Little Lost River Subbasin

TMDL Five-Year Review

Final

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TMDL Five-Year Review

July 2015

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Table of Contents

List of Tables

List of Figures

Executive Summary

This document presents a 5-year review of the *Little Lost River Subbasin TMDL* (DEQ 2000) and addresses the water bodies in the Little Lost River subbasin that are in Category 4a of Idaho's most recent federally approved Integrated Report. This 5-year review has been developed to comply with Idaho Code §39-3611(7) and describes current water quality status, pollutant sources, and recent pollution control efforts in the Little Lost River subbasin, located in eastern Idaho.

The total maximum daily loads (TMDLs) subject to 5-year review are shown in Table A. Sediment TMDLs were completed for the 4th- and 5th-order assessment units (AUs) of the Little Lost River, 4th-order AUs of Sawmill Creek, and 2nd- and 3rd-order AUs of Wet Creek. All sediment TMDLs were approved in 2000, and implementation plans were completed in 2002 (DEQ 2000; Smith 2002).

In 2000, temperature TMDLs were developed and submitted to EPA for two 4th-order AUs of the Little Lost River, one 4th-order AU of Sawmill Creek, and two 3rd-order AUs of Wet Creek. EPA did not take action to approve or disapprove the temperature TMDLs. These temperature TMDLs were erroneously reflected in the 2012 IR as being approved. However, DEQ as part of a parallel effort to this Five Year Review has revised those original temperature TMDLs along with new temperature TMDLs to be submitted to EPA for approval in a separate TMDL addendum.

Table A. Existing sediment TMDL's general status.

Stream Name	Assessment Unit Number	Pollutant	TMDL Approval Year	Implementation Plan Completed	Implementation Activities	Water Quality Trend
Little Lost River	ID17040217SK002_05 ID17040217SK007_04 ID17040217SK009_04 ID17040217SK010_04	Sediment	2000	2002	Fish barrier removals, riparian restoration, intensive riparian management	Improving
Sawmill Creek	ID17040217SK012_04 ID17040217SK014_04	Sediment	2000	2002	Fish barrier removals, riparian restoration, intensive riparian management	Improving
Wet Creek	ID17040217SK024_02 ID17040217SK024_03	Sediment	2000	2002	Fish barrier removals, riparian restoration, intensive riparian management	Improving

Subbasin at a Glance

Substantial improvements have occurred within the three watersheds with respect to sediment loads (Table B). The streambank erosion inventory shows loads have reached target levels in a number of areas as a result of intensive riparian management and improvements to habitat conditions. Depth fines remain a problem for spawning areas and will likely require more time to improve. TMDL AUs should remain in Category 4a for sediment until depth fines improve. New temperature TMDLs will bring many of the AUs within the subbasin into the TMDL process.

Table B. Subbasin at a glance.

Approved TMDLs	Pollutants	Assessment Units Moving from Category 4a to 2
Sawmill Creek—sediment Wet Creek—sediment Little Lost River—sediment	Sediment and temperature	All assessment units addressed in TMDL currently remain listed in Category 4a for sediment. Five AUs are also in Category 4a for temperature.
Implementation Plans	**Implementation Actions**	**Assessment Units Moving from Category 3 to 5**
Agricultural (Smith 2002) Bureau of Land Management administered lands (BLM 2002)	Fish barrier removals, riparian exclosures, intensive riparian management	Seventeen newly listed AUs remain in 2012 Integrated Report Category 5 for temperature (addressed in separate addendum).
		Estimated Percent of Subbasin in Category 4a or 5
		70%

About Assessment Units

Prior to 2002, impaired waters were defined as stream segments with geographical descriptive boundaries. In 2002, the Idaho Department of Environmental Quality modified the structure and format of Idaho’s §303(d) list by combining it with the §305(b) report, required by the Clean Water Act, to inform Congress of the state of Idaho’s waters. This modification included identifying stream segments by AUs instead of nonuniform stream segments and defining the use support of stream AUs by five categories in the Integrated Report. AUs now define all of Idaho’s waters.

1 Introduction

The federal Clean Water Act (CWA) requires that states and tribes restore and maintain the chemical, physical, and biological integrity of the nation's waters (33 USC §1251). States and tribes, pursuant to Section 303 of the CWA, are to adopt water quality standards necessary to protect fish, shellfish, and wildlife while providing for recreation in and on the nation's waters whenever possible. Section 303(d) of the CWA establishes requirements for states and tribes to identify and prioritize water bodies that are water quality limited (i.e., water bodies that do not meet water quality standards). States and tribes must periodically publish a priority list (a "§303(d) list") of impaired waters. For waters identified on this list, states and tribes must develop a total maximum daily load (TMDL) for the pollutants, set at a level to achieve water quality standards.

Idaho Code §39-3611(7) requires a 5-year cyclic review process for Idaho TMDLs:

> The director shall review and reevaluate each TMDL, supporting subbasin assessment, implementation plan(s) and all available data periodically at intervals of no greater than five (5) years. Such reviews shall include the assessments required by section 39-3607, Idaho Code, and an evaluation of the water quality criteria, instream targets, pollutant allocations, assumptions and analyses upon which the TMDL and subbasin assessment were based. If the members of the watershed advisory group, with the concurrence of the basin advisory group, advise the director that the water quality standards, the subbasin assessment, or the implementation plan(s) are not attainable or are inappropriate based upon supporting data, the director shall initiate the process or processes to determine whether to make recommended modifications. The director shall report to the legislature annually the results of such reviews.

To meet the intent and purpose of Idaho Code §39-3611(7), this report documents the review of an approved Idaho TMDL and implementation plan, considers the most current and applicable information in conformance with Idaho Code §39-3607, evaluates the appropriateness of the TMDL to current watershed conditions, implements plan evaluation, and provides for watershed advisory group (WAG) consultation. An evaluation of the recommendations presented is provided. Final decisions for TMDL modifications are decided by the Idaho Department of Environmental Quality (DEQ) director. Approval of TMDL modifications is decided by the US Environmental Protection Agency (EPA), with consultation by DEQ.

1.1 About Assessment Units

Prior to 2002, impaired waters were defined as stream segments with geographical descriptive boundaries. In 2002, DEQ modified the structure and format of Idaho's §303(d) list by combining it with the §305(b) report, required by the CWA to inform Congress of the state of Idaho's waters. This modification included identifying stream segments by assessment units (AUs) instead of nonuniform stream segments and defining the use support of stream AUs by five categories in the Integrated Report. AUs now define all of Idaho's waters. The AUs and the methods used to describe them are found in the *Water Body Assessment Guidance* (Grafe et al. 2002). AUs are groups of similar streams that have similar land use practices, ownership, or land management. Stream order, however, is the main basis for determining AUs—even if ownership and land use change significantly, an AU remains the same. Because AUs are an extension of water body identification numbers, a direct tie exists to the water quality standards for each AU, so beneficial uses defined in the standards are clearly tied to streams on the landscape.

To facilitate comparisons between the 1998 §303(d) list and 2002 Integrated Report, Category 5 for impaired waters, a crosswalk from the 1998 §303(d) list to the new AUs was included in the 2002 Integrated Report. The report is available at DEQ's website: *deq.idaho.gov/media/458038-integrated_report_2002_final_entire.pdf*. The boundaries from the 1998 §303(d)-listed segments were transferred to the new AU framework using an approach similar to how DEQ has been writing subbasin assessments and TMDLs. All AUs contained in any listed segment were carried forward to the 2002 §303(d) listings in Category 5 of the Integrated Report (DEQ 2005). Any AU not wholly contained within a previously listed segment but partially contained (even minimally) was also included on the §303(d) list. This inclusion was necessary to maintain the integrity of the 1998 §303(d) list and continuity with the TMDL program. The Little Lost River subbasin water bodies listed in Category 4a of the 2012 §303(d) list are included in this report (DEQ 2014a).

When assessing new data that indicate full support, only the AU that the monitoring data represents will be removed (delisted) from the §303(d) list (Category 5 of the Integrated Report).

2 TMDL Review and Status

2.1 Subbasin at a Glance

A complete characterization of the Little Lost River subbasin is found in the *Little Lost River Subbasin TMDL* (DEQ 2000). This subbasin description provides a background that frames issues within the Little Lost River TMDLs and §303(d)-listed tributaries.

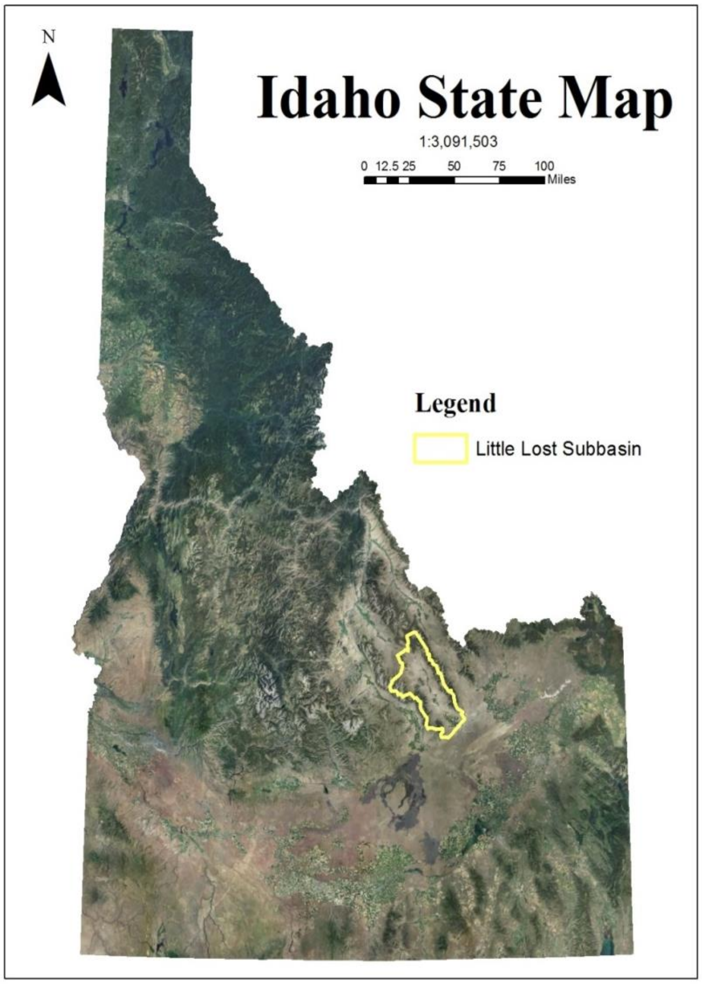
The Little Lost River subbasin is located in eastern Idaho on the northern margin of the Snake River plain (Figure 1). The watershed is approximately 50 miles long and 20 miles wide (963 square miles). The valley floor averages 7 miles wide and is fairly consistent in width from the head of the valley to the mouth. Shaped like a long rectangle, it contains a high elevation valley flanked by the Lost River Range to the west and the Lemhi Range to the east.

The spine of the Lost River Range near the subbasin is predominately 10,000 feet in elevation, varying from 12,000 feet (Mount Breitenbach) in the north to 8,500 feet (Howe Peak) in the south. Most of the Lemhi Range is close to 11,000 feet in elevation with the ridge line ranging from 12,200 feet (Diamond Peak) to 10,800 feet (Saddle Mountain). The northwestern portion of the subbasin broadens a bit with several mountains and hills in the valley located between the Lost River Range and the Little Lost River.

Sawmill Creek elevation reaches 7,200 feet near Timber Creek at the head of Sawmill Canyon with surrounding mountains varying in elevation from 9,000 to 10,900 feet. Sawmill Creek joins Summit Creek at 6,200 feet in elevation. The valley bottom ranges in elevation from 6,600 feet near the source of Summit Creek in the north to 4,800 feet near the Little Lost River sinks, resulting in an approximate average valley gradient of 38 feet per mile (the gradient is steeper in the upper reaches of the valley). Sediment TMDLs for Sawmill Creek, Wet Creek, and Little Lost River were approved by EPA on September 27, 2000 (Figure 1). In the original TMDL, the temperature TMDLs were neither approvel nor disapproved by EPA due to differences in opinion about Idaho's Bull Trout temperature criteria. According to the State of Idaho, for beneficial use of Bull Trout spawning, the water body must remain below 9 ^{o}C or less as a daily average and must not exceed a 13 ^{o}C weekly maximum. EPA's criteria suggests for beneficial Bull Trout spawning the 7 day moving average must remain 10 ^{o}C or below. Ironically, DEQ shows no records of Bull Trout presence in the impaired streams, based on BURP reconnaissance sampling. DEQ has prepared a separate temperature TMDL addendum to EPA addressing those streams known to be temperature impaired, based on the concept of Potential Natural Vegetation methodology to achieve natural conditions.

All of Idaho's subbasin assessments, TMDLs, and implementation plans can be accessed publicly. The following website provides a list of all subbasins found within Idaho, and the direct links that correspond to documents and dates of completion. For more information and access, visit *http://www.deq.idaho.gov/water-quality/surface-water/tmdls/table-of-sbas-tmdls.aspx.*

A reduction in streambank erosion is proposed for each stream based on our established narrative targets during critical periods (Table 1). Recommended reductions (tons per year) for sediment are (1) Sawmill Creek 80%; (2) Little Lost River 61%, and (3) Wet Creek 62%. Load allocations show the target loads and percent reductions necessary to achieve target loads (Table 2). These loads are streambank-specific and result from streambank erosion inventory (SEI) methodology (e.g., lateral recession rates, bank identification) used at the time the TMDL was developed.



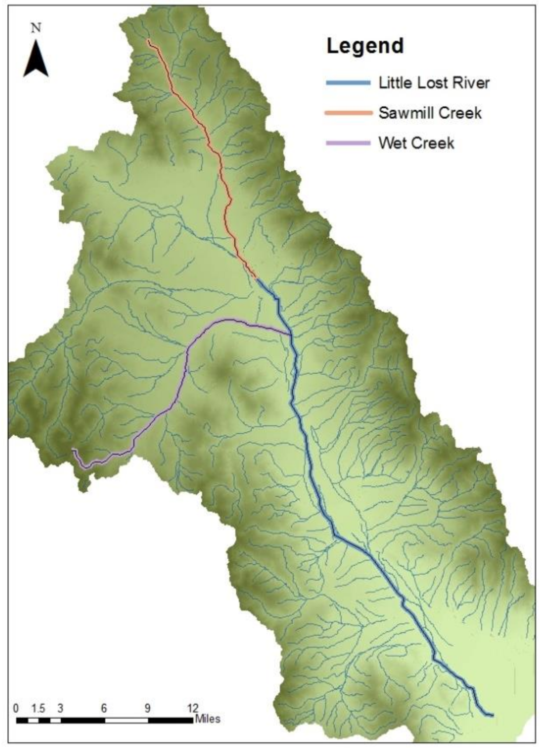


Figure 1. Subbasin and stream locations.

Table 1. Sediment narrative targets during critical periods.

Stream	Assessment Unit Number	Pollutant	Narrative Target	Critical Period	Relevant TMDL Document
Little Lost River	ID17040217SK002_05 ID17040217SK007_04 ID17040217SK009_04 ID17040217SK010_04	Sediment	80% streambank stability, 28% depth fines	Year-round	Little Lost River Subbasin TMDL
Sawmill Creek	ID17040217SK012_04 ID17040217SK014_04	Sediment	80% streambank stability, 28% depth fines	Year-round	Little Lost River Subbasin TMDL
Wet Creek	ID17040217SK024_02 ID17040217SK024_03	Sediment	80% streambank stability, 28% depth fines	Year-round	Little Lost River Subbasin TMDL

Table 2. Little Lost River subbasin load allocations.

Water Body	Assessment Unit Number	Pollutant	Point Sources	Nonpoint Sources	Load Allocation	
					Tons per year	% reduction
Lower Little Lost River	ID17040217SK002_05	Sediment	None	Grazing, recreation	15	35
Lower Middle Little Lost River	ID17040217SK007_04	Sediment	None	Grazing, recreation	11	73
Upper Middle Little Lost River	ID17040217SK009_04	Sediment	None	Grazing, recreation	35	74
Upper Little Lost River	ID17040217SK010_04	Sediment	None	Grazing, recreation	29	9.4
Lower Sawmill Creek	ID17040217SK012_04	Sediment	None	Grazing, recreation	25	53
Middle Sawmill Creek	ID17040217SK012_04	Sediment	None	Grazing, recreation	22	65
Upper Sawmill Creek	ID17040217SK014_04	Sediment	None	Grazing, recreation	52	75
Upper Middle Sawmill Creek	ID17040217SK014_04	Sediment	None	Grazing, recreation	32	91
Lower 1 Wet Creek	ID17040217SK022_03	Sediment	None	Grazing, recreation	17	26
Lower 2 Wet Creek	ID17040217SK022_03	Sediment	None	Grazing, recreation	15	66
Upper Wet Creek	ID17040217SK024_02	Sediment	None	Grazing, recreation	19	83
Middle 1 Wet Creek	ID17040217SK024_03	Sediment	None	Grazing, recreation	20	23
Middle 2 Wet Creek	ID17040217SK024_03	Sediment	None	Grazing, recreation	4	60

2.2 Pollutant Targets

The current state of the science does not allow specification of a sediment load or load capacity that is well known in advance to meet the narrative criteria for sediment and to fully support beneficial uses for cold water aquatic life and salmonid spawning. However, we assume the load capacity is met at levels where streambank erosion is at natural levels. We define the natural state as a bank stability target level of at least 80% and a percent (%) depth fine sediment (4 inches deep in the pool tailout of salmonid spawning habitat, not counting particles larger than 2.5 inches) target level of 28%. We presume that beneficial uses are or would be fully supported at natural background sediment load rates that are at or better than these targets.

The critical time for sedimentation in the Little Lost River subbasin occurs during times of peak flow from runoff. Higher discharge through the rivers and creeks allows more sediment to be carried downstream and deposited. Bare banks from overgrazing and anthropogenic factors are easily washed out and heavily eroded during peak flow events. It is difficult to sample sediment quantities during these high flow events, especially in remote areas. Therefore, we rely upon an estimate of annual erosion from banks based on SEI sampling protocols. Additionally, we measure depth fines at potential spawning habitats (pool tailouts) to provide an estimate of the amount of potentially injurious sediment left behind after erosion.

2.3 Control and Monitoring Points

Monitoring points for the TMDLs were chosen in areas that are accessible and representative of the watershed (Figure 2). Fortunately all AUs in question were sampled with at least one monitoring location representative of the AU in which they are located. In the approved TMDLs (DEQ 2000), streambank erosion monitoring areas were chosen: one site in each of the four Little Lost River AUs; two sites in each of the two Sawmill Creek AUs; one site in the Wet Creek 2nd-order AU; and two sites in each of the two Wet Creek 3rd-order AUs. Additionally, McNeil sediment cores to measure depth fines were conducted at two sites (upper and lower) in each stream (but not necessarily in every AU).

The 2014 monitoring plan provides data for the 5-year review of the Little Lost River subbasin TMDLs from studies conducted in each AU at the same monitoring locations used for the 2000 TMDL. Monitoring included SEIs and McNeil core samples. Using SEI data, we calculated the current sediment load based on bank erosion for each AU and compared it to load rates and target levels seen in the 2000 TMDL. The McNeil core samples were compared to 2000 TMDL levels to determine if improvements occurred within salmonid spawning habitat. Data gained from these measurements allowed us to determine whether conditions for beneficial uses are declining, improving, or meeting targets (Appendix A).

The repeated monitoring approach used in the 5-year review will hopefully steer us towards the goal of the stream's beneficial uses being fully met. If riparian damage has decreased since the original TMDLs were written, the SEIs should yield evidence of reduced erosion that should lead to the encroachment of healthy riparian vegetation such as willows. Willow roots hold streambanks together reducing erosion, while the shade from their branches and leaves decreases the amount of direct solar radiation entering the stream and reduces its temperature.

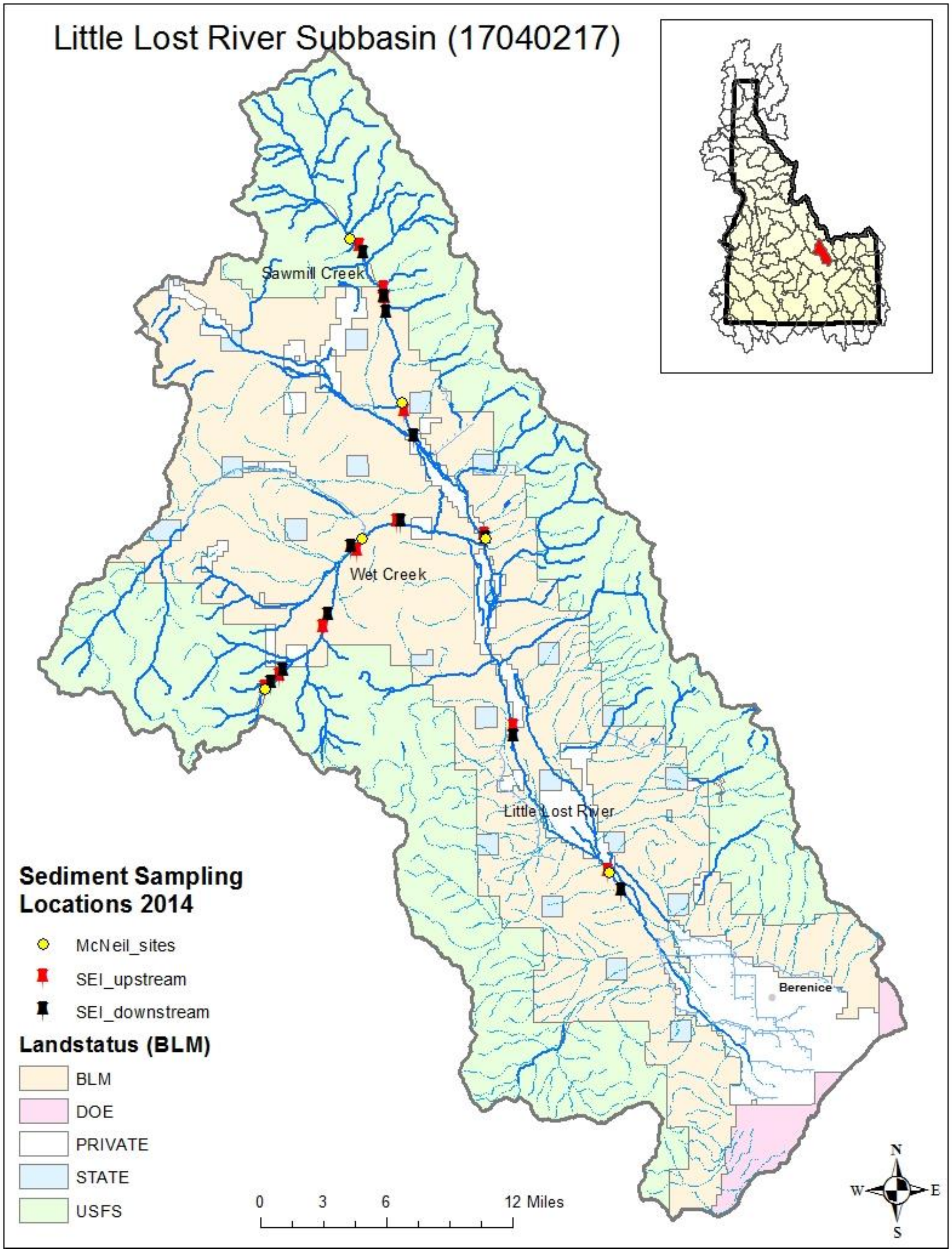


Figure 2. Location of 2014 SEI and McNeil core sampling.

2.4 Load Capacity

Load capacities for sediment as determined in the 2000 TMDLs were based on streambank erosion target levels. The bank stability target of 80% was set to represent the minimum level of stability that would occur naturally. Any stability less than 80% would create eroded loads that exceed load capacities. No additional margin of safety (MOS) was built into the estimates. Current SEI protocols (DEQ 2014b) add an additional 10% MOS to the estimate of excess load, thus 2014 SEI calculations are different from those performed in 2000. Additionally, the SEI technique has evolved; now we estimate two lateral recession rates, one for the load capacity and one for current conditions. These rates result in load capacity estimates that are different from 2000 TMDL levels and create new load allocations for each AU to which current loads are compared. Percent load reduction and bank stability estimates then become the only method to compare changes since the previous TMDLs.

2.5 Load Allocations

Load allocations were determined in the 2000 TMDL by calculating the load of sediment to the stream from eroding streambanks when 80% of the banks are stable with no erosion (natural condition or load capacity) and under current bank conditions. Comparing these two loads shows how much excess sediment is entering the stream from the banks both in terms of tons per year and as a percent reduction to meet target loads. The following load allocation tables (Tables, 6, 11, and 16) are from the *Little Lost River Subbasin TMDL* (DEQ 2000).

Table 6 Little Lost River streambank erosion load allocations.

Reach	Location	Existing Total Erosion (t/y)	Proposed Total Erosion (t/y)	Proposed Erosion Rate (t/mi/y)	Percent Reduction	After Reduction Percent of Total
Upper Little Lost	Private/BLM boundary above Wet Creek upstream to confluence of Summit Creek.	32	29	19	9.4	32%
Upper Middle Little Lost	BLM Private boundary just above Wet Creek to Little Lost Highway Crossing.	135	35	20	74	38%
Lower Middle Little Lost	Little Lost Highway Crossing to private boundary below Buck and Bird Road	41	11	16	73	12%
Lower Little Lost	Above flood control project to Lower bound of §303(d) listed reach	23	15	8	35	16%
	Total	**231**	**90**	**64**	**61**	**100%**

Table 11 Sawmill Creek streambank erosion load allocations.

Reach	Location	Existing Total Erosion (t/y)	Proposed Total Erosion (t/y)	Proposed Erosion Rate (t/mi/y)	Percent Reduction	After Reduction Percent of Total
Upper Sawmill	Upper Private boundary to Timber Creek Campground	210	52	14	75	40%
Upper Middle Sawmill	Sawmill Canyon Road lower Bridge upstream to Horse Lake Creek confluence	345	32	15	91	24%
Middle Sawmill	Sawmill Canyon Road lower Bridge downstream to lower BLM exclosure	63	22	15	65	17%
Lower Sawmill	Bell Mountain Rd to lower BLM exclosure	53	25	12	53	19%
	Total	**671**	**131**	**56**	**80**	**100%**

Table 16 Sediment load allocations/reductions by erosion inventory reach.

Reach	Location	Existing Total Erosion (t/y)	Proposed Total Erosion (t/y)	Proposed Erosion Rate (t/mi/y)	Percent Reduction	After Reduction Percent of Total
Upper	Upper Private boundary to beaver complex below Coal Creek.	115	19	20	83%	21%
Middle 1	Below beaver complex, Approx. 1.7 mi above upper exclosure.	26`	20	40	23%	22%
Middle 2	Between Middle 1 sample and upper exclosure.	10	4	16	6%	5%
Exclosure	Upper Exclosure	16	14	4	13%	16%
Lower 1	Pass Cr. Rd to Dry Cr. Hydro	23	17	16	26%	19%
Lower 2	Confluence to fish ladder just below Dry Cr. Hydro.	45	15	11	66%	17%
	Total	**235**	**89**	**107**	**62%**	**100%**

2.6 Margin of Safety

No additional MOS was used in the streambank erosion estimates from the 2000 TMDL. MOS was considered implicit. Our current SEI protocols (DEQ 2014b) add an additional 10% MOS to the estimate of excess load, thus 2014 SEI load reduction calculations are increased by 10%.

2.7 Seasonal Variation

Seasonal variation in the Little Lost River subbasin is extreme and important to take into account when calculating load capacity and allocations. The valley in the subbasin is characterized as a high desert with annual precipitation less than 10 inches per year. Being a desert, most precipitation falls during winter months as snow, which creates runoff that feeds the streams year-round. Due to the concentrated time at which precipitation occurs, the runoff in the spring is also concentrated. The higher discharge in the spring leads to higher streambank erosion. Yearly changes are another variation to take into account. Wet water years increase spring runoff, which increases stream discharge longer into the year and may cause more streambank erosion. By calculating annual streambank erosion, all the seasonal variation assumed to occur is captured within the annual result.

2.8 Reserve

The calculation of sediment loads, capacities, and allocations is based on achieving a natural minimum target of 80% bank stability. Maintaining this minimum natural level is required, and there will be no reserve or allowance for future growth.

3 Beneficial Use Status

Idaho water quality standards require that surface waters of the state be protected for beneficial uses, wherever attainable (IDAPA 58.01.02.050.02). These beneficial uses are interpreted as existing uses, designated uses, and presumed uses. The *Water Body Assessment Guidance* (Grafe et al. 2002) describes beneficial use identification for use assessment purposes.

Existing uses under the CWA are "those uses actually attained in the water body on or after November 28, 1975, whether or not they are included in the water quality standards." Designated uses are specifically listed for Idaho water bodies in tables in the Idaho water quality standards (IDAPA 58.01.02) in addition to citations for existing and presumed uses.

Undesignated uses are to be designated. In the interim, and absent information on existing uses, DEQ presumes that most waters in the state will support cold water aquatic life and either primary or secondary contact recreation (IDAPA 58.01.02.101.01). To protect these so-called "presumed uses," DEQ will apply the numeric cold water aquatic life criteria and primary or secondary contact recreation criteria to undesignated waters.

3.1 Beneficial Uses

The beneficial uses of the water bodies included in the 2000 TMDL are listed in Table 3.

Table 3. Beneficial uses of 2000 TMDL water bodies.

Assessment Unit Name	Assessment Unit Number	Designated Beneficial Use	Existing Beneficial Use	Presumed Beneficial Use
Little Lost River	ID17040217SK002_05 ID17040217SK007_04 ID17040217SK009_04 ID17040217SK010_04	Cold water aquatic life, salmonid spawning, primary contact recreation	No additional uses	No additional uses
Sawmill Creek	ID17040217SK012_04 ID17040217SK014_04		Cold water aquatic life, salmonid spawning	Primary contact recreation
Wet Creek	ID17040217SK024_02 ID17040217SK024_03		Cold water aquatic life, salmonid spawning	Primary contact recreation

Beneficial uses are protected by a set of criteria, which include *narrative* criteria for pollutants such as sediment and nutrients and *numeric* criteria for pollutants such as bacteria, dissolved oxygen, pH, toxics, ammonia, temperature, and turbidity (IDAPA 58.01.02.250–251) (Table 4). Figure 3 provides the steps in the stream assessment process for determining support status of the beneficial uses of cold water aquatic life, salmonid spawning, and contact recreation.

Table 4. Selected numeric criteria supportive of designated beneficial uses in Idaho water quality standards.

Parameter	Primary Contact Recreation	Secondary Contact Recreation	Cold Water Aquatic Life	Salmonid Spawning[a]
Water Quality Standards: IDAPA 58.01.02.250–251				
Bacteria				
Geometric mean	<126 *E. coli*/100 mL[b]	<126 *E. coli*/100 mL	—	—
Single sample	≤406 *E. coli*/100 mL	≤576 *E. coli*/100 mL	—	—
pH	—	—	Between 6.5 and 9.0	Between 6.5 and 9.5
Dissolved oxygen (DO)	—	—	DO exceeds 6.0 milligrams/liter (mg/L)	**Water Column DO**: DO exceeds 6.0 mg/L in water column or 90% saturation, whichever is greater **Intergravel DO**: DO exceeds 5.0 mg/L for a 1-day minimum and exceeds 6.0 mg/L for a 7-day average
Temperature[c]	—	—	22 °C or less daily maximum; 19 °C or less daily average **Seasonal Cold Water**: Between summer solstice and autumn equinox: 26 °C or less daily maximum; 23 °C or less daily average	13 °C or less daily maximum; 9 °C or less daily average **Bull Trout**: Not to exceed 13 °C maximum weekly maximum temperature over warmest 7-day period, June–August; not to exceed 9 °C daily average in September and October
Turbidity	—	—	Turbidity shall not exceed background by more than 50 nephelometric turbidity units (NTU) instantaneously or more than 25 NTU for more than 10 consecutive days.	—
Ammonia	—	—	Ammonia not to exceed calculated concentration based on pH and temperature.	—
EPA Bull Trout Temperature Criteria: Water Quality Standards for Idaho, 40 CFR Part 131				
Temperature	—	—	—	7-day moving average of 10 °C or less maximum daily temperature for June–September

[a] During spawning and incubation periods for inhabiting species
[b] *Escherichia coli* per 100 milliliters
[c] Temperature exemption: Exceeding the temperature criteria will not be considered a water quality standard violation when the air temperature exceeds the ninetieth percentile of the 7-day average daily maximum air temperature calculated in yearly series over the historic record measured at the nearest weather reporting station.

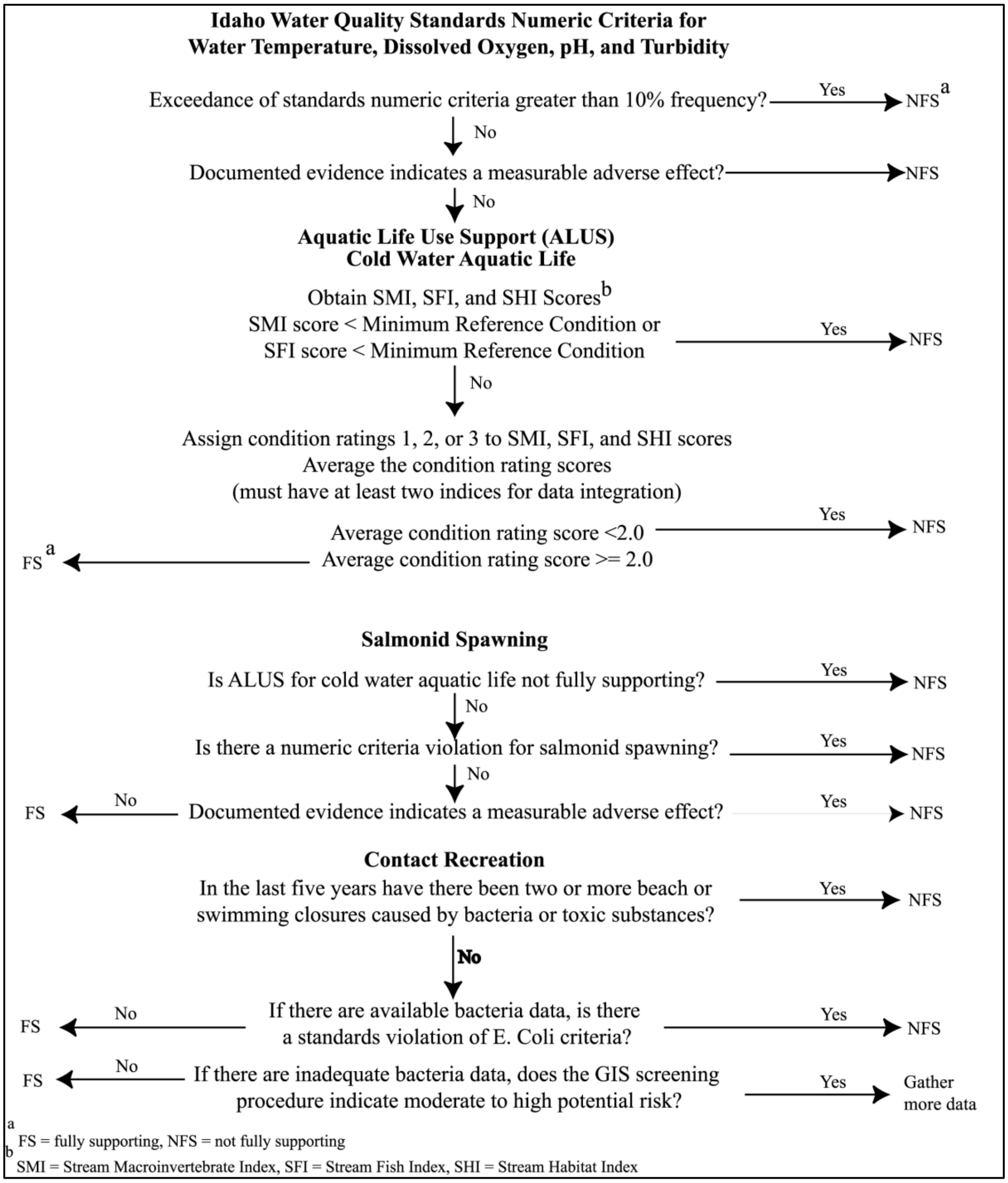


Figure 3. Determination steps and criteria for determining support status of beneficial uses in wadeable streams (Grafe et al. 2002).

3.2 Changes to Subbasin Characteristics

Since the 2000 TMDL was completed, no substantive changes have been made to the population, political boundaries, economy, landownership, land use, roads, and history within the Little Lost River subbasin. With regard to riparian corridors, important projects have primarily been aimed at improving fish migration and habitat and improving grazing management.

3.3 Summary and Analysis of Current Water Quality Data

Data collections in the Little Lost River subbasin since the 2000 TMDL have included periodic Beneficial Use Reconnaissance Program (BURP) assessment level sampling and specific sediment and temperature sampling for TMDL purposes. Table 5, Table 6, and Table 7 provide the BURP sampling results. In general, each stream has passing scores (average score of 2 or above), although some locations have failing average scores. Wet Creek appears to be in the best condition of the three streams with eight passing scores and only one 1995 failing score.

As described in the 2000 TMDL document, wildfires in 1966 and 1988 affected the characteristics of the watershed, particularly to the forested portions of the Sawmill Creek drainage. Wildfires decrease the amount of vegetation around streams leaving their banks bare and increasing erosion rates. The influx of sediment (especially fines) can choke out streams and even cause them to switch channels or braid. Wildfire can also affect stream hydraulics by allowing more precipitation to run off increasing peak discharges. Wildfires are considered a natural condition upon the landscape and fire related sediment fluxes or thermal loading due to loss of vegetative cover are not considered water quality violations but rather, part of the natural conditions.

Climate can play a large role in affecting the watershed as well. Most of the precipitation falling in the Little Lost River subbasin falls as snow during the winter months. Unusually long, wet winters can cause the initial spring runoff to be more severe. The increased discharge can cause flooding and extreme channel/streambank erosion, leading to a higher sediment load. In the case of Sawmill Creek, higher water levels caused the channel to split in multiple areas as the creek reached floodplain levels.

The comparison between 2000 TMDL sediment reductions and 2014 sediment reductions is presented in Table 8. Load capacities generated in the 2014 SEI analysis are three times an order of magnitude smaller than the 2000 load capacities. Current loads are also much smaller and in most cases do not exceed load capacities. The exceptions are the upper most AU of Little Lost River (ID17040217SK010_04), lower most AU of Sawmill Creek (ID17040217SK012_04), and two locations on Wet Creek that span the 2nd- and 3rd-order AU boundary. The difference between the 2000 and 2014 load capacities results from our present protocol that allows us to select a more stringent lateral recession rate for load capacity calculations; in 2000, it was likely that the same lateral recession rate was used for both the load capacity and current load. The difference between 2000 existing loads and 2014 existing (current) loads results from few eroding banks to measure and represents real improvement on the ground. Thus, only two locations had declining conditions (Appendix A).

Table 5. Sawmill Creek BURP data.

Year	Assessment Unit Number	Fish	SMI Score	SFI Score	SHI Score	Average Score	Macroinvertebrates (count)	% EPT	% Obligate CWB	% Scrapers	% Predator
1995	ID17040217SK012_04	None	1	None	1	1	239	81.59	1.26	47.28	12.13
2001	ID17040217SK012_04	None	3	None	3	3	501	54.69	2.2	20.75	3.79
2001	ID17040217SK014_04	None	3	None	3	3	545	53.03	26.24	27.7	13.03
2001	ID17040217SK014_04	3 Rainbow Trout	3	0	3	0	525	52.57	3.04	28.38	5.71
2004	ID17040217SK012_04	None	2	None	1	1.5	529	25.9	0	20.23	1.13
2011	ID17040217SK012_04	None	3	None	3	3	551	5.26	58.8	30.13	4.17

Notes: stream macroinvertebrate index (SMI); stream fish index (SFI); stream habitat index (SHI); *Ephemeroptera*, *Plecoptera*, and *Trichoptera* (EPT) index; cold water biota (CWB)

Table 6. Little Lost River BURP data.

Year	Assessment Unit Number	Fish	SMI Score	SFI Score	SHI Score	Average Score	Macroinvertebrates (count)	% EPT	% Obligate CWB	% Scrapers	% Predator
2001	ID17040217SK007_04	3 Sculpin	3	1	2	2	500	60	0	23.4	40
2001	ID17040217SK002_05	NA	1	None	1	1	576	51.23	0	4.53	2.78
2001	ID17040217SK009_04	NA	2	None	2	2	566	54.24	0	57.07	3

Notes: stream macroinvertebrate index (SMI); stream fish index (SFI); stream habitat index (SHI); *Ephemeroptera*, *Plecoptera*, and *Trichoptera* (EPT) index; cold water biota (CWB), not assessed (NA)

Table 7. Wet Creek BURP data.

Year	Assessment Unit Number	Fish	SMI Score	SFI Score	SHI Score	Average Score	Macroinvertebrates (count)	% EPT	% Obligate CWB	% Scrapers	% Predator
1995	ID17040217SK022_03	NA	1	None	1	1	279	30.47	0	27.24	5.38
1995	ID17040217SK024_02	NA	3	None	1	2	551	40.65	19.06	59.89	7.44
1998	ID17040217SK024_02	1 Rainbow Trout, 11 Sculpin	3	2	1	2	482	48.76	19.09	50.83	9.54
1998	ID17040217SK024_02	NA	3	None	2	2.5	523	43.59	17.78	16.83	8.03
2001	ID17040217SK024_02	7 Rainbow Trout, 56 Sculpin	3	3	1	2.33	504	48.81	8.93	35.71	12.5
2001	ID17040217SK024_03	28 Rainbow Trout, 48 Sculpin	3	3	1	2.33	550	37.91	0.73	56.91	4.18
2001	ID17040217SK024_03	7 Sculpin	3	1	3	2.33	2719	25.16	1.66	48.84	10.7
2010	ID17040217SK024_03	6 Sculpin	3	1	2	2	513	25.73	0	9038	8.38
2011	ID17040217SK022_03	3 Rainbow Trout, 1 Sculpin	3	1	3	2.33	621	18.04	0.16	34.78	4.99

Notes: stream macroinvertebrate index (SMI); stream fish index (SFI); stream habitat index (SHI); *Ephemeroptera*, *Plecoptera*, and *Trichoptera* (EPT) index; cold water biota (CWB); not assessed (NA)

Table 8. TMDL load allocations based on SEI (2000 versus 2014).

Assessment Unit Name	Assessment Unit Number	2014 Load Capacity (tons per mile per year)	2014 Current Loads (tons per mile per year)	2014 Reductions		2000 Reductions		Condition
				Tons per year	%	Tons per year	%	
Lower Little Lost River	ID17040217SK002_05	1.6	0.04	0	0	8	35	Improving
Lower Middle Little Lost River	ID17040217SK007_04	1.7	0.4	0	0	30	73	Improving
Upper Middle Little Lost River	ID17040217SK009_04	NA	NA	NA	NA	100	74	NA
Upper Little Lost River	ID17040217SK010_04	1.8	3.8	6	58	3	9.4	Declining
Lower Sawmill Creek	ID17040217SK012_04	3.1	47.3	139	94	28	53	Declining
Middle Sawmill Creek	ID17040217SK012_04	2.5	1.9	0	0	41	65	Improving
Upper Sawmill Creek	ID17040217SK014_04	4.5	2.2	0	0	158	75	Improving
Upper Middle Sawmill Creek	ID17040217SK014_04	5.1	1.7	0	0	313	91	Improving
Lower 1 Wet Creek	ID17040217SK022_03	1.9	0.8	0	0	6	26	Improving
Lower 2 Wet Creek	ID17040217SK022_03	0.8	0.03	0	0	30	66	Improving
Upper Wet Creek	ID17040217SK024_02	1.9	0.5	0	0	96	83	Improving
Upper Wet Creek	ID17040217SK024_02	2.5	2.9	1	22	96	83	Improving
Middle 1 Wet Creek	ID17040217SK024_03	2.8	3.2	2	19	6	23	Improving
Middle 2 Wet Creek	ID17040217SK024_03	NA	NA	NA	NA	6	60	NA

Lower Sawmill Creek (ID17040217SK012_04) and upper Little Lost River (ID17040217SK010_04) are adjacent to one another suggesting that sediment has been washed out of the banks in this area. This is likely due to changes in hydraulics in the Sawmill Creek drainage over the years after the 1988 fire in the upper Sawmill Creek watershed. A localized hotspot for streambank removal appears in Wet Creek near the 2nd- and 3rd-order boundary based on our 2014 analysis. In this area, sediment erosion levels are still much lower than in 2000, which shows improving conditions.

McNeil core sediment samples taken for the 2000 TMDL (measured in 1999) and in 2014 for similar areas are compared in Table 9. For the most part, these data suggest little change has occurred in Sawmill and Wet Creeks with respect to fine sediment amounts in pool tailout locations. The Little Lost River samples suggest that some movement of sediment has occurred from the upper portion of the watershed to the lower portion. In the 2000 TMDL, the lower Little Lost River location met the percent fines target of 28%, whereas in 2014, the upper Little Lost River location met the target, but the lower section did not. These data may result from an overall movement of sediment down the river corridor. Lower Sawmill Creek had core results in 2014 that almost met target levels (within 1%). This may be further evidence that increased hydraulics coming out of the Sawmill Creek drainage and eroding banks in lower Sawmill Creek are also cleaning out deposited sediment.

Table 9. DEQ McNeil core depth fines (2000 versus 2014).

Location	2000 Depth Fines (%) (< 6.35 mm without 2.5 inches)	2014 Depth Fines (%) (< 6.35 mm without 2.5 inches)
Upper Little Lost River	34	21.5[a]
Lower Little Lost River	15[a]	32.2
Upper Sawmill Creek	41	40.0
Lower Sawmill Creek	38	28.7
Upper Wet Creek	36	37.4
Lower Wet Creek	35–36	34.9

a. Core measurements that meet the 28% target.
Note: millimeters (mm)

In 2002 and 2006, the Bureau of Land Management (BLM) also conducted sediment core sampling on the three TMDL water bodies (Table 10). These data are consistent with our results from 2014 in Table 9. Upper Sawmill Creek has remained at 40% depth fines following an increase in fines in 2002. These levels are likely directly related to the 1988 wildfire in that drainage. Lower Sawmill Creek has seen a fairly consistent decrease over the years from 38% in 1999, 34% in 2002, 25.8% in 2006, and 28.7% in 2014. Since the lowest levels were seen in 2006, and the 2014 levels are very close to the target level, these data suggest that fine sediment in lower Sawmill Creek has stabilized at target levels. Upper Wet Creek showed a decreasing trend down to 22.2% in 2006; however, depth fines have apparently increased again to 37.4% in 2014. Lower Wet Creek levels have remained relatively constant in the mid-30% range throughout the 15-year time period. The Little Lost River site at Buck & Bird Road was not core sampled by DEQ; however, BLM data show a decrease to the low levels in 2006. Lower Little Lost River shows more of an oscillating pattern with increase in 2002 followed by decrease in 2006 and then an increase in 2014. This pattern is presumably related to sediment pulses moving through the entire watershed.

Table 10. McNeil core depth fines results from DEQ and BLM.

Stream Reach	Date			
	1999[a] (%)	2002 (BLM) (%)	2006 (BLM)[b] (%)	2014 (DEQ) (%)
Upper Sawmill Creek	41	49	39.6	40.0
Lower Sawmill Creek	38	34	25.8	28.7
Upper Wet Creek	36	29	22.2	37.4
Lower Wet Creek	35	38	32.8	34.9
Little Lost River (lower middle) at Buck & Bird Road	NA	37	19.7	NA
Little Lost River (lower) above the Flood Control Project	15	29	22	32.2

a. DEQ 2000
b. BLM data provided by Patrick K. Koelsch, Upper Snake Field Office, BLM (December 2006).
Notes: not assessed (NA).

3.4 Beneficial Uses

Current assessment data suggest that Wet Creek uses may indeed be supported; however, multiple temperature TMDLs must be completed throughout the subbasin including Wet Creek. Uses are still impaired at times in Sawmill Creek and the Little Lost River. Sediment data suggest that bank stability has increased throughout the listed units, but depth fines still exceed target levels in most locations (Table 11). Some evidence shows that these fines are beginning to move downstream as well.

Table 11. Summary of recommended changes for AUs evaluated.

Assessment Unit Name	Assessment Unit Number	Pollutant	Recommended Changes to Next Integrated Report	Justification
Little Lost River	ID17040217SK002_05 ID17040217SK007_04 ID17040217SK009_04 ID17040217SK010_04	Sediment	Remain in 4a	Depth fines greater than target
Sawmill Creek	ID17040217SK012_04 ID17040217SK014_04	Sediment	Remain in 4a	Depth fines greater than target
Wet Creek	ID17040217SK024_02 ID17040217SK024_03	Sediment	Remain in 4a	Depth fines greater than target

4 Review of Implementation Plan and Activities

The *Little Lost River Subbasin Total Maximum Daily Load Agricultural Implementation Plan* (Smith 2002) was prepared by the Idaho Association of Soil Conservation Districts in February 2002. The plan outlined four treatment units and identified possible best management practice implementation for treatment. To our knowledge, none of these projects were carried out because of a lack of private landowner interest.

BLM also developed an implementation plan in January 2002 to address issues and lands administered by the agency (BLM 2002). In that plan, BLM proposed to continue its intensive riparian management that was already underway in the subbasin, and to conduct periodic riparian condition, sediment, and temperature monitoring. In November 2002, BLM submitted to DEQ its first implementation monitoring report that included information on proper functioning condition, sediment core sampling, bank stability surveys, and water temperature monitoring for Sawmill Creek, Wet Creek, and Little Lost River within BLM lands (**Error! Reference source not found.**). The report summary follows:

> On Sawmill Creek riparian proper functioning condition was set back by the extremely high flow events of 1995 and 1997 as well as the last two drought years. These appear to be temporary setbacks periodically observed over any l0 year monitoring period. Overall, the long term riparian condition trend still appears to be moving steadily toward proper functioning condition and increased increase bank and channel stability. However, bank stability is currently only fair to poor contributing greatly to the excessive depth fines observed. As the stream continues to move toward proper functioning condition under the current riparian pasture management (early season, short duration grazing), there will be a corresponding increase in the bank stability and a long term reduction in depth fines. Dramatic improvements in riparian habitat condition on Sawmill Creek since 1987 have not been reflected in reduced water temperatures. Drought

> conditions, reduced flows and hot dry summers have all combined to increase water temperatures compared to the baselines in 1997 and, 1999.
>
> Overall, Wet Creek appears to be moving steadily toward proper functioning condition under the current riparian pasture management (early season, short duration grazing). However, channel evolution and floodplain recovery in the highly degraded channel below the Dry Creek Hydropower Project will continue to be very slow. Overall, the 2002 depth fines data in Wet Creek does not appear to correlate well with the concurrent streambank stability surveys. This could be a function of poor flushing flows in 2001 and 2002, sediment loading from roads and possibly excessive sediment loading from upstream sources on private and forest lands. A comparison with the 2002 forest implementation report should tell us a lot. Two years of drought, reduced flows and a series of dry hot summers have combined to increase water temperatures above the baseline observed in 1997. However, there should be a slow long term cooling trend over the next l0 years as the riparian zone continues to mature.
>
> The Little Lost River proper has been extensively disturbed since the early 1900's. Currently, all of the Little Lost River under the jurisdiction of the BLM is under intensive riparian management (riparian pastures or livestock exclosures). Over the next 3-5 years, BLM expects to see significant improvement from non-functional to functional at risk condition. Depth fines are currently excessive and appear to be reflected in the fair to poor streambank stability on the Little Lost River. Improvement in depth fines in the Little Lost River will most likely be slow because channel evolution in heavily disturbed river channel is generally very slow and due to the poor riparian and bank condition on most of the private land which constitutes approximately 50% of the stream length of the Little Lost River. Like the rest of the Little Lost River Valley, drought conditions, reduced flows and hot, dry summers have increased water temperatures in the Little Lost River proper above the 1997 baseline level. Hopefully, the long term monitoring will show a cooling trend with improved riparian condition.

BLM submitted another monitoring report in 2003 that focused on water temperature monitoring in the affected watersheds as well as more stream functional condition surveys. In 2006 BLM submitted sediment core sampling data (explained in Section 3.3) (**Error! Reference source not found.**). The 2003 report summary follows:

> Overall, Sawmill Creek appears to be moving steadily toward proper functioning Condition under the current riparian pasture management (early season, short duration grazing). However, even with the steadily improving cottonwood riparian system, the water temperature remains significantly above the bull trout standards. Extended drought conditions, reduced flows and a hot, dry summer have all combined to increase water temperatures above the 1997 and l999 baselines.
>
> Wet Creek like Sawmill Creek appears to be moving steadily toward proper functioning condition under the current riparian pasture management (early season, short duration grazing). This is especially true for the Hawley Mountain Allotment. However, channel evolution and floodplain recovery in the highly degraded reach below the Dry Creek Hydropower Project will continue to be very slow. This reach was not re-surveyed in 2003 but will be re-surveyed in 2004. As with Sawmill Creek, three years of drought, reduced flows and a hot, dry summer all combined to increase water temperatures above the baseline observed in 1997. However, BLM still expects a slow long-term cooling effect over the next 10 years as the riparian zone continues to mature.
>
> The Little Lost River proper has been extensively disturbed since the early 1900's. Currently, all of the Little Lost River under the jurisdiction of the BLM is under extensive riparian management (i.e. riparian pastures or livestock exclosures). Over the next 3-5 years, the BLM expects to see significant improvement from nonfunctional condition to functional at risk in many reaches. Some of the most heavily disturbed reaches of the Little Lost River fall within the Cedarville Allotment. Five polygons within the Cedarville Allotment were re-surveyed in 2003 and appear to be making slow progress toward proper functioning condition. Two out of the five polygons have moved from nonfunctional to functional at risk while the other three have made significant progress from the low end of nonfunctional to the high end of nonfunctional approaching the functional at risk condition. Like the rest of the Little Lost River valley,

drought conditions, reduced flows and a hot, dry summer all combined to increase water temperature significantly above the1997 baseline level.

4.1 Responsible Parties

Table 12 identifies the agencies responsible for implementing the TMDL.

Table 12. Agencies responsible for TMDL implementation.

Designated Management Agency	Resource Responsibility	Type of Involvement (regulatory, funding, assistance)
Idaho Association of Soil Conservation Districts (IASCD)	Agriculture	Proposed best management practice (BMP) installations, funding, and management
Bureau of Land Management (BLM)	BLM lands	BMP installations and resource management

4.2 Planned Activities

Table 13 lists the strategies for the TMDL implementation plan.

Table 13. Implementation plan strategies.

Water Body	Pollutant	Activity or Strategy	Schedule
Little Lost River	Sediment	Bureau of Land Management (BLM) continued intensive riparian management	On going
Sawmill Creek	Sediment	BLM continued intensive riparian management	On going
Wet Creek	Sediment	BLM continued intensive riparian management	On going

4.3 Accomplished Activities

Since 2003 a number of projects have been implemented by Trout Unlimited (TU), federal and state agencies, and cooperating landowners to provide fish passage at diversions and various barriers. TU and other parties worked with landowners to provide fish passage on three main stem Little Lost River irrigation diversions upstream of Badger Creek. TU and other parties also worked on connecting Badger Creek to the Little Lost River in 2006. TU requested funding from DEQ in 2006 to finish the Waymire Diversion–Wet Creek Project, an irrigation diversion fish barrier on Wet Creek. The US Forest Service (USFS) has worked with TU and landowners to cease grazing in important Bull Trout habitats. USFS has also completed riparian restoration and transplanted Bull Trout into Bunting Creek, rebuilt the channel to reconnect Camp Creek, and replaced culverts on Jackson Creek to improve fish passage. Additionally, BLM working with these other parties has built riparian pasture and exclosure fences, rocked water gaps, and planted thousands of shrub cuttings to accelerate riparian recovery. BLM has continued its program of intensive grazing management and has done extensive surveys on stream function and sediment loads.

Substantial improvement has taken place in streambank stability and decreased streambank erosion based on the results of 2014 inventories (Appendix A). These data suggest that BLM's intensive riparian management is having an effect on this sediment source.

4.4 Future Strategy

While streambank stability has increased and most areas surveyed are at sediment load goals, depth fines in pool tailouts continue to run high suggesting that more time and management are needed to repair these systems.

4.5 Planned Time Frame

Substantial accomplishments have been achieved within the last 14 years since the sediment TMDLs were approved (DEQ 2000). It is not unreasonable to think that continued improvements will help streams attain target fine sediment levels in the next 10–15 years.

5 Summary of Five-Year Review

This section provides a summary of the review process; changes to subbasin conditions since the last assessment; analysis, assumptions and allocations for TMDL; appropriateness of use designations; and water quality criteria.

5.1 Review Process

DEQ reviewed the activities of the federal land management agencies, TU, and private landowners in the subbasin since the TMDL was approved. A number of important projects have restored fish habitat, removed fish barriers, and reduced impacts on riparian areas. We also collected monitoring data during these projects and conducted periodic reconnaissance-level biological/habitat monitoring since TMDL development. DEQ conducted specific sediment monitoring in 2014 in anticipation of this review.

5.2 Changes in Subbasin

To our knowledge no significant changes have occurred in the subbasin with regard to population and changes in land use. Substantive changes in resource management have improved riparian conditions.

5.3 TMDL Analysis

Sediment loads to streams were based on streambank stability and the amount of sediment delivered to streams from streambank erosion. The process by which SEIs are conducted has changed over the years. Thus current load rates may be different from load rates measured in the past. It is not anticipated changes in actual loads will affect our ability to determine change in the watersheds. Streambank stability has improved remarkably over the last 14 years resulting in substantial reduction in sediment loads from streambanks.

5.4 Review of Beneficial Uses

No changes to the list of beneficial uses were found within the subbasin. Improvement has occurred with their status. BURP monitoring shows that many reaches are achieving passing multimetric scores of 2 or above. Sediment load is substantially reduced; however, considerable depth fines still accumulate in spawning areas. We anticipate depth fines to decrease over time as loading decreases. This can be a slow process because climate-driven hydrology may be decreasing flushing flows.

5.5 Water Quality Criteria

No changes have occurred to sediment water quality criteria.

5.6 Watershed Advisory Group Consultation

A formal WAG for the HUC does not exist. During the first iteration of the TMDL, DEQ worked with a local citizens group organized to support the ongoing Governor’s Bull Trout working groups, established by Governor Phil Batt in 1996.

The current iteration of the 5 Year review was presented to the Upper Snake Basin Advisory Group in 2014.

Because DEQ does not have a formal WAG, the public comment draft for new TMDLs will be delivered to the participants of the Bull Trout group, DMAs, federal land managers and local county officials.

5.7 Recommendations for Further Action

Substantial improvement has occurred in sediment loads and biological and habitat conditions within the watersheds. This improvement results from good resource management on the part of federal land management agencies and landowners. It is highly recommended that these activities continue within the subbasin (Table 14). The new temperature TMDLs that have been developed will bring substantially more AUs within the TMDL process. The work that has taken place on the ground has likely already improved conditions for temperature.

Table 14. Summary of recommendations.

Recommended Action	Schedule	Responsibility	Justification
Continue intensive riparian management	Next 5 years	Land management	Has clearly decreased sediment loads.
Continue to restore riparian areas and fish habitat as much as possible	Next 5 years	Land management	Will improve fish scores, reduce depth fines, help with temperature conditions

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Appendix A. Streambank Erosion Inventory and McNeil Core Results

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STREAMBANK EROSION INVENTORY CALCULATION WORKSHEET

Stream:	Little Lost River	**Stream Segment Location (DD)**	
Assessment Unit:	ID104021SK010_04	***Upstream N***	44.147520
Segment Inventoried:	Upper	***W***	-113.245730
Total Reach:	1976 ft	***Downstream N***	44.145030
Date Collected:	8-Sep-14	***W***	-113.244220
Field Crew:	James Heaton, Jason Fales	**Notes:**	Evidence of fines deposited in chennel, most likely from banks upstream of site
Data Reduced By:	James Heaton		

Current Load Streambank Erosion Calculations		Unit	Area Applied
Right, left or both bank measurements	2	Both Banks	Inventoried Segment
Inventory/Thalweg Length (LBB) (stream flowpath distance)	1976.00	ft	Inventoried Segment
TMDL Margin of Safety	10	%	Total Reach
Bulk Density (BD)	85	lb/ft^3	Total Reach
Length of Similar Stream	13500	ft	Total Reach
Estimated Distance inventoried	3952.00	ft	"
Total Erosive Bank Length	282.00	ft	"
Percent Erosive Bank	7.1	%	"
Eroding Area (AE)	318.60	ft^2	"
Lateral Recession Rate (RLR)	0.105		"
Bank Erosion (E)	1.42	tons/year	"
Total Bank Erosion Rate (ER)	3.80	tons/mile/year	Reach and Segment
Total Bank Erosion	9.71	tons/year	"

Recession Rate Calculations

Factor	Field Stability Score	Erosion Severity Reduction
Bank Erosion Evidence (0 to 3)	2	0.5
Bank Stability Condition (0 to 3)	1.5	0.25
Bank Cover/Vegetation(0 to 3)	1.5	0.25
Lateral Channel Stability (0 to 3)	2	0.5
Channel Bottom Stability (0 to 2)	0.5	0.25
In-Channel Deposition (-1 to 1)	-1	-1
Total = Slight (0-4); Moderate (4-8); Severe (>8)	6.5	0.75
Lateral Recession Rate (RLR) (ft/yr)	**0.105**	**0.0175**

Load Capacity Streambank Erosion Calculations for Total Reach		Unit	Area Applied
Eroding Area at Load Capacity (AE)	892.98	ft^2	Inventoried Segment
Bank Erosion at Load Capacity (E)	0.66	tons/year	"
Total Bank Erosion Rate at Load Capacity (ER)	1.77	tons/mile/year	Reach and Segment
Total Bank Erosion at Load Capacity for Reach	4.54	tons/year	Total Reach

Summary of Loads

Current Load		Load Capacity			
Total Bank Erosion Rate (tons/mile/yr)	Total Bank Erosion (tons/yr)	Total Bank Erosion Rate (tons/mile/yr)	Total Bank Erosion (tons/yr)	Load Reduction Required?	Margin of Safety (tons/yr)
3.8	**9.7**	**1.8**	**4.5**	**YES**	**1**

Percent Erosion Reduction (%)	**58**
Total Erosion Reduction (tons/yr)	**6**

STREAMBANK EROSION INVENTORY CALCULATION WORKSHEET

Stream:	Middle Little Lost River	**Stream Segment Location (DD)**	
Assessment Unit:	ID17040217SK007_04	***Upstream N***	44.015587
Segment Inventoried:	Middle	***W***	-113.219670
Total Reach:	3880 ft	***Downstream N***	44.008520
Date Collected:	15-Sep-14	***W***	-113.219860
Field Crew:	James Heaton, Andy Olson	**Notes:**	First half of reach affected by cattle grazing, while the second half has regrown thick willows on both banks. Beaver pond near end of reach
Data Reduced By:	James Heaton		

Current Load Streambank Erosion Calculations		**Unit**	**Area Applied**
Right, left or both bank measurements	2	Both Banks	Inventoried Segment
Inventory/Thalweg Length (LBB) (stream flowpath distance)	3880.00	ft	Inventoried Segment
TMDL Margin of Safety	10	%	Total Reach
Bulk Density (BD)	85	lb/ft^3	Total Reach
Length of Similar Stream	38000	ft	Total Reach
Estimated Distance inventoried	7760.00	ft	"
Total Erosive Bank Length	183.00	ft	"
Percent Erosive Bank	2.4	%	"
Eroding Area (AE)	195.10	ft^2	"
Lateral Recession Rate (RLR)	0.0325		"
Bank Erosion (E)	0.27	tons/year	"
Total Bank Erosion Rate (ER)	0.37	tons/mile/year	Reach and Segment
Total Bank Erosion	2.64	tons/year	"

Recession Rate Calculations

Factor	Field Stability Score	Erosion Severity Reduction
Bank Erosion Evidence (0 to 3)	1.25	0.5
Bank Stability Condition (0 to 3)	0.5	0.25
Bank Cover/Vegetation(0 to 3)	0.25	0.25
Lateral Channel Stability (0 to 3)	1	0.5
Channel Bottom Stability (0 to 2)	0.25	0.25
In-Channel Deposition (-1 to 1)	-1	-1
Total = Slight (0-4); Moderate (4-8); Severe (>8)	2.25	0.75
Lateral Recession Rate (RLR) (ft/yr)	**0.0325**	**0.0175**

Load Capacity Streambank Erosion Calculations for Total Reach		**Unit**	**Area Applied**
Eroding Area at Load Capacity (AE)	1654.62	ft^2	Inventoried Segment
Bank Erosion at Load Capacity (E)	1.23	tons/year	"
Total Bank Erosion Rate at Load Capacity (ER)	1.67	tons/mile/year	Reach and Segment
Total Bank Erosion at Load Capacity for Reach	12.05	tons/year	Total Reach

Summary of Loads

Current Load		**Load Capacity**			
Total Bank Erosion Rate (tons/mile/yr)	Total Bank Erosion (tons/yr)	Total Bank Erosion Rate (tons/mile/yr)	Total Bank Erosion (tons/yr)	Load Reduction Required?	Margin of Safety (tons/yr)
0.4	**2.6**	**1.7**	**12.1**	**No**	**0**

Percent Erosion Reduction (%)	**-357**
Total Erosion Reduction (tons/yr)	**-9**

STREAMBANK EROSION INVENTORY CALCULATION WORKSHEET

Stream:	Lower Little Lost River	**Stream Segment Location (DD)**	
Assessment Unit:	ID17040217SK002_05	***Upstream N***	43.915290
Segment Inventoried:	Lower	***W***	-113.130070
Total Reach:	8391 ft	***Downstream N***	43.902010
Date Collected:	15-Sep-14	***W***	-113.117600
Field Crew:	James Heaton, Andy Olson	**Notes:**	Thick willows on both banks for nearly the whole reach
Data Reduced By:	James Heaton		

Current Load Streambank Erosion Calculations		Unit	Area Applied
Right, left or both bank measurements	2	Both Banks	Inventoried Segment
Inventory/Thalweg Length (LBB) (stream flowpath distance)	8391.00	ft	Inventoried Segment
TMDL Margin of Safety	10	%	Total Reach
Bulk Density (BD)	85	lb/ft^3	Total Reach
Length of Similar Stream	27000	ft	Total Reach
Estimated Distance inventoried	16782.00	ft	"
Total Erosive Bank Length	85.00	ft	"
Percent Erosive Bank	0.5	%	"
Eroding Area (AE)	84.40	ft^2	"
Lateral Recession Rate (RLR)	0.0175		"
Bank Erosion (E)	0.06	tons/year	"
Total Bank Erosion Rate (ER)	0.04	tons/mile/year	Reach and Segment
Total Bank Erosion	0.20	tons/year	"

Recession Rate Calculations

Factor	Field Stability Score	Erosion Severity Reduction
Bank Erosion Evidence (0 to 3)	0.5	0.5
Bank Stability Condition (0 to 3)	0.25	0.25
Bank Cover/Vegetation(0 to 3)	0.25	0.25
Lateral Channel Stability (0 to 3)	0.5	0.5
Channel Bottom Stability (0 to 2)	0.25	0.25
In-Channel Deposition (-1 to 1)	-1	-1
Total = Slight (0-4); Moderate (4-8); Severe (>8)	0.75	0.75
Lateral Recession Rate (RLR) (ft/yr)	**0.0175**	**0.0175**

Load Capacity Streambank Erosion Calculations for Total Reach		Unit	Area Applied
Eroding Area at Load Capacity (AE)	3332.71	ft^2	Inventoried Segment
Bank Erosion at Load Capacity (E)	2.48	tons/year	"
Total Bank Erosion Rate at Load Capacity (ER)	1.56	tons/mile/year	Reach and Segment
Total Bank Erosion at Load Capacity for Reach	7.98	tons/year	Total Reach

Summary of Loads

Current Load		Load Capacity			
Total Bank Erosion Rate (tons/mile/yr)	Total Bank Erosion (tons/yr)	Total Bank Erosion Rate (tons/mile/yr)	Total Bank Erosion (tons/yr)	Load Reduction Required?	Margin of Safety (tons/yr)
0.04	**0.2**	**1.6**	**8.0**	**No**	**0.00**

Percent Erosion Reduction (%)	**-3849**
Total Erosion Reduction (tons/yr)	**-8**

STREAMBANK EROSION INVENTORY CALCULATION WORKSHEET

Stream:	Sawmill Creek	**Stream Segment Location (DD)**	
Assessment Unit:	ID17040217SK014_04	***Upstream N***	44.347530
Segment Inventoried:	Upper	***W***	-113.362280
Total Reach:	2954 ft / 0.56 mi	***Downstream N***	44.341700
Date Collected:	15-Jul-14	***W***	-113.359280
Field Crew:	James Heaton, Jason Fales	**Notes:**	Upstream channel starts as Rosgen C, and changes to a more stable B towards the end of the reach
Data Reduced By:	James Heaton		

Current Load Streambank Erosion Calculations		**Unit**	**Area Applied**
Right, left or both bank measurements	2	Both Banks	Inventoried Segment
Inventory/Thalweg Length (LBB) (stream flowpath distance)	2954.00	ft	Inventoried Segment
TMDL Margin of Safety	10	%	Total Reach
Bulk Density (BD)	100	lb/ft^3	Total Reach
Length of Similar Stream	10000	ft	Total Reach
Estimated Distance inventoried	5908.00	ft	"
Total Erosive Bank Length	314.00	ft	"
Percent Erosive Bank	5.3	%	"
Eroding Area (AE)	772.90	ft^2	"
Lateral Recession Rate (RLR)	0.0325		"
Bank Erosion (E)	1.26	tons/year	"
Total Bank Erosion Rate (ER)	2.24	tons/mile/year	Reach and Segment
Total Bank Erosion	4.25	tons/year	"

Recession Rate Calculations

Factor	**Field Stability Score**	**Erosion Severity Reduction**
Bank Erosion Evidence (0 to 3)	0.5	0.5
Bank Stability Condition (0 to 3)	0.5	0.25
Bank Cover/Vegetation(0 to 3)	0.5	0.25
Lateral Channel Stability (0 to 3)	1	0.5
Channel Bottom Stability (0 to 2)	0.25	0.25
In-Channel Deposition (-1 to 1)	-0.5	-1
Total = Slight (0-4); Moderate (4-8); Severe (>8)	2.25	0.75
Lateral Recession Rate (RLR) (ft/yr)	**0.0325**	**0.0175**

Load Capacity Streambank Erosion Calculations for Total Reach		**Unit**	**Area Applied**
Eroding Area at Load Capacity (AE)	2908.47	ft^2	Inventoried Segment
Bank Erosion at Load Capacity (E)	2.54	tons/year	"
Total Bank Erosion Rate at Load Capacity (ER)	4.55	tons/mile/year	Reach and Segment
Total Bank Erosion at Load Capacity for Reach	8.62	tons/year	Total Reach

Summary of Loads

Current Load		**Load Capacity**			
Total Bank Erosion Rate (tons/mile/yr)	Total Bank Erosion (tons/yr)	Total Bank Erosion Rate (tons/mile/yr)	Total Bank Erosion (tons/yr)	Load Reduction Required?	Margin of Safety (tons/yr)
2.2	**4.3**	**4.5**	**8.6**	**No**	**0**

Percent Erosion Reduction (%)	**-103**
Total Erosion Reduction (tons/yr)	**-4**

STREAMBANK EROSION INVENTORY CALCULATION WORKSHEET

Stream:	Sawmill Creek	**Stream Segment Location (DD)**	
Assessment Unit:	ID17040217SK014_04	***Upstream N***	44.317350
Segment Inventoried:	Middle	***W***	-113.339870
Total Reach:	2403 ft	***Downstream N***	44.312100
Date Collected:	15-Jul-14	***W***	-113.339870
Field Crew:	James Heaton, Jason Fales	**Notes:**	Beaver Complex at start of reach
Data Reduced By:	James Heaton		

Current Load Streambank Erosion Calculations		Unit	Area Applied
Right, left or both bank measurements	2	Both Banks	Inventoried Segment
Inventory/Thalweg Length (LBB) (stream flowpath distance)	2403.00	ft	Inventoried Segment
TMDL Margin of Safety	10	%	Total Reach
Bulk Density (BD)	105	lb/ft^3	Total Reach
Length of Similar Stream	10000	ft	Total Reach
Estimated Distance inventoried	4806.00	ft	"
Total Erosive Bank Length	223.00	ft	"
Percent Erosive Bank	4.6	%	"
Eroding Area (AE)	587.70	ft^2	"
Lateral Recession Rate (RLR)	0.025		"
Bank Erosion (E)	0.77	tons/year	"
Total Bank Erosion Rate (ER)	1.69	tons/mile/year	Reach and Segment
Total Bank Erosion	3.21	tons/year	"

Recession Rate Calculations

Factor	Field Stability Score	Erosion Severity Reduction
Bank Erosion Evidence (0 to 3)	0.25	0.5
Bank Stability Condition (0 to 3)	0.25	0.25
Bank Cover/Vegetation(0 to 3)	0.5	0.25
Lateral Channel Stability (0 to 3)	1	0.5
Channel Bottom Stability (0 to 2)	0	0.25
In-Channel Deposition (-1 to 1)	-0.5	-1
Total = Slight (0-4); Moderate (4-8); Severe (>8)	1.5	0.75
Lateral Recession Rate (RLR) (ft/yr)	**0.025**	**0.0175**

Load Capacity Streambank Erosion Calculations for Total Reach		Unit	Area Applied
Eroding Area at Load Capacity (AE)	2533.17	ft^2	Inventoried Segment
Bank Erosion at Load Capacity (E)	2.33	tons/year	"
Total Bank Erosion Rate at Load Capacity (ER)	5.11	tons/mile/year	Reach and Segment
Total Bank Erosion at Load Capacity for Reach	9.69	tons/year	Total Reach

Summary of Loads

Current Load		Load Capacity			
Total Bank Erosion Rate (tons/mile/yr)	Total Bank Erosion (tons/yr)	Total Bank Erosion Rate (tons/mile/yr)	Total Bank Erosion (tons/yr)	Load Reduction Required?	Margin of Safety (tons/yr)
1.7	**3.2**	**5.1**	**9.7**	**No**	**0**

Percent Erosion Reduction (%)	**-202**
Total Erosion Reduction (tons/yr)	**-6**

STREAMBANK EROSION INVENTORY CALCULATION WORKSHEET

Stream:	Sawmill Creek	**Stream Segment Location (DD)**	
Assessment Unit:	ID17040217SK012_04	***Upstream N***	44.311210
Segment Inventoried:	Lower middle	***W***	-113.338290
Total Reach:	4068 Ft	***Downstream N***	44.301350
Date Collected:	16-Jul-14	***W***	-113.337990
Field Crew:	James Heaton, Jason Fales	**Notes:**	Heavy Erosion + Wide channels when banks are dominated by sagebrush and grass. Little Erosion and narrow channels when banks covered by willows.
Data Reduced By:	James Heaton, Jason Fales		

Current Load Streambank Erosion Calculations		Unit	Area Applied
Right, left or both bank measurements	2	Both Banks	Inventoried Segment
Inventory/Thalweg Length (LBB) (stream flowpath distance)	4068.00	ft	Inventoried Segment
TMDL Margin of Safety	10	%	Total Reach
Bulk Density (BD)	100	lb/ft^3	Total Reach
Length of Similar Stream	17500	ft	Total Reach
Estimated Distance inventoried	8136.00	ft	"
Total Erosive Bank Length	489.00	ft	"
Percent Erosive Bank	6.0	%	"
Eroding Area (AE)	663.40	ft^2	"
Lateral Recession Rate (RLR)	0.045		"
Bank Erosion (E)	1.49	tons/year	"
Total Bank Erosion Rate (ER)	1.94	tons/mile/year	Reach and Segment
Total Bank Erosion	6.42	tons/year	"

Recession Rate Calculations

Factor	Field Stability Score	Erosion Severity Reduction
Bank Erosion Evidence (0 to 3)	0.5	0.5
Bank Stability Condition (0 to 3)	0.25	0.25
Bank Cover/Vegetation(0 to 3)	0.5	0.25
Lateral Channel Stability (0 to 3)	1.5	0.5
Channel Bottom Stability (0 to 2)	0.5	0.25
In-Channel Deposition (-1 to 1)	0.25	-1
Total = Slight (0-4); Moderate (4-8); Severe (>8)	3.5	0.75
Lateral Recession Rate (RLR) (ft/yr)	**0.045**	**0.0175**

Load Capacity Streambank Erosion Calculations for Total Reach		Unit	Area Applied
Eroding Area at Load Capacity (AE)	2207.53	ft^2	Inventoried Segment
Bank Erosion at Load Capacity (E)	1.93	tons/year	"
Total Bank Erosion Rate at Load Capacity (ER)	2.51	tons/mile/year	Reach and Segment
Total Bank Erosion at Load Capacity for Reach	8.31	tons/year	Total Reach

Summary of Loads

Current Load		**Load Capacity**			
Total Bank Erosion Rate (tons/mile/yr)	Total Bank Erosion (tons/yr)	Total Bank Erosion Rate (tons/mile/yr)	Total Bank Erosion (tons/yr)	Load Reduction Required?	Margin of Safety (tons/yr)
1.9	**6.4**	**2.5**	**8.3**	**No**	**0**

Percent Erosion Reduction (%)	**-29**
Total Erosion Reduction (tons/yr)	**-2**

STREAMBANK EROSION INVENTORY CALCULATION WORKSHEET

Stream:	Sawmill Creek	**Stream Segment Location (DD)**	
Assessment Unit:	ID17040217SK012_04	***Upstream N***	44.233030
Segment Inventoried:	Lower	***W***	-113.320550
Total Reach:	8689 Ft	***Downstream N***	44.215370
Date Collected:	5-Aug-14	***W***	-113.311580
Field Crew:	James Heaton, Jason Fales	**Notes:**	Evidence of grazing + Tromping, eaten willows. Anastamosing channels, fine sediment deposition.
Data Reduced By:	James Heaton, Jason Fales		

Current Load Streambank Erosion Calculations		Unit	Area Applied
Right, left or both bank measurements	2	Both Banks	Inventoried Segment
Inventory/Thalweg Length (LBB) (stream flowpath distance)	8639.00	ft	Inventoried Segment
TMDL Margin of Safety	10	%	Total Reach
Bulk Density (BD)	100	lb/ft^3	Total Reach
Length of Similar Stream	15000	ft	Total Reach
Estimated Distance inventoried	17278.00	ft	"
Total Erosive Bank Length	2837.50	ft	"
Percent Erosive Bank	16.4	%	"
Eroding Area (AE)	4763.50	ft^2	"
Lateral Recession Rate (RLR)	0.325		"
Bank Erosion (E)	77.41	tons/year	"
Total Bank Erosion Rate (ER)	47.31	tons/mile/year	Reach and Segment
Total Bank Erosion	134.40	tons/year	"

Recession Rate Calculations		
Factor	**Field Stability Score**	**Erosion Severity Reduction**
Bank Erosion Evidence (0 to 3)	2.25	0.5
Bank Stability Condition (0 to 3)	2	0.25
Bank Cover/Vegetation(0 to 3)	1.5	0.25
Lateral Channel Stability (0 to 3)	2.5	0.5
Channel Bottom Stability (0 to 2)	1.25	0.25
In-Channel Deposition (-1 to 1)	1	-1
Total = Slight (0-4); Moderate (4-8); Severe (>8)	10.5	0.75
Lateral Recession Rate (RLR) (ft/yr)	**0.325**	**0.0175**

Load Capacity Streambank Erosion Calculations for Total Reach		Unit	Area Applied
Eroding Area at Load Capacity (AE)	5801.15	ft^2	Inventoried Segment
Bank Erosion at Load Capacity (E)	5.08	tons/year	"
Total Bank Erosion Rate at Load Capacity (ER)	3.10	tons/mile/year	Reach and Segment
Total Bank Erosion at Load Capacity for Reach	8.81	tons/year	Total Reach

Summary of Loads					
Current Load		**Load Capacity**			
Total Bank Erosion Rate (tons/mile/yr)	Total Bank Erosion (tons/yr)	Total Bank Erosion Rate (tons/mile/yr)	Total Bank Erosion (tons/yr)	Load Reduction Required?	Margin of Safety (tons/yr)
47.3	**134.4**	**3.1**	**8.8**	**YES**	**13**

Percent Erosion Reduction (%)	**94**
Total Erosion Reduction (tons/yr)	**139**

STREAMBANK EROSION INVENTORY CALCULATION WORKSHEET

Stream:	Upper Wet Creek	**Stream Segment Location (DD)**	
Assessment Unit:	ID17040217SK024_02	***Upstream N***	44.043770
Segment Inventoried:		***W***	-113.456170
Total Reach:	2045	***Downstream N***	44.047030
Date Collected:	5-Aug-14	***W***	-113.450710
Field Crew:	James Heaton, Jason Fales	**Notes:**	Old grazing apparent, but the stream has corrected itself in most areas. Stable vegetation growing on old cutbanks.
Data Reduced By:	James Heaton		

Current Load Streambank Erosion Calculations		**Unit**	**Area Applied**
Right, left or both bank measurements	2	Both Banks	Inventoried Segment
Inventory/Thalweg Length (LBB) (stream flowpath distance)	2045.00	ft	Inventoried Segment
TMDL Margin of Safety	10	%	Total Reach
Bulk Density (BD)	85	lb/ft^3	Total Reach
Length of Similar Stream	7000	ft	Total Reach
Estimated Distance inventoried	4090.00	ft	"
Total Erosive Bank Length	108.00	ft	"
Percent Erosive Bank	2.6	%	"
Eroding Area (AE)	133.60	ft^2	"
Lateral Recession Rate (RLR)	0.0325		"
Bank Erosion (E)	0.18	tons/year	"
Total Bank Erosion Rate (ER)	0.48	tons/mile/year	Reach and Segment
Total Bank Erosion	0.63	tons/year	"

Recession Rate Calculations

Factor	Field Stability Score	Erosion Severity Reduction
Bank Erosion Evidence (0 to 3)	0.25	0.5
Bank Stability Condition (0 to 3)	0.5	0.25
Bank Cover/Vegetation(0 to 3)	0.25	0.25
Lateral Channel Stability (0 to 3)	1	0.5
Channel Bottom Stability (0 to 2)	0.25	0.25
In-Channel Deposition (-1 to 1)	0	-1
Total = Slight (0-4); Moderate (4-8); Severe (>8)	2.25	0.75
Lateral Recession Rate (RLR) (ft/yr)	**0.0325**	**0.0175**

Load Capacity Streambank Erosion Calculations for Total Reach		**Unit**	**Area Applied**
Eroding Area at Load Capacity (AE)	1011.90	ft^2	Inventoried Segment
Bank Erosion at Load Capacity (E)	0.75	tons/year	"
Total Bank Erosion Rate at Load Capacity (ER)	1.94	tons/mile/year	Reach and Segment
Total Bank Erosion at Load Capacity for Reach	2.58	tons/year	Total Reach

Summary of Loads

Current Load		**Load Capacity**			
Total Bank Erosion Rate (tons/mile/yr)	Total Bank Erosion (tons/yr)	Total Bank Erosion Rate (tons/mile/yr)	Total Bank Erosion (tons/yr)	Load Reduction Required?	Margin of Safety (tons/yr)
0.5	**0.6**	**1.9**	**2.6**	**No**	**0.00**

Percent Erosion Reduction (%)	**-308**
Total Erosion Reduction (tons/yr)	**-2**

STREAMBANK EROSION INVENTORY CALCULATION WORKSHEET

Stream:	Upper Wet Creek 2	**Stream Segment Location (DD)**	
Assessment Unit:	ID17040217SK024_02	***Upstream N***	44.051840
Segment Inventoried:	Below Culvert and Beaver Dam	***W***	-113.442310
Total Reach:	2336	***Downstream N***	44.055340
Date Collected:	5-Aug-14	***W***	-113.439030
Field Crew:	James Heaton, Jason Fales	**Notes:**	Various blown out beavers dams down entire reach
Data Reduced By:	James Heaton		

Current Load Streambank Erosion Calculations		Unit	Area Applied
Right, left or both bank measurements	2	Both Banks	Inventoried Segment
Inventory/Thalweg Length (LBB) (stream flowpath distance)	2336.00	ft	Inventoried Segment
TMDL Margin of Safety	10	%	Total Reach
Bulk Density (BD)	85	lb/ft^3	Total Reach
Length of Similar Stream	7000	ft	Total Reach
Estimated Distance inventoried	4672.00	ft	"
Total Erosive Bank Length	400.00	ft	"
Percent Erosive Bank	8.6	%	"
Eroding Area (AE)	627.60	ft^2	"
Lateral Recession Rate (RLR)	0.0475		"
Bank Erosion (E)	1.27	tons/year	"
Total Bank Erosion Rate (ER)	2.86	tons/mile/year	Reach and Segment
Total Bank Erosion	3.80	tons/year	"

Recession Rate Calculations

Factor	Field Stability Score	Erosion Severity Reduction
Bank Erosion Evidence (0 to 3)	1.25	0.5
Bank Stability Condition (0 to 3)	0.5	0.25
Bank Cover/Vegetation(0 to 3)	1	0.25
Lateral Channel Stability (0 to 3)	0.5	0.5
Channel Bottom Stability (0 to 2)	1	0.25
In-Channel Deposition (-1 to 1)	-0.5	-1
Total = Slight (0-4); Moderate (4-8); Severe (>8)	3.75	0.75
Lateral Recession Rate (RLR) (ft/yr)	**0.0475**	**0.0175**

Load Capacity Streambank Erosion Calculations for Total Reach		Unit	Area Applied
Eroding Area at Load Capacity (AE)	1466.07	ft^2	Inventoried Segment
Bank Erosion at Load Capacity (E)	1.09	tons/year	"
Total Bank Erosion Rate at Load Capacity (ER)	2.46	tons/mile/year	Reach and Segment
Total Bank Erosion at Load Capacity for Reach	3.27	tons/year	Total Reach

Summary of Loads

Current Load		Load Capacity			
Total Bank Erosion Rate (tons/mile/yr)	Total Bank Erosion (tons/yr)	Total Bank Erosion Rate (tons/mile/yr)	Total Bank Erosion (tons/yr)	Load Reduction Required?	Margin of Safety (tons/yr)
2.9	**3.8**	**2.5**	**3.3**	**YES**	**0.4**

Percent Erosion Reduction (%)	**22**
Total Erosion Reduction (tons/yr)	**1**

STREAMBANK EROSION INVENTORY CALCULATION WORKSHEET

Stream:	Middle Wet Creek	**Stream Segment Location (DD)**	
Assessment Unit:	ID17040217SK024_03	***Upstream N***	44.084670
Segment Inventoried:		***W***	-113.400280
Total Reach:	5775	***Downstream N***	44.093340
Date Collected:	5-Aug-14	***W***	-113.395730
Field Crew:	James Heaton, Jason Fales	**Notes:**	Tall banksof Loess on river right are easily erodable
Data Reduced By:	James Heaton		

Current Load Streambank Erosion Calculations		Unit	Area Applied
Right, left or both bank measurements	2	Both Banks	Inventoried Segment
Inventory/Thalweg Length (LBB) (stream flowpath distance)	5775.00	ft	Inventoried Segment
TMDL Margin of Safety	10	%	Total Reach
Bulk Density (BD)	85	lb/ft^3	Total Reach
Length of Similar Stream	14000	ft	Total Reach
Estimated Distance inventoried	11550.00	ft	"
Total Erosive Bank Length	752.00	ft	"
Percent Erosive Bank	6.5	%	"
Eroding Area (AE)	1353.40	ft^2	"
Lateral Recession Rate (RLR)	0.06		"
Bank Erosion (E)	3.45	tons/year	"
Total Bank Erosion Rate (ER)	3.16	tons/mile/year	Reach and Segment
Total Bank Erosion	8.37	tons/year	"

Recession Rate Calculations

Factor	Field Stability Score	Erosion Severity Reduction
Bank Erosion Evidence (0 to 3)	1.5	0.5
Bank Stability Condition (0 to 3)	1	0.25
Bank Cover/Vegetation(0 to 3)	1	0.25
Lateral Channel Stability (0 to 3)	1	0.5
Channel Bottom Stability (0 to 2)	1	0.25
In-Channel Deposition (-1 to 1)	-0.5	-1
Total = Slight (0-4); Moderate (4-8); Severe (>8)	5	0.75
Lateral Recession Rate (RLR) (ft/yr)	**0.06**	**0.0175**

Load Capacity Streambank Erosion Calculations for Total Reach		Unit	Area Applied
Eroding Area at Load Capacity (AE)	4157.39	ft^2	Inventoried Segment
Bank Erosion at Load Capacity (E)	3.09	tons/year	"
Total Bank Erosion Rate at Load Capacity (ER)	2.83	tons/mile/year	Reach and Segment
Total Bank Erosion at Load Capacity for Reach	7.50	tons/year	Total Reach

Summary of Loads

Current Load		Load Capacity			
Total Bank Erosion Rate (tons/mile/yr)	Total Bank Erosion (tons/yr)	Total Bank Erosion Rate (tons/mile/yr)	Total Bank Erosion (tons/yr)	Load Reduction Required?	Margin of Safety (tons/yr)
3.2	**8.4**	**2.8**	**7.5**	**YES**	**1**

Percent Erosion Reduction (%)	**19**
Total Erosion Reduction (tons/yr)	**2**

STREAMBANK EROSION INVENTORY CALCULATION WORKSHEET

Stream:	Lower Wet Creek	**Stream Segment Location (DD)**	
Assessment Unit:		***Upstream N***	44.137010
Segment Inventoried:	Lower middle	***W***	-113.367800
Total Reach:	1897 ft	***Downstream N***	44.139760
Date Collected:	3-Sep-14	***W***	-113.372920
Field Crew:	James Heaton, Andy Olson	**Notes:**	Within riparian protection fencing program. One abandoned side channel present. Natural grazing, willows and grass chewed down but still healthy.
Data Reduced By:	James Heaton		

Current Load Streambank Erosion Calculations		Unit	Area Applied
Right, left or both bank measurements	2	Both Banks	Inventoried Segment
Inventory/Thalweg Length (LBB) (stream flowpath distance)	1897.00	ft	Inventoried Segment
TMDL Margin of Safety	10	%	Total Reach
Bulk Density (BD)	85	lb/ft^3	Total Reach
Length of Similar Stream	6355	ft	Total Reach
Estimated Distance inventoried	3794.00	ft	"
Total Erosive Bank Length	147.50	ft	"
Percent Erosive Bank	3.9	%	"
Eroding Area (AE)	181.65	ft^2	"
Lateral Recession Rate (RLR)	0.0375		"
Bank Erosion (E)	0.29	tons/year	"
Total Bank Erosion Rate (ER)	0.81	tons/mile/year	Reach and Segment
Total Bank Erosion	0.97	tons/year	"

Recession Rate Calculations

Factor	Field Stability Score	Erosion Severity Reduction
Bank Erosion Evidence (0 to 3)	1.25	0.5
Bank Stability Condition (0 to 3)	0.25	0.25
Bank Cover/Vegetation(0 to 3)	0.5	0.25
Lateral Channel Stability (0 to 3)	0.75	0.5
Channel Bottom Stability (0 to 2)	0.5	0.25
In-Channel Deposition (-1 to 1)	-0.5	-1
Total = Slight (0-4); Moderate (4-8); Severe (>8)	2.75	0.75
Lateral Recession Rate (RLR) (ft/yr)	**0.0375**	**0.0175**

Load Capacity Streambank Erosion Calculations for Total Reach		Unit	Area Applied
Eroding Area at Load Capacity (AE)	934.48	ft^2	Inventoried Segment
Bank Erosion at Load Capacity (E)	0.70	tons/year	"
Total Bank Erosion Rate at Load Capacity (ER)	1.93	tons/mile/year	Reach and Segment
Total Bank Erosion at Load Capacity for Reach	2.33	tons/year	Total Reach

Summary of Loads

Current Load		Load Capacity			
Total Bank Erosion Rate (tons/mile/yr)	Total Bank Erosion (tons/yr)	Total Bank Erosion Rate (tons/mile/yr)	Total Bank Erosion (tons/yr)	Load Reduction Required?	Margin of Safety (tons/yr)
0.8	**1.0**	**1.9**	**2.3**	**No**	**0**

Percent Erosion Reduction (%)	**-140**
Total Erosion Reduction (tons/yr)	**-1**

STREAMBANK EROSION INVENTORY CALCULATION WORKSHEET

Stream:	Lower Wet Creek 2	**Stream Segment Location (DD)**	
Assessment Unit:	ID17040217SK022_03	***Upstream N***	44.156970
Segment Inventoried:	~0.5 mi downstream from Pass Creek Road	***W***	-113.328980
Total Reach:	1021 ft	***Downstream N***	44.157280
Date Collected:	3-Sep-14	***W***	-113.325100
Field Crew:	James Heaton, Andy Olson	**Notes:**	Early season grazing apparent. Grass and willows have regrown. Channel is straightened by glacial deposit along left bank increasing velocity. Armored cattle stream area
Data Reduced By:	James Heaton		

Current Load Streambank Erosion Calculations		Unit	Area Applied
Right, left or both bank measurements	2	Both Banks	Inventoried Segment
Inventory/Thalweg Length (LBB) (stream flowpath distance)	1021.00	ft	Inventoried Segment
TMDL Margin of Safety	10	%	Total Reach
Bulk Density (BD)	85	lb/ft^3	Total Reach
Length of Similar Stream	18900	ft	Total Reach
Estimated Distance inventoried	2042.00	ft	"
Total Erosive Bank Length	12.00	ft	"
Percent Erosive Bank	0.6	%	"
Eroding Area (AE)	6.00	ft^2	"
Lateral Recession Rate (RLR)	0.0225		"
Bank Erosion (E)	0.01	tons/year	"
Total Bank Erosion Rate (ER)	0.03	tons/mile/year	Reach and Segment
Total Bank Erosion	0.11	tons/year	"

Recession Rate Calculations

Factor	Field Stability Score	Erosion Severity Reduction
Bank Erosion Evidence (0 to 3)	0.25	0.5
Bank Stability Condition (0 to 3)	0.25	0.25
Bank Cover/Vegetation(0 to 3)	0.25	0.25
Lateral Channel Stability (0 to 3)	0.5	0.5
Channel Bottom Stability (0 to 2)	0.5	0.25
In-Channel Deposition (-1 to 1)	-0.5	-1
Total = Slight (0-4); Moderate (4-8); Severe (>8)	1.25	0.75
Lateral Recession Rate (RLR) (ft/yr)	**0.0225**	**0.0175**

Load Capacity Streambank Erosion Calculations for Total Reach		Unit	Area Applied
Eroding Area at Load Capacity (AE)	204.20	ft^2	Inventoried Segment
Bank Erosion at Load Capacity (E)	0.15	tons/year	"
Total Bank Erosion Rate at Load Capacity (ER)	0.79	tons/mile/year	Reach and Segment
Total Bank Erosion at Load Capacity for Reach	2.81	tons/year	Total Reach

Summary of Loads

Current Load		Load Capacity			
Total Bank Erosion Rate (tons/mile/yr)	Total Bank Erosion (tons/yr)	Total Bank Erosion Rate (tons/mile/yr)	Total Bank Erosion (tons/yr)	Load Reduction Required?	Margin of Safety (tons/yr)
0.03	**0.1**	**0.8**	**2.8**	**No**	**0**

Percent Erosion Reduction (%)	**-2547**
Total Erosion Reduction (tons/yr)	**-3**

Stream:	Upper Little Lost River					
Date (mm/dd/yyyy):	9/11/2014					
Site Description:	Upstream from campground					
Lat/Lon:	44.14603 N -113.24379 W					
Lat/Lon accuracy:						
Datum:	WGS 72					
Samping Event ID	ID17040217SK010_04					
Personnel:	James Heaton, Andy Olson					
Rosgen Channel:	C					
Habitat Unit	Pool Tailout					
Reach Gradient (%):	2					
Geology (Q, G, V, or S):	G					
Target Species:	Trout					
Flow (cfs):	20					
Surrounding Land Use:	Range					
Sample number		1	2	3		
Ocular est. % surface fines						
Sieve size		(mL)	(mL)	(mL)		
63 mm (2.5")		2200	0	1610		
25 mm (1.0")		1300	1325	1625		
12.5 mm (0.5")		140	610	480		
6.34 mm (0.25")		130	450	275		
1.0 - 0.25" Subtotal		1570	2385	2380		
4.75 mm (0.187")		75	150	100		
2.36 mm (0.0937")		60	400	120		
850 µm (0.0331")		45	250	110		
212 µm (0.0083")		20	425	70		
106 µm (0.0041")						
75 µm (0.0029")						
53 µm (0.0021")		40	75	50		
Bottom pan (< 53 µm)						
< 0.25" Subtotal		240	1300	450		
Sample total w/o 2.5" particles		1810	3685	2830	Mean	STDDEV
% fines w/o 2.5" particles		0.132596685	0.352781547	0.159010601	0.214796	0.098164
Sample total w/ 2.5" particles		4010	3685	4440	Mean	STDDEV
% fines w/ 2.5" particles		0.059850374	0.352781547	0.101351351	0.171328	0.129421

Stream:	Lower Little Lost River					
Date (mm/dd/yyyy):	9/15/2015					
Site Description:	Next to Campground					
Lat/Lon:	43.91535 N -113.12930 W					
Lat/Lon accuracy:						
Datum:	WGS 72					
Samping Event ID	ID17040217SK002_05					
Personnel:	James Heaton, Andy Olson					
Rosgen Channel:	C					
Habitat Unit	Pool Tailout					
Reach Gradient (%):	2					
Geology (Q, G, V, or S):	G					
Target Species:	Trout					
Flow (cfs):	22					
Surrounding Land Use:	Range, Recreation					
Sample number		1	2	3		
Ocular est. % surface fines						
Sieve size		(mL)	(mL)	(mL)		
63 mm (2.5")		320	0	900		
25 mm (1.0")		2020	2320	2500		
12.5 mm (0.5")		800	910	600		
6.34 mm (0.25")		450	680	550		
1.0 - 0.25" Subtotal		3270	3910	3650		
4.75 mm (0.187")		200	250	200		
2.36 mm (0.0937")		575	600	370		
850 µm (0.0331")		375	620	470		
212 µm (0.0083")		510	570	250		
106 µm (0.0041")						
75 µm (0.0029")						
53 µm (0.0021")		40	100	60		
Bottom pan (< 53 µm)						
< 0.25" Subtotal		1700	2140	1350		
Sample total w/o 2.5" particles		4970	6050	5000	Mean	STDDEV
% fines w/o 2.5" particles		0.342052314	0.353719008	0.27	0.321924	0.037023
Sample total w/ 2.5" particles		5290	6050	5900	Mean	STDDEV
% fines w/ 2.5" particles		0.321361059	0.353719008	0.228813559	0.301298	0.052929

Stream:	Upper Sawmill Creek					
Date (mm/dd/yyyy):	9/8/2014					
Site Description:	Campsite ~1.5 mi upstream of bridge crossing					
Lat/Lon:	44.35343 -113.37254					
Lat/Lon accuracy:		meters				
Datum:	WGS 72					
Samping Event ID						
Personnel:	J Fales, J Heaton					
Rosgen Channel:	b					
Habitat Unit	Pool Tailout					
Reach Gradient (%):	2.5					
Geology (Q, G, V, or S):	S					
Target Species:	Trout					
Flow (cfs):	25					
Surrounding Land Use:	Basin + Range					
Sample number		1	2	3		
Ocular est. % surface fines						
Sieve size		(mL)	(mL)	(mL)		
63 mm (2.5")		2970	3800	3600		
25 mm (1.0")		870	1540	1120		
12.5 mm (0.5")		820	650	420		
6.34 mm (0.25")		530	490	540		
1.0 - 0.25" Subtotal		2220	2680	2080		
4.75 mm (0.187")		180	200	280		
2.36 mm (0.0937")		500	400	720		
850 µm (0.0331")		400	450	720		
212 µm (0.0083")		200	220	240		
106 µm (0.0041")						
75 µm (0.0029")						
53 µm (0.0021")		50	40	105		
Bottom pan (< 53 µm)						
< 0.25" Subtotal		1330	1310	2065		
Sample total w/o 2.5" particles		3550	3990	4145	Mean	STDDEV
% fines w/o 2.5" particles		0.374647887	0.328320802	0.498190591	0.400386	0.071697
Sample total w/ 2.5" particles		6520	7790	7745	Mean	STDDEV
% fines w/ 2.5" particles		0.20398773	0.168164313	0.266623628	0.212925	0.04069

Stream:	Lower Samill Creek					
Date (mm/dd/yyyy):	9/8/2014					
Site Description:	200 yds upstream of temp logger					
Lat/Lon:	44.23966 N / -113.32376 W					
Lat/Lon accuracy:			meters			
Datum:	WGS 72					
Samping Event ID	ID17040217SK012_04					
Personnel:	J Fales, J Heaton					
Rosgen Channel:	C					
Habitat Unit	Pool Tailout					
Reach Gradient (%):	2.5					
Geology (Q, G, V, or S):	S					
Target Species:	Trout					
Flow (cfs):	25					
Surrounding Land Use:	Basin + Range					
Sample number		1	2	3		
Ocular est. % surface fines						
Sieve size		(mL)	(mL)	(mL)		
63 mm (2.5")		3470	510	700		
25 mm (1.0")		1770	1420	1250		
12.5 mm (0.5")		320	650	480		
6.34 mm (0.25")		250	390	430		
1.0 - 0.25" Subtotal		2340	2460	2160		
4.75 mm (0.187")		80	150	170		
2.36 mm (0.0937")		110	340	390		
850 µm (0.0331")		150	510	450		
212 µm (0.0083")		80	170	210		
106 µm (0.0041")						
75 µm (0.0029")						
53 µm (0.0021")		40	30	40		
Bottom pan (< 53 µm)						
< 0.25" Subtotal		460	1200	1260		
Sample total w/o 2.5" particles		2800	3660	3420	Mean	STDDEV
% fines w/o 2.5" particles		0.164285714	0.327868852	0.368421053	0.286859	0.088239
Sample total w/ 2.5" particles		6270	4170	4120	Mean	STDDEV
% fines w/ 2.5" particles		0.073365231	0.287769784	0.305825243	0.22232	0.105585

Stream:	Wet Creek Upper					
Date (mm/dd/yyyy):	9/9/2014					
Site Description:	Below Private Boundary					
Lat/Lon:	44.04370 N -113.45623 W					
Lat/Lon accuracy:		meters				
Datum:	WGS 72					
Samping Event ID	ID17040215SK024_02					
Personnel:	J Fales, J Heaton					
Rosgen Channel:	B					
Habitat Unit	Pool Tailout					
Reach Gradient (%):	2.5					
Geology (Q, G, V, or S):	G					
Target Species:	Trout					
Flow (cfs):	7					
Surrounding Land Use:	Range					
Sample number		1	2	3		
Ocular est. % surface fines						
Sieve size		(mL)	(mL)	(mL)		
63 mm (2.5")		1380	2140	1700		
25 mm (1.0")		710	1780	970		
12.5 mm (0.5")		940	730	1040		
6.34 mm (0.25")		720	630	550		
1.0 - 0.25" Subtotal		2370	3140	2560		
4.75 mm (0.187")		220	170	210		
2.36 mm (0.0937")		790	410	340		
850 µm (0.0331")		630	440	420		
212 µm (0.0083")		380	460	210		
106 µm (0.0041")						
75 µm (0.0029")						
53 µm (0.0021")		90	60	30		
Bottom pan (< 53 µm)						
< 0.25" Subtotal		2110	1540	1210		
Sample total w/o 2.5" particles		4480	4680	3770	Mean	STDDEV
% fines w/o 2.5" particles		0.470982143	0.329059829	0.320954907	0.373666	0.068893
Sample total w/ 2.5" particles		5860	6820	5470	Mean	STDDEV
% fines w/ 2.5" particles		0.360068259	0.225806452	0.221206581	0.269027	0.064403

Stream:	Wet Creek Lower					
Date (mm/dd/yyyy):	9/9/2014					
Site Description:	1/2 mi upstream of Pass Creek Road Crossing					
Lat/Lon:	44.14656 N / -113.36309					
Lat/Lon accuracy:			meters			
Datum:	WGS 72					
Samping Event ID	ID17040215SK022_03					
Personnel:	J Fales, J Heaton					
Rosgen Channel:	C					
Habitat Unit	Pool Tailout					
Reach Gradient (%):	2					
Geology (Q, G, V, or S):	G					
Target Species:	Trout					
Flow (cfs):	17					
Surrounding Land Use:	Range					
Sample number		1	2	3		
Ocular est. % surface fines						
Sieve size		(mL)	(mL)	(mL)		
63 mm (2.5")		140	0	160		
25 mm (1.0")		690	1130	1320		
12.5 mm (0.5")		1760	1350	1800		
6.34 mm (0.25")		2010	1660	1700		
1.0 - 0.25" Subtotal		4460	4140	4820		
4.75 mm (0.187")		590	560	530		
2.36 mm (0.0937")		1600	780	1000		
850 µm (0.0331")		540	360	630		
212 µm (0.0083")		200	100	310		
106 µm (0.0041")						
75 µm (0.0029")						
53 µm (0.0021")		40	20	30		
Bottom pan (< 53 µm)						
< 0.25" Subtotal		2970	1820	2500		
Sample total w/o 2.5" particles		7430	5960	7320	Mean	STDDEV
% fines w/o 2.5" particles		0.399730821	0.305369128	0.341530055	0.348877	0.038872
Sample total w/ 2.5" particles		7570	5960	7480	Mean	STDDEV
% fines w/ 2.5" particles		0.392338177	0.305369128	0.334224599	0.343977	0.036168

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