaceuous	9,043	1.5
Hay/Pasture	3,321	0.5
Barren Land	1,070	0.2
Developed, Low Intensity	836	0.1
Developed, Open Space	777	0.1
Developed, Medium Intensity	593	0.1
Emergent Herbaceuous Wetlands	383	0.1
Open Water	128	0.0
Woody Wetlands	100	0.0
Developed, High Intensity	45	0.0
Perennial Snow/Ice	32	0.0
Mixed Forest	14	0.0

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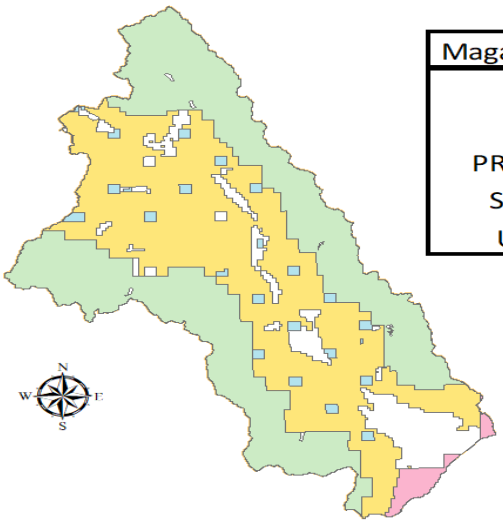
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Land Management

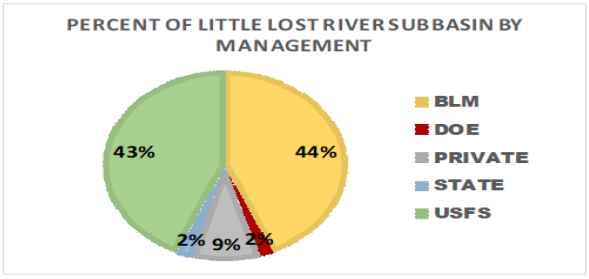
Only 9% of this subbasin are privately owned lands. The majority of the subbasin consists of federally owned and controlled lands. Federal land management in the subbasin is controlled by the United State Department of Interior - Bureau of Land Management (BLM), the United States Forest Service (USFS) and the Department of Energy. Eighty-nine percent of this subbasin is controlled by federal land managers.

Dispersed throughout the subbasin are sections of land controlled by the State of Idaho (2%).

Figure 5: Little Lost River Subbasin Land Management



Magagement	Acres
BLM	268,649
DOE	10,777
PRIVATE	55,630
STATE	13,451
USFS	267,799



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Conservation Accomplishments

The USDA Natural Resource Conservation Service (NRCS) and the Butte Soil and Water Conservation District are involved with developing and implementing BMPs in the Little Lost River subbasin on privately owned lands. The partners have been very active in the subbasin installing conservation measures to help man and the environment.

Conservation projects are not specifically identified by individual involvement in this document in order to protect the landowners right of privacy under Farm Bill Section 1619.

Table 2: Conservation practice implemented by the Butte SWCD and the NRCS in the Little Lost River Subbasin from 2015 thru 2019.

Year	Location	Practices	Acres (bold number is contract total)	Feet	Number of installments
2015	Lost River Sinks		**60,062**		
		Pipeline		17,795.2	
		rest rotation grazing	60,062		
		watering facility			2
		spring development			1
2016	Richard Butte		**888.5**		
		center pivot	179.5		
		irrigation pipeline		10,905	
		structure for water control			1
		pumping plant			1
		nutrient management	181.2		
		irrigation water management	181.2		
		conservation cover	153.1		
2018	Big Spring Creek		**268.2**		
		LESA system and irrigation water management (1 yr)	268.2		
2018	South Creek	LESA system and irrigation water management (1 yr)	**272.5**		
2018	South Creek	LESA system and irrigation water management (1 yr)	**299.9**		
2018	Warm Spring Creek - Little Lost River		**374.3**		
		pumping plant			1
		livestock pipeline		505	
		watering facility			2
		water storage facility			1
		fence		630	
		filter strip	0.4		
		nutrient management (3 years)	335.4		
2018	South Creek		**417.6**		

Year	Location	Practices	Acres (bold number is contract total)	Feet	Number of installments
		structure for water control			3
		irrigation pipeline		12,338	
		sprinkler system	410.5		
		irrigation water management (3 years)	410.5		
2018	South Creek		**844.1**		
		pumping plant			1
		sprinkler system	358.1		
		flowmeters			5
		irrigation pipeline		6438	
		irrigation water management (3 years)	702		
2018	South Creek		**53.9**		
		conservation cover	8		
		field border	2.3		
		wetland wildlife habitat management (3 years)	53.9		
2018	Big Spring Creek		**1,178.3**		
		herbaceous weed treatment	169		
		stream corridor bank stability	3.5		
2019	South Creek		**278.7**		
		sprinkler system	278.7		
		irrigation water management (1 year)	**278.7**		
2019	South Creek		**310**		
		sprinkler system	257.8		
		irrigation water management (1 year)	125.6		
2019	Warm Spring Creek - Little Lost River		**0.5**		
		Seasonal High Tunnel	0.5		

Year	Location	Practices	Acres (bold number is contract total)	Feet	Number of installments
2019	Little Lost River Sinks		**0.5**		
		Seasonal High Tunnel	0.5		
2019	Big Spring Creek		**277**		
		sprinkler system	276.8		
		Irrigation Water Management (1 year)	276.8		

Source: Courtesy of the Butte SWCD and the Arco NRCS office.

Water Quality Problems

Beneficial Use Status

Idaho water quality standards require that beneficial uses of all water bodies be protected. Beneficial uses can include existing uses, designated uses, and presumed existing uses. Designated uses are uses officially recognized by the state. In cases where designated uses have not been established by the state for a given water body, DEQ has established the presumed existing uses of supporting cold water aquatic life and either primary or secondary contact recreation. Beneficial uses for water bodies on the 303(d) list in the Little Lost River Subbasin are listed below in Table 3.

Table 3. Little Lost River subbasin beneficial uses of §303(d)-listed streams.

Assessment Unit Name	Assessment Unit Number	Beneficial Uses[a]	Type of Use
Little Lost River	ID17040217SK001_05 ID17040217SK002_05 ID17040217SK007_04 ID17040217SK010_04	CW, SS, PCR	Designated
Big Springs Creek	ID17040217SK003_02 ID17040217SK003_03 ID17040217SK003_04	CW, SCR	Presumed
Little Lost River Tributaries	ID17040217SK007_02	CW, SCR	Presumed
Little Lost River Tributaries	ID17040217SK009_02	CW, SCR	Presumed
Sawmill Creek and tributaries	ID17040217SK014_04 ID17040217SK014_02	CW, SCR	Presumed
Squaw Creek	ID17040217SK015_02	CW, SCR	Presumed
Timber Creek	ID17040217SK018_03	CW, SCR	Presumed
Moffett Creek	ID17040217SK019_02 a	CW, SCR	Presumed
Summit Creek	ID17040217SK019_03	CW, SCR	Presumed

Assessment Unit Name	Assessment Unit Number	Beneficial Uses[a]	Type of Use
Dry Creek and tributaries	ID17040217SK020_03 ID17040217SK021_02 ID17040217SK021_03	CW, SCR	Presumed
Deer Creek	ID17040217SK025_02	CW, SCR	Presumed

[a] Cold water (CW), salmonid spawning (SS), primary contact recreation (PCR), secondary contact recreation (SCR)
Source: DEQ 2015.

Table 4. Little Lost River subbasin beneficial uses of unlisted but impaired streams.

Assessment Unit Name	Assessment Unit Number	Beneficial Uses [a]	Type of Use
Little Lost River	ID17040217SK009_04	CW, SS, PCR	Designated
Sawmill Creek	ID17040217SK012_04	CW, SCR	Presumed
Wet Creek	ID17040217SK022_03 ID17040217SK024_02 ID17040217SK024_03	CW, SCR	Presumed

[a] Cold water (CW), salmonid spawning (SS), primary contact recreation (PCR), secondary contact recreation (SCR)
Source: DEQ 2015.

Pollutants

The Little Lost River Subbasin Assessment and Total Maximum Daily Load 2015 Temperature Addendum established shade target levels for 24 Assessment Units (AUs). Seventeen AUs were currently listed in the TMDL with an additional 5 AUs with temperature loading prepared in 2000 but not acted upon by the USEPA. An additional 2 AUs were included in the Temperature Addendum (DEQ 2015) were included because new date showed they are temperature impaired. Table 5 lists the AUs and the lack of shade needed to meet the goals described in the Temperature Addendum (DEQ 2015).

Table 5. 2015 303(d) listed stream segments: identified pollutants and required reductions.

Water Body	Assessment Units	303(d) Listed Pollutants	% Reduction	Average Lack of Shade (%)
Big Springs	ID17040217SK003_02	Temperature	18	-15
Big Springs	ID17040217SK003_03	Temperature	14	-19
Big Springs	ID17040217SK003_04	Temperature	49	-38
Deer Creek	ID17040217SK025_02	Temperature	10	-7
Dry Creek	ID17040217SK020_03	Temperature	4	-4
Dry Creek	ID17040217SK021_02	Temperature	18	-19
Dry Creek	ID17040217SK021_03	Temperature	17	-7
Dry Creek tributaries	ID17040217SK015_02	Temperature	5	-6

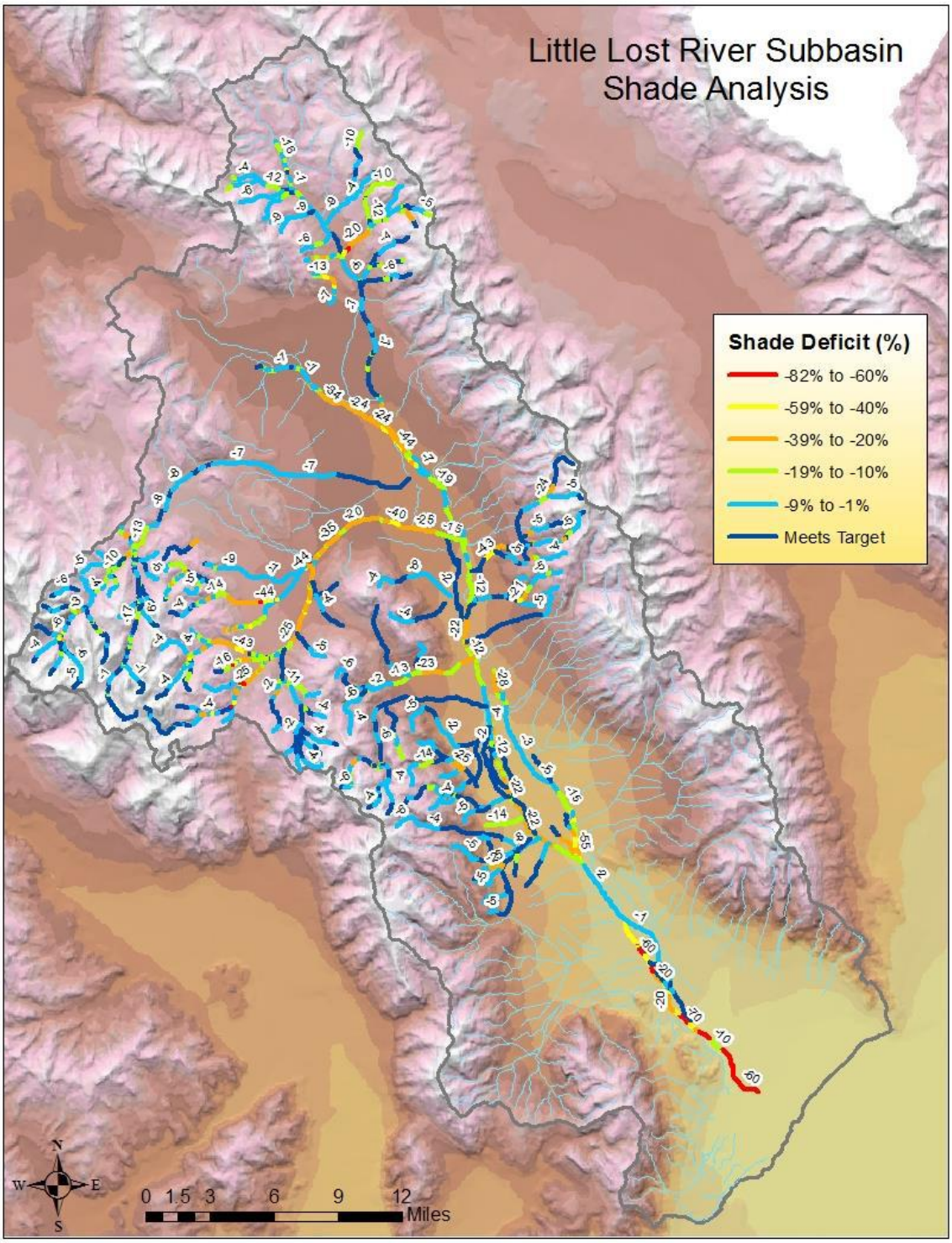
Water Body	Assessment Units	303(d) Listed Pollutants	% Reduction	Average Lack of Shade (%)
Little Lost River	ID17040217SK001_05	Temperature	69	-49
Little Lost River	ID17040217SK002_05	Temperature	17	-26
Little Lost River	ID17040217SK007_04	Temperature	21	-17
Little Lost River	ID17040217SK009_04	Temperature	31	-18
Little Lost River	ID17040217SK010_04	Temperature	18	-16
Little Lost River tributaries	ID17040217SK007_02	Temperature	0	-5
Little Lost River tributaries	ID17040217SK009_02	Temperature	1	-6
Long Lost Creek	ID17040217SK021_02	Temperature	0	-4
Moffett Creek	ID17040217SK019_02a	Temperature	0	-4
Sawmill Creek	ID17040217SK012_04	Temperature	13	-7
Sawmill Creek	ID17040217SK014_02	Temperature	6	-8
Sawmill Creek	ID17040217SK014_04	Temperature	9	-9
Summit Creek	ID17040217SK019_03	Temperature	31	-21
Squaw Creek	ID17040217SK015_02	Temperature	49	-11
Wet Creek	ID17040217SK022_03	Temperature	24	-27
Wet Creek	ID17040217SK024_02	Temperature	13	-12
Wet Creek	ID17040217SK024_03	Temperature	22	-26
William Creek	ID17040217SK009_02	Temperature	27	-8

Most AUs lacked shade, although the exceptions were Moffett Creek (ID17040217SK019_02a), some of the tributaries to the Little Lost River (ID17040217SK007_02) and Long Lost Creek (Dry Creek tributary, ID17040217SK021_02) that had no excess load. The 24 AUs with temperature targets are shown in Figure 6.

In Appendix A, the AUs for private lands that lacked shade are shown. Of the 24 AUs with a Temperature TMDL written for them 19 AUs have some portion of an AU that crosses private grounds. Appendix A breaks out details from Table 5 for sections of AUs that are on private lands (similar to Appendix B in the Little Lost River Temperature TMDL Addendum (DEQ 2015) tables B-3 through B-29.

There are five AUs from the TMDL that are not on private land. Stream AUs that received a temperature TMDL allocation but that are not on private lands include: ID17040217SK002_05, Little Lost River, Big Spring Creek to canal (T06N, R28E), ID17040217SK010_04, Little Lost River, confluence of Summit and Sawmill Creeks to Wet Creek, ID17040217SK018_03, Timber Creek, Redrock Creek to mouth, ID17040217SK021_02, Dry Creek, source to Long Lost Creek, ID17040217SK021_03, and Dry Creek, Long Lost Creek to Dry Creek Canal. These AUs are not included in this plan

Figure 6: Shade deficit for Little Lost Subbasin.



Source: DEQ 2015

Threatened and Endangered Species

There are six known threatened or endangered species in the Little Lost River Subbasin. They include Bull Trout (*Salvelinus confluentus*), Yellow Billed Cuckoo (*Coccyzus americanus),* the Grizzly Bear (*Ursus arctos horribilis*), The North American Wolverine (*Gulo gulo luscus*), and the Canada Lynx (*Lynx canadensis*). The White Bark Pine (*Pinus albicaulis*) is candidate species that may be found in the subbasin. Listed or threatened species may be affected by many factors. For the fish factors some include loss of spawning habitat due to excessive fine sediment. This fine sediment can abrade and or suffocate the eggs, trapping fry in the gravels. Dewatering of tributary streams isolates fish populations and fry from the main stem, which provides critical summer and winter habitat needed for sustainable fish populations. Increased water temperature caused by natural drought or dewatering of streams reduces habitat viability. Loss of vegetation along streambank also affects stream temperature and habitat viability both directly and indirectly for fish.

Table 6. Threatened and Endangered species in the Little Lost River Subbasin, Which Includes parts of Butte, Clark, Custer, and Lemhi Counties.

Species	Status	Habitat Affected by Water Quality or Distribution
Yellow Billed Cuckoo (*Coccyzus americanus)*	Threatened species	No
Canada Lynx (Lynx canadensis)	Threatened species	No
Bull Trout (Salvelinus confluentus)	Threatened species / Designated Critical Habitat	Yes
White Bark Pine (*Pinus albicaulis*)	Candidate Species	No
North American Wolverine (*Gulo gulo luscus*)	Proposed Threatened	No
Grizzly Bear (Ursus arctos horribilis)	Threatened	No

Source: US Fish and Wildlife Service Environmental Conservation Online System (ECOS) Information for Planning and Consultation (IPaC) search https://ecos.fws.gov/ipac/ and Idaho Governor's Office of Species Conservation https://species.idaho.gov/listed-species-in-idaho/

There are six federally listed aquatic plants and animals that will be influenced by actions suggested in this TMDL implementation plan. Agricultural conservation planning will be coordinated with other species recovery and protection efforts in the subbasin to improve listed species' habitats and address any potential impacts from BMP implementation. Improvements in water quality, achieved from BMPs installed on agricultural lands, are not expected to adversely affect these listed species and should improve or enhance their habitat.

The Little Lost River drainage upstream of the Big Springs Creek confluence is one of 59 key watersheds identified in Governor Batt's State of Idaho Bull Trout Conservation Plan (Batt 1996). Bull Trout have been reported in the upper reaches of Badger and Big Creeks, lower reach of Camp Creek, Hawley Creek, Iron Creek, Jackson Creek, mid- and upper reaches of the mainstream (including Sawmill Creek), Mill Creek, Quigley

Creek, Redrock Creek, Smithie Fork, Timber Creek, Squaw Creek (Sawmill Canyon), North Fork Squaw Creek, lower Slide Creek, upper reach of Warm Creek, Wet Creek (except the midsection), and Williams Creek DEQ 2015.

Animal Feeding Operations and Dairies

The Idaho Legislature passed the Beef Cattle Environmental 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. Subsequent to the rules becoming 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 IDAPA 02.04.15 not located on Indian Reservations (ISDA 2000).

As of 2005, new and existing operations must have Nutrient Management Plans (NMP) in place. Cattle in winter feeding or grazing areas or pastures—those areas that are not confined—are not regulated under the AFO/CAFO regulations. Attempts are made to provide technical assistance, and improvements to winter feeding areas, or even relocating some operations away from live water sources.

Treatment

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 location to a water body of concern of concern and the potential for pollutant transport and delivery to the receiving water body. Accordingly, the following is a general rule that applies to the prioritization of critical acres within in each watershed.

Agricultural critical areas with the Little Lost River subbasin include:

- Surface irrigated cropland and pastureland
- Unstable and erosive stream banks
- Areas of severe gully erosion
- Areas where livestock have unlimited or direct access to streams
- Animal Feed Operations (AFOs) and Confined Animal Feeding Operations (CAFOs) impacting surface or irrigation waters

In addition to the above, consideration is given to proximity to higher pollutant reduction goals and willingness of landowners to implement BMPs. Each operation and location is unique, and individual farm planning is needed to optimize BMP implementation and load reductions.

Treatment

The following Treatment Units (TUs) describe areas in the Lemhi subbasin with similar land uses, soils, productivity, resource concerns, and treatment needs. These TUs not only provide a method for delineating and describing land use but are also used to evaluate land use impacts to water quality and in the formulation of alternatives for solving water quality problems. BMPs to improve water quality are suggested for critical areas within each treatment unit.

- Riparian Areas
- Pasture
- Irrigated Cropland or Hayland/Pasture
- Rangeland
- Livestock Feeding Operations

Recommended BMPs

BMPs appropriate for the reduction of agricultural impacts to water quality in the Little Lost River subbasin subwatersheds are listed below in following tables. Individual conservation planning for willing landowners will determine the most appropriate BMPs to install on a case by case basis. The information included in Tables 7 through 10 provides an estimate only of the BMPs recommended for critical acres in the subbasin. A more precise estimate of quantities of each BMP recommended to install will be determined at the time of conservation planning for a particular landowner.

Tables 7 through 10 provide types of voluntary BMPs that are available to producers within the subbasin that will improve site specific water quality concerns with proper design, installation, and/or implementation based on applicable NRCS standards and specifications, as appropriate. Only those combination of BMPs necessary for water quality improvement that are also feasible to the participant will be voluntarily implemented.

Agricultural conservation and soil erosion practices are designed to control, reduce, or prevent soil erosion and sedimentation on agricultural land uses are listed in Tables 7 through 10 below. Recommended BMPs are selected to reduce irrigation-induced and streambank erosion, contain and filter sediment, nutrients, and bacteria from irrigation wastewater, contain and properly dispose of animal wastes, and reduce leaching of nutrients and pesticides.

Temperature

Typically, the longer a body of water is exposed to high ambient temperatures, such as >90º F, the more likely that the water body is going to warm up as it flows downstream. Additional inflows from tributaries and natural springs may help maintain lower water temperatures, but if those inflows are warmer than the receiving water, temperatures will increase. Grazing management in riparian areas can help maintain water temperatures but cannot lower them. Ambient temperatures typically drive water temperatures, even

more so than does direct infrared solar radiation. Reflected radiation is important, as it can increase air temperatures, especially within narrow canyon areas.

Planting and/or maintaining vegetation, especially woody species, seem to be the most successful method for decreasing water temperatures. Again, it's actually only about reducing the "increase of temperature". Woody species are generally thought of as the only vegetative species tall enough to cast shadows over waters, to reduce infiltration infrared. They can do that, as well as reduce the adjacent microclimate temperatures, helping reduce ambient temperatures surrounding the water body. In very low gradient streams, with high water tables, woody species may not be appropriate. Herbaceous riparian species, such as sedge, rush, and other like varieties, can tolerate and thrive on saturated or nearly saturated soils. If this vegetation can be increased where stream channels are dish-shaped, channels can narrow, converting to more trapezoid-shaped channels with undercut banks. These channel shapes generally coincide with deeper water depths, narrower bankfull widths, and greater contact to subsurface ground water flow, which is cooler than ambient air temperatures. Depending on the stream type (gradient, soils, existing vegetation, or water availability), reducing the increase of stream water temperature can be achieved through woody or non-woody vegetation. Channel shape is also very important, which follows with the change in increase of riparian vegetation. The less surface exposure air and a greater contact to soil water, regardless of sunlight penetration (infrared to approx. 0.5 cm), temperatures are not as likely to increase dramatically in summer months. Regardless of the TMDL objectives, these rules apply to riparian areas.

Numerous techniques are available to the landowner to improve stream bank and pasture conditions, but each pasture and riparian area is generally managed differently and requires individual attention. Fencing, grazing management, water facilities, water gaps, protein supplements, pasture irrigation water management, erosion controls, and other practices should all be considered during the development of an individual Conservation Plan. BMPs include, but are not limited to, the following:

Table 7: Recommended BMPs for elevated water temperature in riparian areas.

Recommended BMPs: Water Quality Degradation - Elevated Water Temperature - Riparian	NRCS Code
Watering Facility	614
Tree/Shrub Establishment	612
Structure for Water Control	587
Streambank and Shoreline Protection	580
Stream Habitat Improvement and Management	395
Riparian Herbaceous Cover	390
Restoration and Management of Rare or Declining Habitats	643
Prescribed Grazing	528
Channel Bed Stabilization	584

Recommended BMPs: Water Quality Degradation - Elevated Water Temperature - Riparian	NRCS Code
Aquatic Organism Passage	396
Access Control	472

Table 8: Recommended BMPs for elevated water temperature for rangeland areas.

Recommended BMPs: Water Quality Degradation – Elevated Water Temperature - Rangeland	NRCS Code
Watering Facility	614
Water Well	642
Pumping Plant	533
Spring Development	574
Pipeline	516
Range Planting	550
Prescribed Grazing	528A
Fence	382
Brush Management	314
Pest Management	595
Heavy Use Area Protection	561

Table 9: Recommended BMPs for elevated water temperatures for cropland and hayland.

Recommended BMPs: Water Quality Degradation – Elevated Water Temperature - Surface Irrigated Cropland and Hayland	NRCS Code
Conservation Crop Rotation	328
Irrigation System, Sprinkler	442
Irrigation System, Surface and Subsurface	443
Irrigation Water Management	449
Nutrient Management	590
Upland Wildlife Management	645
Pest Management	595
Residue Management, Mulch Till	329B
Residue Management, Seasonal	344
Filter Strips	393

Table 10: Recommended BMPS for elevated water temperature for irrigated pasture.

Recommended BMPs: Water Quality Degradation – Elevated Water Temperature - Irrigated Pasture	NRCS Code
Fencing	382
Heavy Use Area Protection	561
Filter Strips	393
Spring Water Development	574
Irrigations Systems	442, 447
Pasture and Hayland Planting	512
Livestock Water Facility	614
Irrigation Water Management	449
Stream Channel Stabilization	584
Prescribed Grazing System	528A
Pest Management	595

Implementation Priority

The TMDL implementation planning process included assessing impacts to water quality in the Little Lost River Subbasin from agricultural lands on 303(d) listed streams and recommending a priority for installing BMPs to meet water quality objectives stated in the Little Lost River Subbasin Assessment and Total Maximum Daily Load 2015 Temperature Addendum. Data from water quality monitoring and field inventory and evaluations were used to identify critical agricultural areas affecting water quality and set priorities for treatment.

Recommended Priorities for BMP Implementation

To implement the TMDL, land managers should work to attain target shade levels for individual stream reaches with priority given to areas with the greatest discrepancies between existing and target shade levels, described in this plan as “lack of shade”. Because of the analysis methodology used, AUs with lack of shade less than 10% can be considered in good condition and should be treated with low priority.

Those AUs with lack of shade between 10% and 30% have real shade deficiencies, and those above 30% (red) have serious problems. These stream segments should be the highest priority for treatment.

In addition to the above, consideration is given to proximity to higher pollutant reduction goals, and willingness of landowner to implement the BMPs. Each operation and

location is unique, and individual on farm planning is needed to optimize BMP implementation and load reductions

Treatment Alternatives

All BMPs are voluntary. All BMPs need to be site specific according to the conservation needs of the location and the land management goals of the cooperating landowner. Innovative approaches to conservation could include:

- Beaver Mimicry Structures
- Flow Enhancement
- Ground water well sources
- Reconnecting streams to their receiving waters
- Water Right Diversion Consolidation and Relocation

Because of the complexity of land use in this large watershed, ongoing efforts from the Soil Conservation District will be critical in providing direction and guidance to local landowners who strive to optimize implementation of BMPs that will achieve the goals of the TMDL. Implementation of BMPs at this large scale may take up to 20 years to accomplish. On-site monitoring and BMP effectiveness evaluations will be performed as part of the feedback loop, to assure agricultural-related activities are achieving the desired results

Funding

Financial and technical assistance for installation of BMPs is needed to ensure success of this implementation plan. The Butte Soil and Water Conservation District will actively pursue multiple potential funding sources to implement water quality improvements on private agricultural and grazing lands. Many of these programs can be used in combination with each other to implement BMPs.

These sources include (but are not limited to):

CWA 319 –These are Environmental Protection Agency funds allocated to the Nez Perce Tribe and the State of Idaho. The Idaho Department of Environmental Quality (DEQ) administers the Clean Water Act §319 Non-point Source Management Program for areas outside the Nez Perce Reservation. Funds focus on projects to improve water quality and are usually related to the TMDL process. The Nez Perce tribe has CWA 319 funds available for projects on Tribal lands on a competitive basis. Source: DEQ *http://www.deq.idaho.gov/water/prog_issues/surface_water/nonpoint.cfm#management*

Resource Conservation and Rangeland Development Program (RCRDP) –The RCRDP is a loan program administered by the ISCC for implementation of agricultural and rangeland best management practices or loans to purchase equipment to increase conservation. Source: ISWCC *https://swc.idaho.gov/what-we-do/conservation-loans/*

PL-566 –This is the Small Watershed Rehabilitation Program administered by the USDA Natural Resources Conservation Service (NRCS).

Agricultural Management Assistance (AMA) –The 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. Source: NRCS *https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/ama/*

Conservation Reserve Program (CRP) –The 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. Source: NRCS *https://www.fsa.usda.gov/programs-and-services/conservation-programs/conservation-reserve-program/index*

Conservation Technical Assistance (CTA) –The 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. Source: Local Conservation District and NRCS: *https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/technical/*

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. Source: NRCS *https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/eqip/*

Agricultural Conservation Easement Program (ACEP) – The ACEP program provides financial and technical assistance to help conserve agricultural lands and wetlands and their related benefits. Under the Agricultural Land Easements component, NRCS helps Indian tribes, state and local governments and non-governmental organizations protect working agricultural lands and limit non-agricultural uses of the land. Under the Wetlands Reserve Easements component, NRCS helps to restore, protect and enhance enrolled wetlands. *https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/easements/*

Conservation Security Program (**CSP)** –CSP is a voluntary program that rewards the Nation's premier farm and ranch land conservationists who meet the highest standards of conservation environmental management. Source: NRCS *https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/csp/*

Grazing Land Conservation Initiative (**GLCI)** –The GLCI's 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. *https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/people/partners/glci/*

Habitat Improvement Program (HIP) – This is an Idaho Department of Fish and Game program 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. Source: IDFG *https://idfg.idaho.gov/conservation/habitat/hip*

Partner's Program in Idaho – The goal of the U.S. Fish and Wildlife Service's Partners Program is to work with private and Tribal landowners who want to voluntarily improve fish, wildlife, and plant habitat on their lands. Source: USFWS *https://www.fws.gov/idaho/articles.cfm?id=149489623*

Sage Grouse Initiative (SGI) - A highly targeted and science-based landscape approach to proactively conserve sage-grouse and sustain the working rangelands that support western ranching economies. Source: NRCS *https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/plantsanimals/fishwildlife/?cid=steldevb1027671*

Working Lands for Wildlife (WLFW) - Target conservation efforts to improve agricultural and forest productivity which enhance wildlife habitat on working landscapes. Target species are used as barometers for success because their habitat needs are representative of healthy, functioning ecosystems where conservation efforts benefit a much broader suite of species. Source: NRCS *https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/plantsanimals/fishwildlife/?cid=stelprdb1046975*

Outreach

Conservation partners in the Little Lost River subbasin will use their combined resources to provide information about BMPs to improve water quality to agricultural landowners and operators within the Little Lost River subbasin. A local outreach plan may be developed. Newspaper articles, district newsletters, watershed and project tours, landowner meetings and one-on-one personal contact may be used as outreach tools.

Outreach efforts will:

- Provide information about the TMDL process
- Supply water quality monitoring results
- Accelerate the development of conservation plans and program participation
- Distribute progress reports
- Enhance technology transfer related to BMP implementation
- Increase public understanding of agriculture's contribution to conserve and enhance natural resources
- Improve public appreciation of agriculture's commitment to meeting the TMDL challenge
- Identify and encourage the use of BMPs for recreation activities in the subbasin

Monitoring and Evaluation

Field Level

At the field level, annual status reviews will be conducted to ensure that the contracts are on schedule and that BMPs are being installed according to standards and specifications. BMP effectiveness monitoring will be conducted on installed projects to determine installation adequacy, operation consistency and maintenance, and the relative effectiveness of implemented BMPs in reducing water quality impacts. This monitoring will also measure the effectiveness of BMPs in controlling agricultural nonpoint-source pollution. These BMP effectiveness evaluations will be conducted according to the protocols outlined in the Agriculture Pollution Abatement Plan and the ISCC Field Guide for Evaluating BMP Effectiveness.

The Revised Universal Soil Loss Equation (RUSLE) and Surface Irrigation Soil Loss (SISL) Equation are used to predict sheet and rill erosion on non-irrigated and irrigated lands. The Alutin Method, Imhoff Cones, and direct-volume measurements are used to determine sheet and rill irrigation-induced and gully erosion. Stream Visual Assessment Protocol (SVAP) and Streambank Erosion Condition Inventory (SECI) are used to assess aquatic habitat, stream bank erosion, and lateral recession rates. The Idaho OnePlan's 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 level, there are many governmental and private groups involved with water quality monitoring. The Idaho Department of Environmental Quality uses the Beneficial Use Reconnaissance Protocol (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. In addition, IDEQ will be conducting five-year TMDL reviews.

Annual reviews for funded projects will be conducted to ensure the project is kept on schedule. With many projects being implemented across the state, ISCC developed a software program to track the costs and other details of each BMP installed. This program can show what has been installed by project, by watershed level, by sub-basin level, and by state level. These project and program reviews will ensure that TMDL implementation remains 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

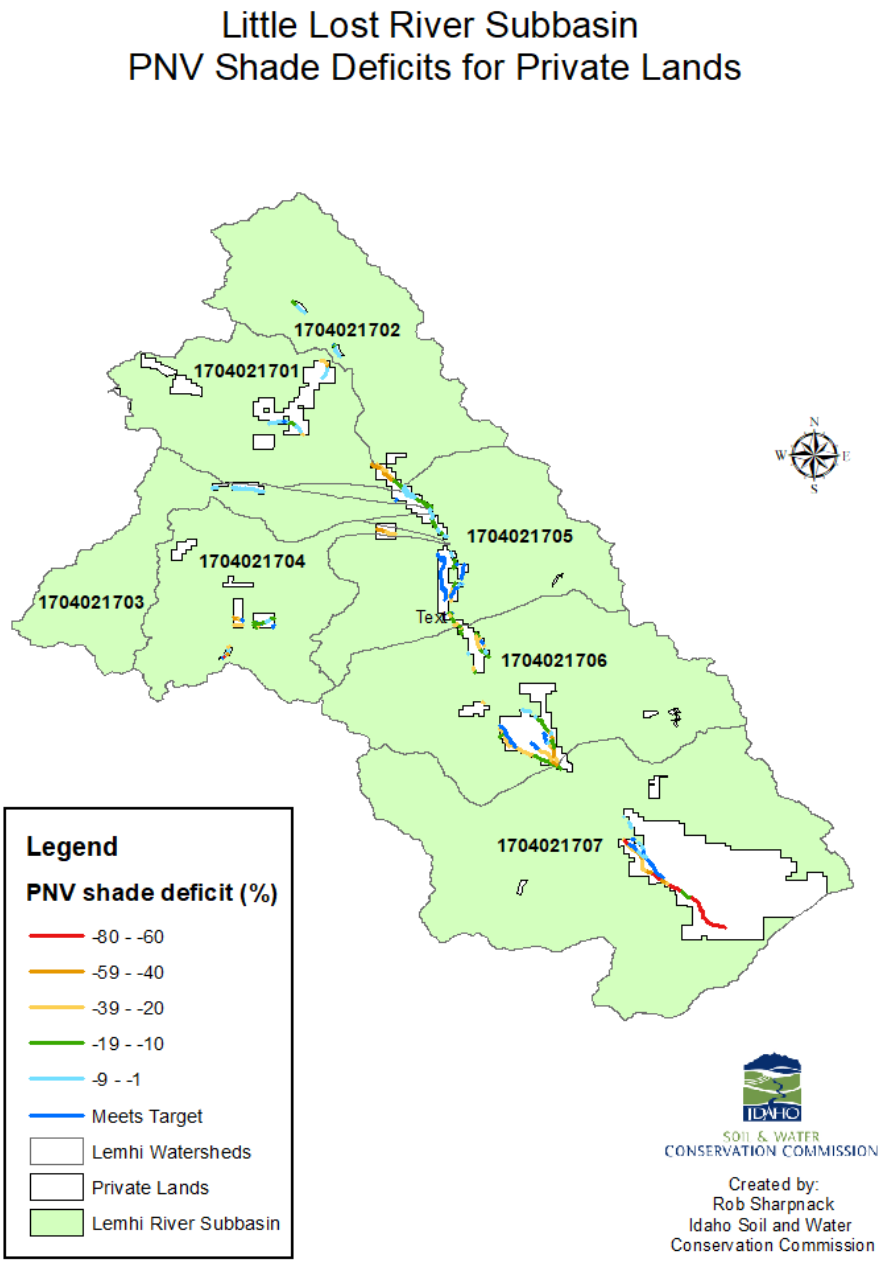
DEQ 2015. Little Lost River Subbasin Assessment and Total Maximum Daily Load 2015 Temperature Addendum 101p.

SWCC 2002. Little Lost River Subbasin Total Maximum Daily Load Agricultural Implementation Plan 18p.

Appendices

Appendix A

Figure 7: Little Lost River Subbasin Potential Natural Vegetation Shade Deficits for Private Lands.



Appendix A breaks down individual AU reaches on private lands by shade deficits according to the Little Lost River Subbasin Assessment and Total Maximum Daily Load 2015 Temperature Addendum. This is done to show priority areas on private lands and to assist in project planning and development. Figure 7 shows of the private lands and AUs that cross those private lands that have temperature TMDLs. Tables 11 through 30 show the PNV value on each portion of these AUs on private land for the existing shade, shade target, needed adjustment, and distance.

Table 11: Assessment Unit ID17040217SK001_05 Little Lost River from Canal (T06N, R28E) to Playas, Private Land Shade Evaluation and Targets Summary. Based on DEQ PNV Assessment.

Existing % Shade	Target / Goal (%)	Adjustment (%)	Segment Length (m)	Segment Length (mi)
20	21	-1	823	0.6
10	17	-7	1,735	1.1
70	80	-10	1,469	0.9
20	32	-12	607	0.4
60	80	-20	3,110	1.9
50	80	-30	730	0.4
40	80	-40	521	0.3
30	80	-50	1,015	0.6
20	80	-60	4,763	3.0
10	80	-70	1,938	1.2
0	80	-80	701	0.4
		Total	17,413	10.8

Table 12: Assessment Unit ID17040217SK003_02 Big Springs Creek, source to unnamed tributary at 44.029, -113.206, and three small tributaries near the mouth of Big Springs Creek, Private Land Shade Evaluation and Targets Summary. Based on DEQ PNV Assessment.

Existing % Shade	Target / Goal (%)	Adjustment (%)	Segment Length (m)	Segment Length (mi)
Good	Exceeded	None	2,047	1.3
40	44	-4	511	0.3
30	44	-14	1,945	1.1
20	44	-24	3,724	2.3
10	38	-28	918	0.6
10	44	-34	650	0.4
0	44	-44	113	0.1
		Total	9,908	6.1

Table 13: Assessment Unit ID17040217SK003_03 Big Springs Creek, unnamed tributary at 44.029, -113.206 to Uncle Ike Creek, Private Land Shade Evaluation and Targets Summary. Based on DEQ PNV Assessment.

Existing % Shade	Target / Goal (%)	Adjustment (%)	Segment Length (m)	Segment Length (mi)
60	65	-5	1,593	1.0
50	65	-15	2,659	1.7
20	65	-45	733	0.4
10	65	-55	348	0.2
		Total	5,332	3.3

Table 14: Assessment Unit ID17040217SK003_04 Big Springs Creek, Uncle Ike Creek to Mouth, Private Land Shade Evaluation and Targets Summary. Based on DEQ PNV Assessment.

Existing % Shade	Target / Goal (%)	Adjustment (%)	Segment Length (m)	Segment Length (mi)
50	65	-15	903	0.6
40	65	-25	455	0.3
10	65	-55	1,787	1.0
		Total	3,145	1.9

Table 15: Assessment Unit ID17040217SK007_02 Little Lost River Tributaries, Badger Creek to Big Spring Creek, Private Land Shade Evaluation and Targets Summary. Based on DEQ PNV Assessment.

Existing % Shade	Target / Goal (%)	Adjustment (%)	Segment Length (m)	Segment Length (mi)
0	20	34	259	0.2
0	999	0	3,130	1.9
		Total	3,390	2.1

Table 16: Assessment Unit ID17040217SK007_04 Little Lost River Tributaries, Badger Creek to Big Spring Creek, Private Land Shade Evaluation and Targets Summary. Based on DEQ PNV Assessment.

Existing % Shade	Target / Goal (%)	Adjustment (%)	Segment Length (m)	Segment Length (mi)
30	32	-2	26	0.0
20	32	-12	2,896	1.9
10	32	-22	5,133	3.3
		Total	8,056	5.2

Table 17: Assessment Unit ID17040217SK009_02 Little Lost River Tributaries, Wet Creek to Badger Creek, Private Land Shade Evaluation and Targets Summary. Based on DEQ PNV Assessment.

Existing % Shade	Target / Goal (%)	Adjustment (%)	Segment Length (m)	Segment Length (mi)
Good	Exceeded	None	70	0.0
20	27	-7	319	0.2
		Total	389	0.2

Table 18: Assessment Unit ID17040217SK009_04 Little Lost River, Wet Creek to Badger Creek, Private Land Shade Evaluation and Targets Summary. Based on DEQ PNV Assessment.

Existing % Shade	Target / Goal (%)	Adjustment (%)	Segment Length (m)	Segment Length (mi)
20	29	-9	169	0.1
20	32	-12	2,180	1.4
10	29	-19	778	0.6
10	32	-22	3,011	1.8
0	32	-32	465	0.3
		Total	6,603	4.2

Table 19: Assessment Unit ID17040217SK010_04 Little Lost River, confluence of Summit and Sawmill Creeks to Wet Creek, Private Land Shade Evaluation and Targets Summary. Based on DEQ PNV Assessment.

Existing % Shade	Target / Goal (%)	Adjustment (%)	Segment Length (m)	Segment Length (mi)
0	7	-7	1,977	1.3
20	29	-9	4,068	2.5
10	29	-19	5,214	3.2
0	29	-29	240	0.1
		Total	11,499	7.1

Table 20: Assessment Unit ID17040217SK012_04 Sawmill Creek, Warm Creek to Mouth, Private Land Shade Evaluation and Targets Summary. Based on DEQ PNV Assessment.

Existing % Shade	Target / Goal (%)	Adjustment (%)	Segment Length (m)	Segment Length (mi)
0	32	-32	2,273	1.4

Table 21: Assessment Unit ID17040217SK014_02 Sawmill Creek Tributaries, Private Land Shade Evaluation and Targets Summary. Based on DEQ PNV Assessment.

Existing % Shade	Target / Goal (%)	Adjustment (%)	Segment Length (m)	Segment Length (mi)
60	64	-4	494	0.3
20	27	-7	794	0.5
60	82	-22	373	0.2
40	64	-24	98	0.1
10	39	-29	88	0.1
50	82	-32	243	0.2
40	82	-42	290	0.2
		Total	2,381	1.6

Table 22: Assessment Unit ID17040217SK014_04 Sawmill Creek, Source to Warm Creek, Private Land Shade Evaluation and Targets Summary. Based on DEQ PNV Assessment.

Existing % Shade	Target / Goal (%)	Adjustment (%)	Segment Length (m)	Segment Length (mi)
Good	Exceeded	None	177	0.2
30	31	-1	1,263	0.8
20	26	-6	1,693	1.1
20	31	-11	432	0.3
20	39	-19	29	0.0
		Total	3,595	2.4

Table 23: Assessment Unit ID17040217SK015_02 Squaw Creek, Source to Mouth, Private Land Shade Evaluation and Targets Summary. Based on DEQ PNV Assessment.

Existing % Shade	Target / Goal (%)	Adjustment (%)	Segment Length (m)	Segment Length (mi)
70	89	-19	114	0.1

Table 24: Assessment Unit ID17040217SK019_02a Moffett Creek, Private Land Shade Evaluation and Targets Summary. Based on DEQ PNV Assessment.

Existing % Shade	Target / Goal (%)	Adjustment (%)	Segment Length (m)	Segment Length (mi)
30	31	-1	437	0.3

Table 25: Assessment Unit ID17040217SK019_03 Summit Creek, Private Land Shade Evaluation and Targets Summary. Based on DEQ PNV Assessment.

Existing % Shade	Target / Goal (%)	Adjustment (%)	Segment Length (m)	Segment Length (mi)
Good	Exceeded	None	138	0.1
30	31	-1	1,852	0.8
40	44	-4	573	0.7
10	21	-11	585	0.4
20	44	-24	335	0.2
0	44	-44	1,908	1.1
		Total	5,391	3.3

Table 26: Assessment Unit ID17040217SK020_03 Dry Creek, Dry Creek Canal to Mouth, Private Land Shade Evaluation and Targets Summary. Based on DEQ PNV Assessment.

Existing % Shade	Target / Goal (%)	Adjustment (%)	Segment Length (m)	Segment Length (mi)
Good	Exceeds	0	128	0.1
0	7	-7	3,217	2.0
0	8	-8	10	0.0
		Total	3,355	2.1

Table 27: Assessment Unit ID17040217SK022_03 Wet Creek, Squaw Creek to Mouth, Private Land Shade Evaluation and Targets Summary. Based on DEQ PNV Assessment.

Existing % Shade	Target / Goal (%)	Adjustment (%)	Segment Length (m)	Segment Length (mi)
10	35	-25	936	0.6
0	40	-40	876	0.5
		Total	1,812	1.1

Table 28: Assessment Unit ID17040217SK024_02 Wet Creek, Source to Big Creek, Private Land Shade Evaluation and Targets Summary. Based on DEQ PNV Assessment.

Existing % Shade	Target / Goal (%)	Adjustment (%)	Segment Length (m)	Segment Length (mi)
Good	Exceeds	0	1,097	0.8
50	53	-3	640	0.4
40	45	-5	182	0.1
50	56	-6	369	0.2
70	82	-12	477	0.3
40	53	-13	164	0.1
30	45	-15	79	0.0
60	82	-22	830	0.5
20	53	-33	0	0.0
10	45	-35	70	0.0
10	53	-43	508	0.3
10	56	-46	77	0.0
20	93	-73	40	0.0
		Total	4,531	2.7

Table 29: Assessment Unit ID17040217SK024_03 Wet Creek, Big Creek to Squaw Creek, Private Land Shade Evaluation and Targets Summary. Based on DEQ PNV Assessment.

Existing % Shade	Target / Goal (%)	Adjustment (%)	Segment Length (m)	Segment Length (mi)
Good	Exceeds	0	88	0.1
40	45	-5	282	0.2
30	45	-15	971	0.7
		Total	1,340	1.0

Table 30: Assessment Unit ID17040217SK025_02 Deer Creek, Source to Mouth, Private Land Shade Evaluation and Targets Summary. Based on DEQ PNV Assessment.

Existing % Shade	Target / Goal (%)	Adjustment (%)	Segment Length (m)	Segment Length (mi)
30	65	-35	403	0.3