# Lolo Creek Watershed
# Total Maximum Daily Load
# Implementation Plan for Agriculture

Developed for the Idaho Department of Environmental Quality
Prepared by: Idaho Soil Conservation Commission
In Cooperation with Clearwater Soil and Water Conservation District

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# TMDL Implementation Plan for Agriculture

# Lolo Creek Watershed

## Introduction

This report will serve as an addendum to the 1993 Agricultural Pollution Abatement Plan (APAP) Lolo / Fords Creek final report, and will also serve as the Lolo Creek Watershed Agricultural TMDL Implementation Plan. The Idaho Department of Environmental Quality (IDEQ) is currently writing the TMDL for the Lolo Creek Sub basin, and it should be completed in 2010. The Idaho State Soil and Water Conservation Commission (SWC) is responsible for preparing the Lolo Creek Watershed TMDL Implementation Plan for grazing and agriculture. This implementation plan will focus on implementing Best Management Practices (BMPs) and will work toward restoring the designated beneficial uses to full support status.

### Purpose

The Lolo Creek TMDL Implementation Plan for Agriculture outlines an adaptive management approach for implementation of best management practices (BMPs) and resource management systems (RMS) on agricultural lands. The purpose of this plan is to recommend BMPs that would improve or restore physical, chemical, and biological functions of Lolo Creek Watershed.

### Goal

The goal of this implementation plan is to assist in a comprehensive watershed management plan focusing on agriculture and grazing improvements that compliment other resource improvements specified in the Lolo Creek Tributaries Subbasin Assessment and TMDLs. The overall goal is to meet the TMDL load reductions for the listed pollutants and to restore and protect the designated beneficial uses of Lolo Creek.

### *Objectives*

Lolo Creek is listed in Section 2 (Waters that Support Beneficial Uses) on the 2008 Integrated 303(d) / 305(b) list as meeting full support status but Jim Brown Creek, a tributary to Lolo Creek, is listed in Section 5 (Impaired Waters), as a water quality limited stream because of excessive nutrients, bacteria, sediment and temperature (Table 1). Musselshell Creek and Eldorado Creek are listed in Section 5 because of low biota and habitat ratings, based on the DEQ Bioassessment BURP Protocol.

**Table 1. 2008 303(d) impaired listed streams within Lolo Creek watershed (IDEQ, 2008).**

| *Stream Name* | *Stream Description* | *Listed Pollutants* |
|---|---|---|
| Jim Brown Creek ID17060306CL031_02 & _03 | Source to mouth | Nutrients, Bacteria, Sediment, Temperature |
| Musselshell Creek ID17060306CL032_02 & _03 | Source to mouth | Combined Biota/Habitat Bioassessments (DEQ - BURP) |

Note: Eldorado Creek is also listed for combined biota/habitat bioassessments but will not be discussed further in this plan because of its location on USFS.

This plan will focus implementation efforts on Best Management Practices (BMPs) designed to reduce nutrient, bacteria, and sediment contributions and to lower stream temperatures on Lolo Creek and its tributaries on agriculture, pasture, hayland, and forestland. Emphasis will also be placed on BMP effectiveness evaluation and monitoring in terms of pollutant reduction and impacts on the existing beneficial uses of all the listed stream segments.

A concerted effort will be made to coordinate all implementation projects with the many agencies and entities having resource management responsibilities within this watershed. A coordinated resource management plan between these agencies would greatly enhance the successful implementation of the Lolo Creek Tributaries SBA/TMDLs.

# Background

## Project Setting

The Lolo Creek watershed, located within the Clearwater River subbasin, consists of 156,786 acres and is located in the Columbia Plateau and Northern Rocky Mountains Geomorphic Provinces of north central Idaho (Figure 1). Bedrock predominantly consists of granitic rock of the Idaho Batholith on the east side, Columbia River Basalt on the west, and metamorphic rock on the southwest edge of the watershed. The portion of the watershed developed in granitics exhibits a large amount of topographic relief and greatest channel density.

Climate in the watershed is characterized by cool moist winters and warm dry summers and varies with elevation. Rainfall patterns change markedly with elevation. The average annual precipitation ranges from 24 inches at Kamiah (elev. 1212 ft.) to 43 inches at Pierce (elev. 3188 ft.) to more than 70 inches at Hemlock Butte (elev. 5810

ft.). At the higher elevations a greater proportion of the yearly total precipitation is received in the form of snow during the winter season (Nov. – March).

The growing season also varies in the watershed based on climatic data from three nearby stations (Orofino, Kooskia, and Nez Perce). The average consecutive frost free period, above 32 degrees, ranges from 158 days at the lowest elevation, to 118 days on the upland prairies (CSWCD 1993).

Soils within the Lolo Creek watershed are located on several different landforms with a mixture of parent materials. There are alluvial soils located on stream terraces and in basins. Soils on plateaus and uplands are formed in residuum and loess with ash mantle in areas. Steep canyon sides with occasional gently sloping benches have soils formed in colluviums, residuum, and slope alluvium with an addition of loess and an ash mantle in areas. Foothills and mountainsides have soils formed in colluviums, residuum, and slope alluvium generally from granite or basalt. They have ash mantles of varying thickness.

Vegetation consists primarily of conifer forest. The steep south-facing slopes on the North side of the canyon support ponderosa pine woodland interspersed with rocky, grassy openings, and sparsely vegetated cliffs and rock outcrops. Herbaceous vegetation dominates the pine understory. Shrubs are uncommon, except in draws, or in association with some other rocky habitats. Canyon grassland openings tend to be dominated by invasive annual grasses such as ventanata (*Ventenata dubia*) and bromes (*Bromus* spp.). Intact native bunchgrass understory's or canyon grasslands containing bluebunch wheatgrass (*Agropyron spicatum*) and Idaho fescue (*Festuca idahoensis*) are apparently rare. Douglas-fir becomes common and is the dominant or co-dominant conifer in most places, along with ponderosa pine, all the way to the Clearwater NF boundary. This change to mixed conifer vegetation coincides with the point where timber harvesting has been widespread. Shrubs such as common snowberry (*Symphoricarpos albus*), mallow ninebark (*Physocarpus malvaceus*), and oceanspray (*Holodiscus discolor*) also become widespread. On these southerly aspects, grand fir (*Abies grandis)* is locally common only towards the upper end of the watershed. Other conifers such as lodgepole pine (*Pinus contorta*), western larch (*Larix occidentalis*) and western redcedar (*Thuja plicata*) also occur in places. The steep north-facing slopes on the south side of the canyon support a closed canopy Douglas-fir forest along the lower half of the watershed. Timber harvest has been minimal here, in contrast to adjacent forests above the canyon. Large rock outcrops are frequent along the canyon face. Riparian vegetation is best developed in floodplain areas. White alder (*Alnus rhombifolia)* occurs along lower Lolo Creek. Communities characterized by thinleaf alder (*Alnus incana*), black cottonwood (*Populus trichocarpa*), Pacific ninebark (*Physocarpus capitatus*), or other deciduous tall shrubs are common. (Mancuso, 1996)

Introduced weedy species are found throughout Lolo Creek canyon. Dry, rocky canyon slopes, areas disturbed by logging operations, and riparian sections grazed by livestock have been especially prone to weed invasion. Invasive annual grasses, notably ventanata and several species of brome dominate the grassy openings along

the lower canyon's steep south-facing slopes. Pasture grasses such as orchard grass (*Dactylis glomerata*) and timothy (*Phleum pratense*) are common as a result of post-logging reseeding efforts and areas planted to pasture. Another forage grass, hedgehog dogtail (*Cynosurus echinatus*) is locally common in dry, rocky forest openings. Yellow starthistle (*Centaurea solstitialis*) and Spotted knapweed (*Centaurea maculosa*) are common along open floodplain segments of Lolo Creek and in some open areas that were logged in the past. The most widespread weedy forb is erect cinquefoil (*Potentilla recta*). It occurs throughout the canyon in all but closed canopy habitats and is abundant in many places. Large to small swards of bracken fern (*Pteridium aquilinum*) are common in disturbed areas, especially in areas that have been logged. (Mancuso, 1996)

## Threatened and Endangered Species

Idaho's anadromous fish species are truly unique because few Columbia River salmon and steelhead currently have the ability to make spawning migrations of up to 900 miles. Lolo Creek is a significant producer of spring Chinook salmon and summer steelhead trout in the Clearwater River Subbasin.

Fish population surveys show that steelhead, cutthroat, bull trout, spring Chinook salmon, whitefish and brook trout are present in Lolo Creek. In addition, the Nez Perce Tribe spring Chinook rearing facility is located along Camp Creek and uses water from both Camp and Yoosa creeks. Only the steelhead, bull trout and Chinook salmon are on the Threatened and Endangered list. (USFS, 1999)

Spring-run Chinook salmon are a sensitive species and occur in Lolo Creek. Concentrated spawning areas occur along Lolo Creek up to Yoosa Creek. (USFS, 1999)

Steelhead trout are listed as threatened under ESA. The Lolo Creek drainage produces very few steelhead trout due to overall low adult returns and habitat conditions. Adult and juvenile plantings have occurred over the past 20 years. Steelhead trout mostly spawn in the mainstem of Lolo Creek (from Musselshell Creek to Yoosa Creek) and possibly a few other accessible tributaries in upper Lolo Creek drainage. (USFS, 1999)

Although the Lolo Creek drainage was probably within the historical range of bull trout, populations have since been largely extirpated. No documented spawning or rearing of bull trout has occurred in the Lolo Creek drainage over the past several years (USFS 1999). Past monitoring by federal, state, and tribal biologists show two juvenile bull trout in 1987, and a total of 15 fish from 1990, 1993-1995, 1998- 2000, and 2003-2004 surveys. No fish were observed in 1996-1997, 2001-2002, or from 2005-2007.

There are three known wolf pack in the Lolo creek watershed; all of which are listed as experimental populations. The Gray Wolf, being a keystone predator, is an integral component of the ecosystems to which it typically belongs. The wide range of habitats

in which wolves can thrive reflects their adaptability as a species, and includes temperate forests, mountains, tundra, taiga, and grasslands. (USFWS, 2011)

Plants of concern in Lolo Creek watershed are Broad-fruit Mariposa, and Plumed clover according to the NRCS ARC-GIS cdceo database.

## Subwatersheds

Most of the tributaries within the Lolo Creek watershed are located in the forested areas of the Clearwater National Forest (CNF). The Musselshell subwatershed is a subunit of the Lolo Creek watershed and it contains Jim Brown Creek and Musselshell Creek. Jim Brown Creek and a small section of Musselshell Creek are the only tributaries listed as water quality impaired and located within the agricultural portion of the Lolo Creek watershed. Grazing is the predominant agricultural land use within these two drainages.

The Musselshell subwatershed encompasses 35,304 acres and contains almost exclusively timbered areas and riparian meadows with livestock grazing (Hoffman 1991). Land ownership consists of Potlatch Corporation (58%), Idaho Department of Lands (25%), US Forest Service (13%), and private ownership (14%).

The majority of the cropland acres (8,037 acres) are located in the Fraser area (approximately 7 mi from the Clearwater River on Highway 11 on the Weippe Prairie) in the northwest portion of the watershed.

### Land Ownership and Use

Land ownership in this watershed is comprised of federal, state, private, and tribal holdings. The U.S. Forest Service (USFS) manages the eastern-most portion of the watershed, which is federally owned. The USFS manages approximately 51% of the timbered watershed, with BLM managing around 2%. The rest of the timbered ground is split in part with Idaho Department of Lands (IDL) owning 12%, and Potlatch Corporation (industrial private) and the private (non-industrial) sharing 34%. The remaining 1% is owned and managed by the Nez Perce Tribe (NPT) and the Bureau of Indian Affairs (BIA) (Figure 2).

Land uses included within the private non-industrial portion are forestry, non-irrigated cropland and pasture/hayland. Cropland and pasture/hayland represents an overall 5% and 4% respectfully (Figure 3).

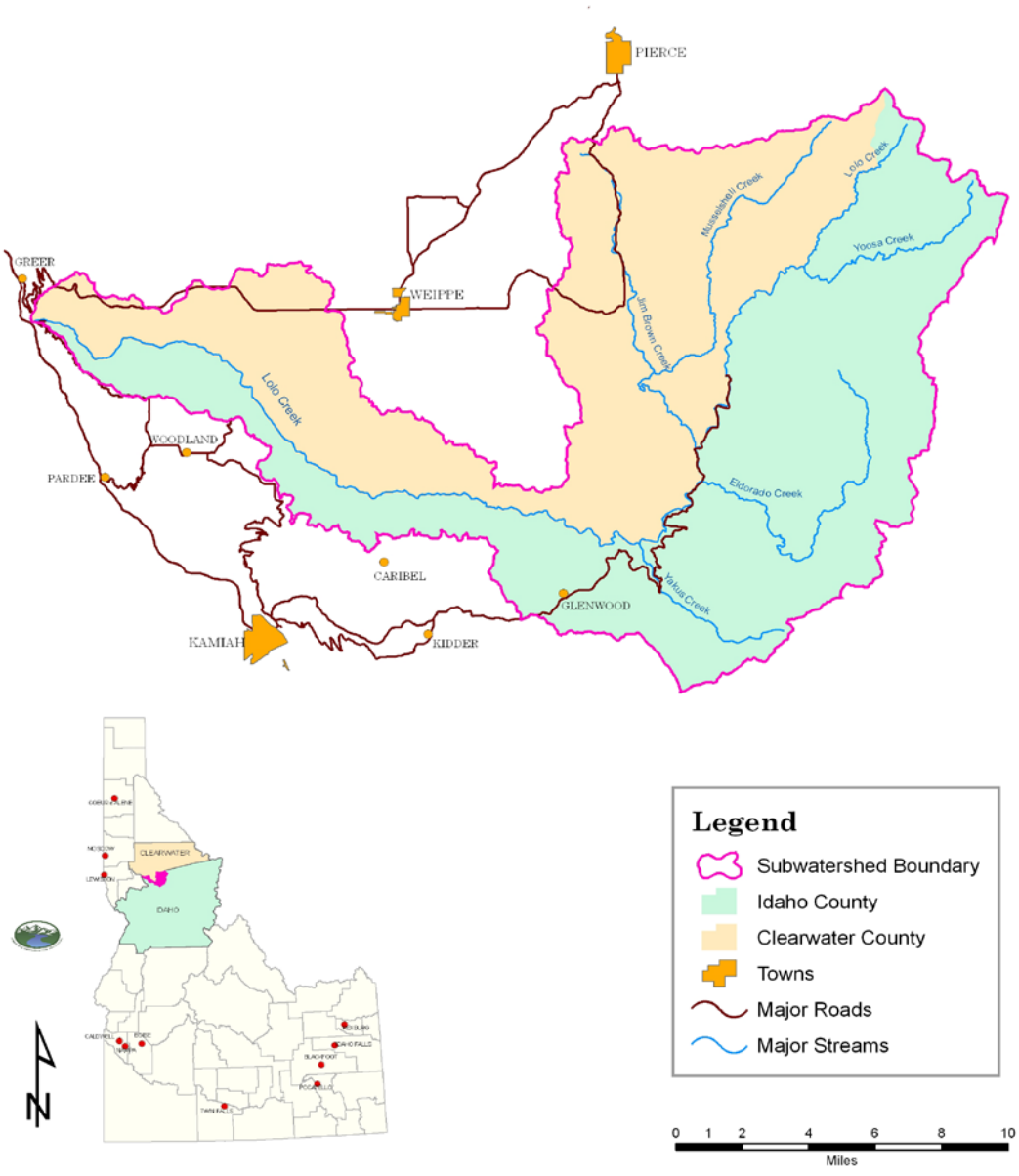


Figure 1. Location Map

# Lolo Creek Subwatershed Management Map

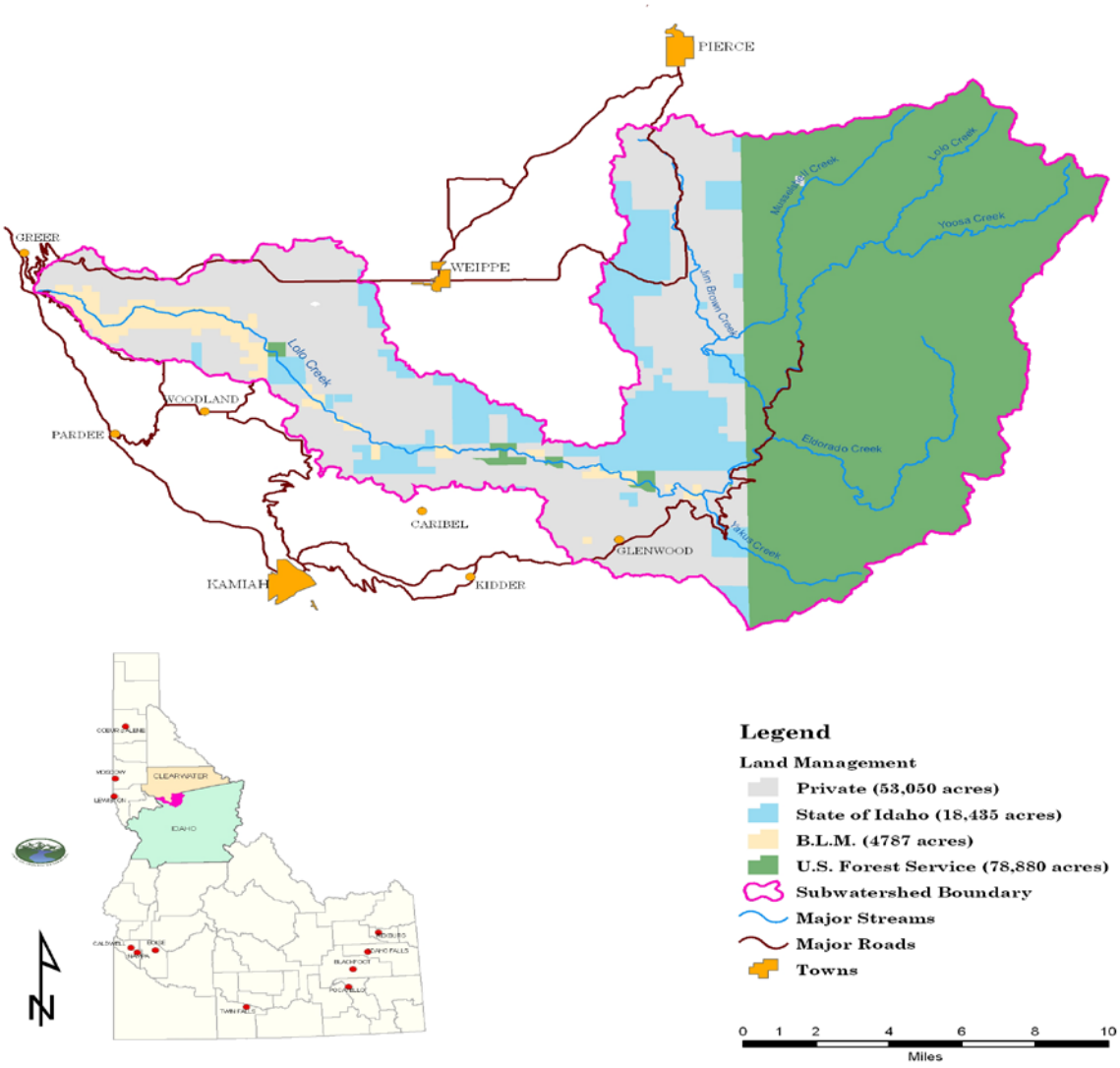


Figure 2. Land Management

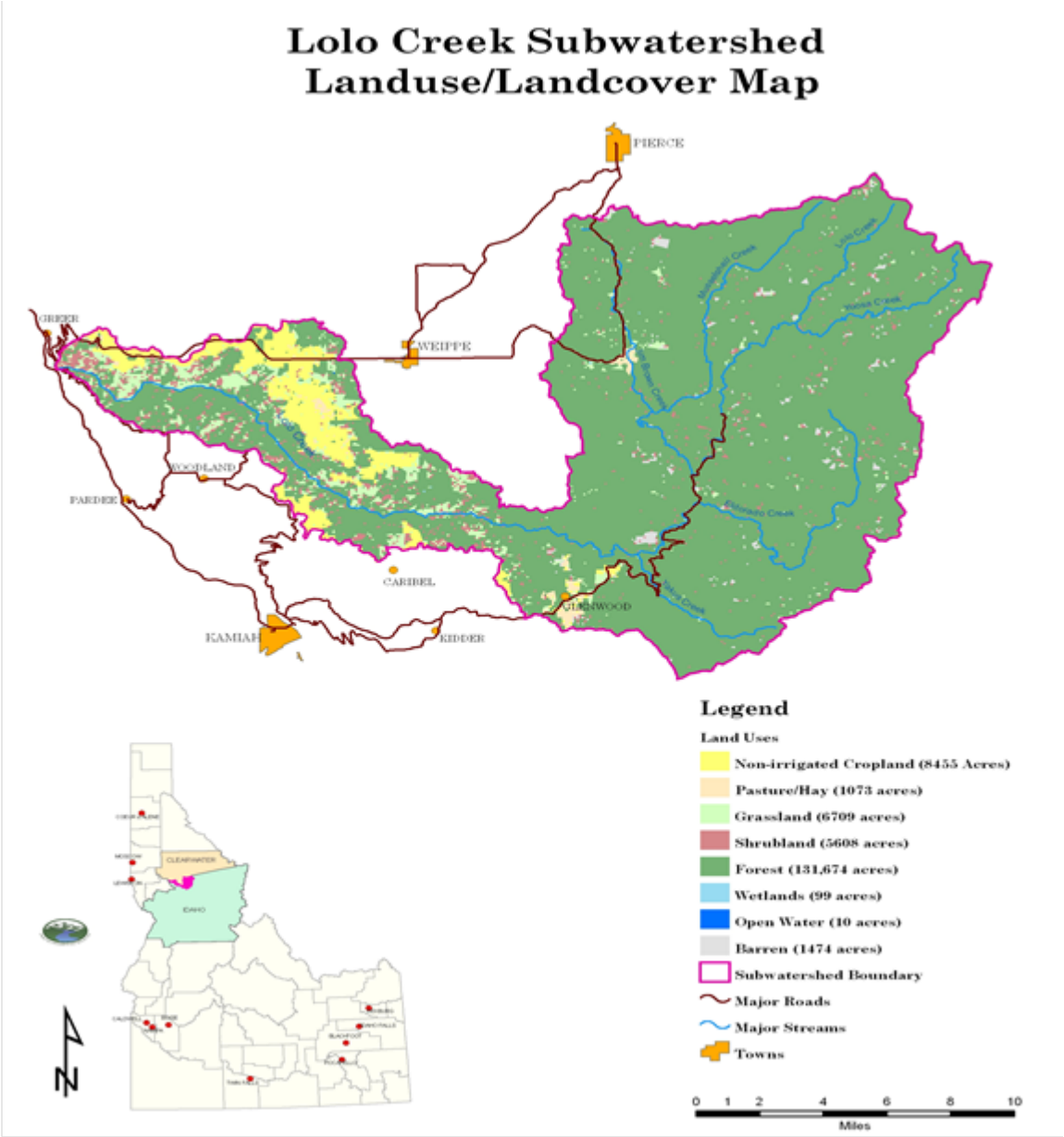


Figure 3. Land Use / Land Cover

## Conservation Accomplishments

The Lolo Creek watershed is a very diverse and contains many resources. These resources include outstanding fisheries, abundant wildlife, many pristine streams, wetlands, riparian areas, cultural resources, recreation and aesthetics. As such, water quality has always been at the forefront when water quality management plans have been discussed and implemented.

The USFS, BLM, IDL, Potlatch Corporation, and the Nez Perce Tribe have all implemented numerous water quality improvement projects over the years. The majority of these improvement projects took place within the forested sector of the Lolo Creek watershed. Project accomplishments include (but are not limited to) such things as culvert upgrades to improve fish passage, streamwork to improve fish habitat, road work, and forest stand improvements.

This implementation plan focuses on agriculture and grazing. The conservation accomplishments related to those land uses are listed below.

### Federal Programs

CRP

In 1990 there were 1,050 acres of cropland enrolled in the Conservation Reserve Program (CRP). Approximately 615 acres remain in the CRP program today. Additionally, there are 138 acres currently enrolled in the Continuous Conservation Reserve Program (CCRP) for streamside pasture projects. One of the largest CCRP contracts in the nation, which won a national award for the participating landowner, was the Lolo Creek Riparian Restoration Project within the Cottonwood Flats section of Lolo Creek. Fencing, livestock exclusion and streambank re-vegetation made up the bulk of the BMPs that were implemented.

### State Programs

EPA 319 Clean Water Act Grant

A biological assessment was performed in August of 1996 on reaches upstream and downstream of the Kamiah-Weippe Road bridge crossing. The biological assessment was designed to provide baseline information indicating the status of biological conditions within the stream. The CSWCD spent approximately $87,000 of EPA 319 grant funds to install the BMPs needed to control erosion and sediment delivery to Lolo Creek.

A project to stabilize the eroding roadway leading to Lolo Creek was initiated. A preliminary survey was conducted in April of 1997 to assess the condition of the roadway prior to road stabilization work. Road work was initiated in the early summer of 1997 and completed during the summer of 1998. A follow up implementation effectiveness survey was completed in September of 1998.

The conclusions drawn from this project showed that best management practices installed between 1997 and 1998 mitigated road problem areas and nearly eliminated heavy sediment delivery to Lolo Creek from eroding roadways. Some sediment delivery continues due to slope steepness and aspect.

Stream habitat can be expected to improve due to the installed erosion control practices (Gilmore 1998).

SAWQP

In 1992, the Clearwater Soil and Water Conservation District applied and received funding for Lolo Creek improvements through the State Agricultural Water Quality Program (SAWQP). That funding program lasted through 1999 and covered the implementation of many BMPs on cropland and pasture/hayland. No-till, continuous no-till and direct seed operations increased from less than 10 percent at the start of the project to over 90 percent at project completion. Over half of the total project funds were focused on the advancement of no-till and direct seed operations.

As a result of the adoption of this tillage operation, sheet and rill erosion was completely eliminated; gully erosion was greatly reduced on cropland within the Fraser area (approximately 7 mi from the Clearwater River on Highway 11 on the Weippe Prairie) of this watershed.

In the last two decades, many smaller acreage farm operators within the watershed have since quit farming due to their advanced ages. Currently, there are just a few farm operators cultivating the majority of the cropland acres within the Lolo Creek watershed.

Table 2 summarizes the BMPs installed from the SAWQP Project.

**Table 2. Completed SAWQP Agricultural BMPs in the Lolo Creek Watershed.**

| *Resource* | *BMP* | *Amount* | *Units* | *Cost* |
|---|---|---|---|---|
| **Cropland** | Access Road | 62 | Ft. | |
| (8,037 acres) | Contour Farming | 9729 | Ac. | |
| | Grade Stab. Structure | 5 | Ea. | |
| | Grassed Waterway | 413 | Ft. | |
| | Residue Mgmt. No-Till | 10,244 | Ac. | |
| | Residue Mgmt. Seasonal | 769 | Ac. | |
| | Strip Cropping, Field | 76 | Ac. | |
| | Subsurface Drain | 11,988 | Ft. | |
| | Water and Sediment Control Basin | 4 | Ea. | |
| **Pasture/Hayland** | Critical Area Planting | 1 | Ac. | |
| (2,978 acres) | Diversion Dam | 375 | Ft. | |
| | Fence | 39,004 | Ft. | |

| | | | | |
|---|---|---|---|---|
| | Heavy Use Protection | 9 | Ea. | |
| | Pasture/Hayland Planting | 402 | Ac. | |
| | Pipeline | 150 | Ft. | |
| | Pond | 4 | Ea. | |
| | Prescribed Grazing | 7,550 | Ac. | |
| | Use Exclusion | 13 | Ac. | |
| | Watering Facility | 2 | Ea. | |
| **TOTAL BMP COSTS** | | | | **$574,076** |

Jim Brown Creek Riparian/Wetland Restoration Project

In early 1995, the CSWCD implemented a riparian/wetland project, funded by SAWQP in the Jim Brown Creek watershed. The site was located in the middle reaches of Jim Brown Creek on privately owned land. The lower reach of Bat Creek, a small tributary to Jim Brown Creek, was added to the project area in 1996. Dollar figures associated with the installed BMPs for the Lolo Creek SAWQP are shown in Table 2. Several BMP components were installed in this area (Table 3).

**Table 3. Riparian/Wetland BMP Component Practices**

| *BMP Components* | *Component Amount* | *Component Practice Purpose* |
|---|---|---|
| Planned Grazing Systemincluding: Proper Grazing Use, Deferred Grazing, and Livestock Exclusion | 32 acres | Reduce erosion and improve water quality |
| Heavy Use Area Protection | 4 stream access ramps | Stabilize areas frequently and intensively used by animals and protect the area from erosion |
| Riparian Fencing<br>Jim Brown Creek<br>Bat Creek | 2303 feet<br><br>450 feet | Exclude livestock from area that is protected from grazing; protect new seedlings and plantings from grazing |
| Streambank and Shoreline Protection | 2303 feet | Use tree and shrub vegetation to stabilize and protect streambanks, improve water quality and habitat for fish and wildlife |

Due to BMP installation, vegetation now covers previously bare and unstable banks; local erosion is diminished and sediment delivery downstream likely reduced. Woody vegetation plantings had a difficult time surviving competition from grasses, rodent damage, and drought. But, exclusion fencing to deter grazing at the project area has allowed grass growth and volunteer woody vegetation re-growth to occur. Photos captured changes in vegetative re-growth. The most dramatic results occurred within the first year following BMP implementation along both Jim Brown and Bat Creeks.

The stream access ramps installed on both Jim Brown and Bat Creek are protecting riparian areas from erosion by limiting cattle access to specific entry sites. Stream access ramps have proven effective at reducing sediment delivery from stock trails and streambank trampling.

Photo documentation provided a simple visual to show marked improvements in streambank stabilization. Using snapshots, a short-term evaluation was possible. A vivid improvement to streambank stabilization and reduced erosion was realized from BMP implementation. Biological indicators proved to be an excellent supplement to photo documentation for evaluating the effectiveness of BMP component implementation. Biological indicators provide a broad picture of overall aquatic health. Although the biological indicators respond very quickly to improved habitat conditions, follow-up evaluations are required to authenticate long term water quality improvements. These biological indicators that were collected subsequent to BMP installation suggest improved water quality conditions. (Gilmore, 2000).

## Past Monitoring Associated with Accomplishments

Excerpts taken from “Lolo Creek SAWQP Trend Analysis – 1996 through 2000 Water Years” (Gilmore 2001).

“The goal of this monitoring effort was to estimate trends in watershed sediment loading. The efforts bring to light the interdependence between stream conditions and weather patterns. For each of the monitoring stations, the tons of suspended sediment discharged per water year decreased compared to values prior to project initiation, as well as those compared to the first water year of the monitoring regime. Although, mean discharge values and annual precipitation also decreased. Since the amount of solids discharged out of the system is determined mathematically (rate of flow multiplied by the concentration of solids), it is logical to predict the solids discharged will decrease with less runoff.

Best management practices have been implemented on the majority of agricultural lands within the watershed. The CSWCD has completed other sediment delivery reduction programs within this timeframe, including the above mentioned road stabilization project immediately upstream of the Middle Lolo Creek monitoring site, and

the riparian grazing demonstration project upstream of the Jim Brown and Texas Creek monitoring stations.

In summary, the projects have resulted in a decrease in sediment loading from selected monitoring stations throughout the monitoring seasons. Because the watershed is so large and agricultural lands are the minority of land uses, it is difficult to link the reduction of sediment loading directly to BMP implementation. The scope of this monitoring effort did not include a detailed evaluation of watershed hydrology.

Stream levels were continuously recorded with a high level of confidence, as well as samples taken and evaluated for total suspended sediment. Although, stage to discharge calculations were estimated with precursor values assigned. A more detailed evaluation of watershed hydrology needs to be performed. Sediment is delivered to receiving waters from many other land uses within the drainage, including roadways, streambank erosion, timber harvest activities, etc. Through site examinations, testimonials, and photos, the CSWCD, Idaho SCC, and USDA-NRCS staff has strong supporting documentation linking BMP implementation to sediment delivery reductions."

### Compilation of Water Quality Monitoring Efforts for Jim Brown Creek

In 1994, a Coordinated Resource Management Cooperative was formed to address sedimentation and water temperature issues within the Jim Brown Creek watershed. The Cooperative suggested a compilation of previous and on-going monitoring efforts be conducted. Results were distributed to inform landowners and Cooperative members of the monitoring efforts extent. This report describes watershed monitoring projects to include project sponsors and monitoring parameters. (McRoberts, 2003-2004)

Monitoring conducted in the decade of 1990 through 2000 includes work accomplished by Potlatch Corporation, Idaho Department of Health and Welfare-Division of Environmental Quality (DEQ), the Clearwater Soil and Water Conservation District (CSWCD), US Forest Service, Nez Perce Tribe, and Idaho Department of Fish and Game. (McRoberts, 2003-2004)

# 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 Lolo Creek

watershed water bodies identified on the 2008 Integrated 303(d) list in the Lolo Creek watershed are listed below in Table 4. (IDEQ, 2011)

**Table 4. Lolo Creek tributaries beneficial uses.**

| Stream Name | Listing | Assessment Unit | Designated Beneficial Uses | Existing Beneficial Uses [a] |
|---|---|---|---|---|
| Eldorado Creek | Source to mouth | ID17060306CL029_02 | None Designated | COLD, SCR, SS |
| Jim Brown Creek | Source to mouth | ID17060306CL031_02 & 031_03 | None Designated | COLD, SCR, SS |
| Musselshell Creek | Source to mouth | ID17060306CL032_02 & 032_03 | None Designated | COLD, SCR, SS |

[a] COLD – cold water aquatic life, SS – salmonid spawning, SCR – secondary contact recreation,

## Pollutants

The following statements were taken directly from the Lolo Creek SBA-TMDL (IDEQ, 2011).

> "Nutrient, sediment, *E. coli* and DO concentrations measured during the year long sampling effort did not show that numeric criteria were exceeded. Where narrative criteria were used, the measured concentrations fell within the target ranges developed for other regional TMDLs.
>
> Instantaneous temperature measurements exceeded the salmonid spawning criteria, especially if the stringent bull trout requirements are applied. Continuous temperature data collected by the CNF also exceeded salmonid spawning criteria for short durations, and were the most likely source of the original 303(d) temperature listings in the subbasin. Measurements of existing shade taken on 7 stream segments in the subbasin showed that all the listed streams lack shade when compared to desired targets for their riparian vegetation types and bankfull widths. Dollar Creek, Eldorado Creek and Musselshell Creek have relatively good quality segments with respect to shade and other segments that need improvement. Jim Brown Creek consistently lacks substantial shade. (Table 2)." (IDEQ, 2011)

**Table 2. Summary of assessment outcomes.**

| Stream Name | Assessment Unit | Pollutant | TMDL(s) Completed | Recommended Changes to §303(d) List | Justification |
|---|---|---|---|---|---|
| Eldorado Creek | ID17060306CL029_02 | Temp | Yes | Move to Section 4a | SBA/TMDL completed |
| Jim Brown Creek | ID17060306CL031_02 & 03 | Temp, Nut, Bac, Sed | Temp Yes | Move to Section 4a for Temp, remove Nut, Sed, Bac | SBA/TMDL completed |
| Musselshell Creek | ID17060306CL032_02 & 03 | Temp | Yes | Move to Section 4a | SBA/TMDL completed |

The Potential Natural Vegetation (PNV) temperature presented in Chapter 5 of the TMDL call for more shade on upper Eldorado Creek, Jim Brown Creek and Musselshell Creek. Future restoration projects undertaken in the name of temperature TMDL implementation should help stabilize the banks and reduce direct access to the stream by cattle, which should further reduce the amount of sediment, nutrients and *E. coli* conveyed to these streams. A growth reserve is not included in the total maximum daily loads. Future sources will need to acquire a load allocation from existing allocations unless the load capacity is increased.

## AGRICULTURAL INVENTORY AND EVALUATION

Recent investigations have determined that there are some private lands in areas of Lolo Creek that are not on the 303(d) list, which could benefit from BMP implementation. These few areas are included in Table 5 along with Jim Brown Creek estimates. Jim Brown does remain as the primary focus for BMP implementation. Areas of concern when inventoried were primarily range and pasture areas; private forest areas and riparian areas.

## RECOMMENDED BMPS AND ESTIMATED COSTS

BMPs appropriate for the reduction of agricultural impacts to water quality in the Lolo Creek subwatersheds and their installation costs are listed below in Table 5. Conservation planning with willing individual landowners will determine the most appropriate BMPs to install. The information included in Table 5 provides a rough estimate only of the BMPs recommended for critical acres in the subbasin. A more precise estimate of individual quantities required of each recommended BMP will be determined during conservation plan development with a particular landowner.

This plan will make BMP recommendations only for private lands within the watersheds examined. Jim Brown Creek is the primary drainage recommended for BMP installation. There are some areas directly along Lolo Creek and in private lands on Musselshell Creek that may need some BMP installations as well. Table 5 gives the recommended BMP's and the amount of each that would be recommended based on

the past monitoring, evaluations and assessments that have occurred. The primary focus should be on interested volunteers that are willing to implement these practices. The closer to the actual stream work is done, the more impact it will have on the water quality in the short term.

**Table 5. Recommended BMPs and estimated costs.**

| *TU* | *Recommended BMPs* | *NRCS Practice Code* | *Estimated Number* | *Units* | *Estimated Costs* |
|---|---|---|---|---|---|
| Cropland / | Pasture and Hay Planting | 512 | 20 | acre | $ 1,600.00 |
| Hayland | Residue Management | 329 | 20 | acre | $ 600.00 |
| | Nutrient Management | 590 | 20 | acre | $ 10.00 |
| Range | Fence | 382 | 1000 | foot | $ 4,500.00 |
| | Spring Development | 574 | 5 | each | $ 15,000.00 |
| | Pipeline | 516 | 5000 | foot | $ 21,750.00 |
| | Watering Facility | 614 | 7 | each | $ 14,000.00 |
| | Prescribed Grazing | 528 | 1000 | acre | $ 3,000.00 |
| Forestry | Access Road | 560 | 10000 | foot | $ 200,000.00 |
| | Critical Area Planting | 342 | 150 | acre | $ 66,000.00 |
| | Forest Slash Treatment | 384 | 2000 | acre | $ 600,000.00 |
| | Forest Stand Improvement | 666 | 10000 | acre | $ 5,000,000.00 |
| Riparian | Channel Stabilization | 584 | 5000 | foot | $ 500,000.00 |
| | Fence | 382 | 10000 | foot | $ 45,000.00 |
| | Heavy Use Protection | 561 | 20 | each | $ 100,000.00 |
| | Prescribed Grazing | 528 | 150 | acre | $ 450.00 |
| | Riparian Forest Buffer | 391 | 50 | acre | $ 200,000.00 |
| | Streambank Protection | 580 | 5000 | foot | $ 300,000.00 |
| | Spring Development | 574 | 15 | each | $ 45,000.00 |
| | Pipeline | 516 | 10000 | foot | $ 43,500.00 |
| | Watering Facility | 614 | 15 | each | $ 30,000.00 |
| | | | | | |
| TOTAL: | | | | | $ 7,190,410.00 |

These BMP's have been selected due to their past success in reducing pollutant loadings and benefiting water quality. A discussion in the "Conservation Accomplishment" section on BMP successes provides the anticipated benefit from these selected BMP's as seen from past accomplishments.

## Funding

Financial and technical assistance for installation of BMPs is needed to ensure success of this implementation plan. The Clearwater 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

**Water Quality Program for Agriculture (WQPA) –**The WQPA is administered by the Idaho Soil and Water Conservation Commission (SWC). This program is also coordinated with the TMDL process.

**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.

**Conservation Improvement Grants** – These grants are administered by the SWC.
**PL-566** –This is the small watershed 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 http://www.nrcs.usda.gov/programs/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 http://www.nrcs.usda.gov/programs/crp/

**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: http://www.nrcs.usda.gov/programs/cta/

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

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

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

**State Revolving Loan Funds** (**SRF) –**These funds are administered through the ISCC. Source: ISCC http://www.scc.state.id.us/programs.htm

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

**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 http://www.nrcs.usda.gov

**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. Source: http://www.glci.org/

**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 http://fishandgame.idaho.gov/cms/wildlife/hip/default.cfm

**Partners for Fish and Wildlife Program in Idaho –** This is a U.S. Fish and Wildlife program providing funds for the restoration of degraded riparian areas along streams, and shallow wetland restoration. Source: USFWS http://www.fws.gov/partners/pdfs/ID-needs.pdf

**Outreach**

Conservation partners in the Lolo watershed will use their combined resources to provide information about BMPs to improve water quality to agricultural landowners and operators. 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
- Organize an informational tour bringing together other local governments and Soil Conservation Districts' Board of Supervisors.

# Monitoring and Evaluation

## Field Level

At the field level, annual status reviews will be conducted by district or partner agency personnel to insure 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 SWC 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 has used 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 insure 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 insure 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.

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