

Pend Oreille Tributaries Sediment Total Maximum Daily Loads

Upper Pack River, Hellroaring Creek, Sand Creek,
Schweitzer Creek, Gold Creek, Rapid Lightning Creek,
North Gold Creek



**Idaho Department of Environmental Quality and
U.S. Environmental Protection Agency, Region 10**

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**Prepared for:
Idaho Department of Environmental Quality and
U.S. Environmental Protection Agency, Region 10**

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Abbreviations, Acronyms, and Symbols

§303(d)	Refers to section 303 subsection (d) of the Clean Water Act, or a list of impaired water bodies required by this section	DMA	designated management agency
μ	micro, one-one thousandth	DO	dissolved oxygen
§	Section (usually a section of federal or state rules or statutes)	DWS	domestic water supply
AgPlan	Agricultural Pollution Plan of 1979	EPA	United States Environmental Protection Agency
AU	assessment unit	F	Fahrenheit
BLM	United States Bureau of Land Management	FPA	Idaho Forest Practices Act
BMP	best management practice	GIS	Geographical Information Systems
BURP	Beneficial Use Reconnaissance Program	HUC	Hydrologic Unit Code
C	Celsius	IDAPA	Refers to citations of Idaho administrative rules
CFR	Code of Federal Regulations (refers to citations in the federal administrative rules)	IDFG	Idaho Department of Fish and Game
cfs	cubic feet per second	IDL	Idaho Department of Lands
CGP	construction general permit	INFISH	federal Inland Native Fish Strategy
cm	centimeter	ISCC	Idaho Soil Conservation Commission
CWA	Clean Water Act	ITD	Idaho Transportation Department
CWE	cumulative watershed effects	LA	load allocation
DEQ	Department of Environmental Quality	LC	load capacity
		mg/L	milligrams per liter
		MOS	margin of safety
		NB	natural background

NPDES	National Pollutant Discharge Elimination System	WBAG	<i>Water Body Assessment Guidance</i>
NRCS	Natural Resources Conservation Service	WBAGII	<i>Water Body Assessment Guidance, second edition</i>
PCR	primary contact recreation	WEPP	Water Erosion Prediction Project
RUSLE 2	Revised Universal Soil Loss Equation Version 2	WLA	wasteload allocation
SBA	subbasin assessment		
SFI	DEQ's Stream Fish Index		
SHI	DEQ's Stream Habitat Index		
SMI	DEQ's Stream Macroinvertebrate Index		
SRW	special resource water		
SS	salmonid spawning		
STATSGO	State Soil Geographic Database		
SWPPP	storm water pollution prevention plan		
TDS	total dissolved solids		
TMDL	total maximum daily load		
TSS	total suspended solids		
U.S.C.	United States Code		
USFS	United States Forest Service		
USGS	United States Geological Survey		
WAG	Watershed Advisory Group		

Executive Summary

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. 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. Currently this list must be published every 2 years. 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. (In common usage, a TMDL also refers to the written document that contains the statement of loads and supporting analyses, often incorporating TMDLs for several water bodies and/or pollutants within a given watershed.)

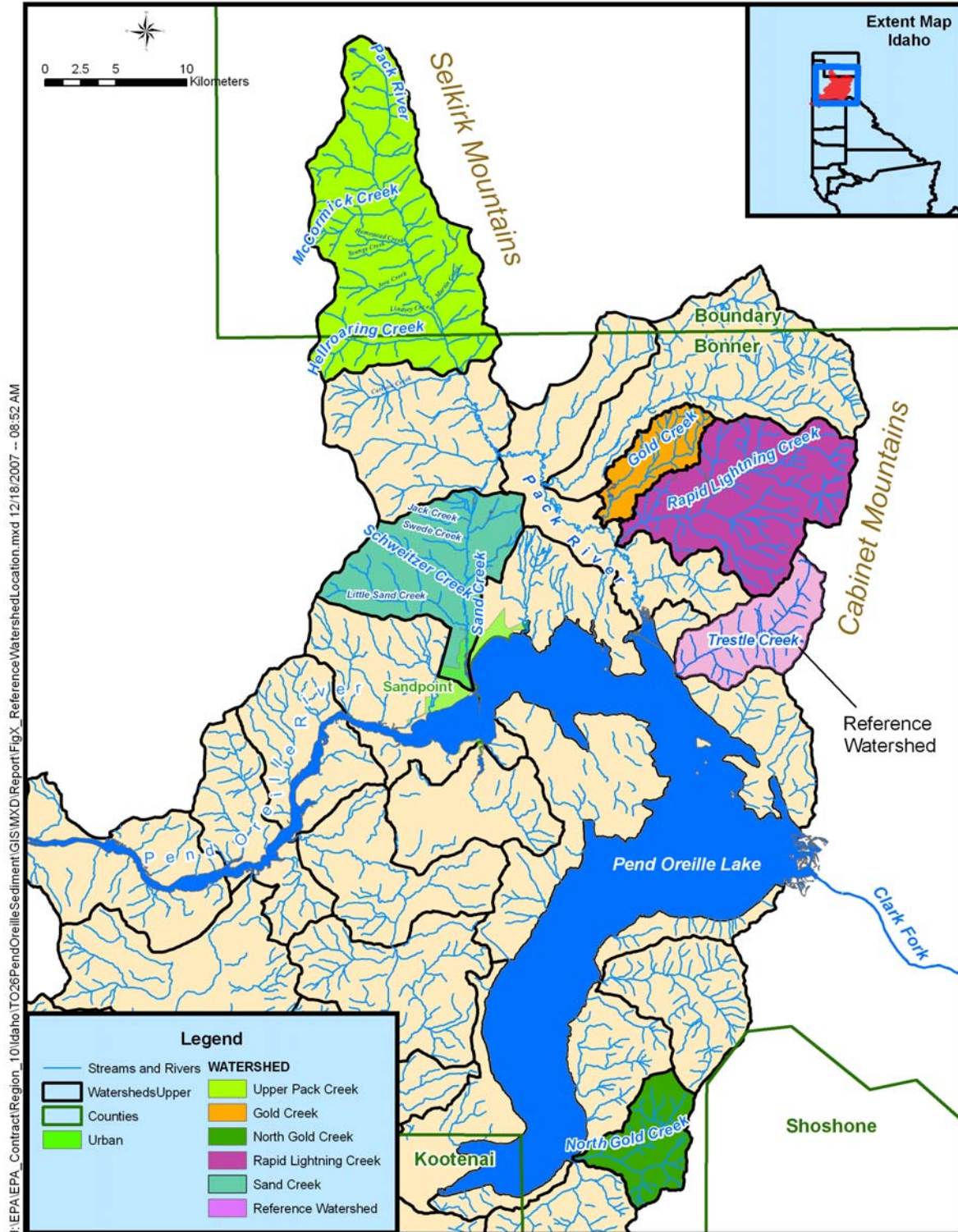
This document addresses selected water bodies in the Pend Oreille Subbasin that are on Idaho's current §303(d) list. The overall purpose of the Pend Oreille Lake Tributaries Sediment TMDLs document is to characterize and document sediment pollutant loads for a select group of tributaries in the Pend Oreille Subbasin. The first portion of this document is the Subbasin Assessment, which is partitioned into four major sections: watershed characterization, water quality concerns and status, pollutant source inventory, and a summary of past and present pollution control efforts. This information was then used to develop sediment TMDL calculations for specific tributaries in the Pend Oreille Subbasin. The TMDL analysis identifies pollutant sources and quantifies sediment load reductions needed to return impaired waters to a condition supporting beneficial uses.

Subbasin at a Glance

The headwaters of the Pend Oreille River Subbasin (hydrologic unit code [HUC] 17010214) are in the Cabinet, Selkirk, and Bitterroot mountains and these tributaries empty into Pend Oreille Lake. The Clark Fork River is the largest tributary to the lake and enters the lake's eastern edge from Montana. The Pend Oreille River, flowing west into Washington, is the only surface water outflow from Pend Oreille Lake.

This report addresses five watersheds in the Pend Oreille Subbasin that include 11 assessment units identified in Idaho's 2002 Integrated Report as water quality limited by an unknown pollutant or excess sediment. These 6th order watersheds are Upper Pack Creek, Gold Creek, North Gold Creek, Rapid Lightning Creek, and Sand Creek (Figure ES-1). The five watersheds addressed in this report comprise 121,927 acres, or approximately 190 square miles of the Pend Oreille Subbasin, and include the following assessment units: the Pack River (17010214PN041_02 and 03), McCormick Creek (17010214PN042_02), HellroaringCreek (17010214PN044_02), Sand Creek (17010214PN049_02 and 03), Schweitzer Creek (17010214PN052_02), Gold Creek (ID17010214PN034_02), Rapid Lightning Creek (ID17010214PN033_03), and North Gold Creek (ID17010214PN025_02 and 03) (Table ES-1).

Figure ES-1. Location of the Pend Oreille River Subbasin and Selected Idaho Tributaries



This report addresses watersheds contained by Boundary and Bonner counties, rural and sparsely populated counties of northern Idaho. Most of the Upper Pack River watershed is within Boundary County, Idaho. The 2006 Boundary County population estimate was 10,831, with very few of these residents in the Upper Pack River watershed (U.S. Census Bureau 2007a). Gold Creek, Rapid Lightning Creek, Sand Creek, North Gold Creek, and Trestle Creek are all located in Bonner County, Idaho. The 2006 U.S. Census Bureau estimate for Bonner County population was 41,275. Sandpoint is the county seat of Bonner County with a population of 6,835, which represents the largest urban area within the watersheds of concern. Urban growth is expected to continue in Sand Creek, Schweitzer Creek and the Pack River watersheds.

The Pend Oreille Subbasin was glacially formed during the ice age and the east side of the lake was in the path of the ancient Missoula Flood. Pend Oreille Lake is a leading recreational fishery destination and, because the lake is one of the deepest in the world, it is used to test submarine prototypes and other research. The Pend Oreille Subbasin supports a diversity of recreational opportunities, including skiing in the Schweitzer Ski Basin, golfing, camping, boating, and hunting. In addition to recreation, other key industries include forestry and textiles. There are National Forests and the Pack River Flats Wildlife Management Area within Boundary and Bonner Counties. Pend Oreille Lake, the City of Sandpoint, and many recreational attractions throughout the Pend Oreille Subbasin make these watersheds a prime location for continued growth and development (PRWC 2006).

The Upper Pack River watershed from the headwaters to the confluence with Caribou Creek covers 76 square miles or 48,466 acres. The watershed includes the 1st and 2nd order portions of Pack River and its tributaries, including Beehive Creek, Slide Creek, Thor Creek, Zuni Creek, West Branch Pack River, McCormick Creek from headwaters to Pack River, and 1st and 2nd order portions of McCormick Creek, Zee Creek, Homestead Creek, Youngs Creek, Jeru Creek, Lindsey Creek, Pearson Creek, Martin Creek, Blanc Creek, Hellroaring Creek, and Tavern Creek. Caribou Creek and Hellroaring Creek are 3rd order tributaries to the Upper Pack River. Lindsey Creek, Jeru Creek, Martin Creek and Homestead Creek are 2nd order tributaries to the Upper Pack River. The Pack River Stream Channel Assessment report (Golder 2003) indicates that the Upper Pack River riparian community is well established.

The Sand Creek watershed covers 38 square miles or 24,209 acres, and includes 1st to 3rd order portions of the creek as well as Jack Creek, Little Sand Creek, Swede Creek, and Schweitzer Creek. Sand Creek generally flows north to south and discharges into Pend Oreille Lake near the southeast corner of Sandpoint. The drinking water for the City of Sandpoint is withdrawn from Little Sand Creek.

The Gold Creek watershed encompasses 12 square miles, or 7,747 acres. Gold Creek flows into the Pack River approximately 4 miles upstream from where State Highway 200 crosses the Pack River (IDL 2003e). The Gold Creek watershed contains the mainstem Gold Creek from the headwaters to its confluence with the Pack River and 1st and 2nd order portions of Gold Creek. Gold Creek is a 3rd order tributary to the Pack River (IDL 2003e).

Table ES-1. Assessment Units Identified as Impaired in the 2002 Integrated Report in the Pend Oreille Subbasin (HUC 17010214)

Watershed Name	Water Body Name	Assessment Unit	Impairment Boundaries	Pollutant of Concern
Upper Pack River	Upper Pack River	ID17010214PN041_02	Upper Pack River – source to Lindsey Creek. First and 2 nd order portions of Pack River, West Branch Pack River, Zuni Creek, Martin Creek, Homestead Creek, Lindsey Creek, Pearson Creek, Youngs Creek, Thor Creek, Beehive Creek, Slide Creek.	Cause Unknown ¹
		ID17010214PN041_03	Mainstem Upper Pack River, source to Lindsey Creek.	Cause Unknown ¹
	McCormick Creek	ID17010214PN042_02	McCormick Creek – Source to Pack River. First and 2 nd order portions of McCormick Creek.	Cause Unknown ²
	Hellroaring Creek	ID17010214PN044_02	Hellroaring Creek – source to Pack River. First and 2 nd order portions of Hellroaring Creek	Cause Unknown ¹
Sand Creek ⁴	Sand Creek	ID17010214PN049_02	First and 2 nd order portions, source to Schweitzer Creek	Cause Unknown ¹
	Sand Creek	ID17010214PN049_03	Sand Creek – Source to Schweitzer Creek. Third order portion of Sand Creek.	Cause Unknown ¹
	Schweitzer Creek	ID17010214PN052_02	Schweitzer Creek – source to Sand Creek. First and 2 nd order portions of Schweitzer Creek.	Sediment
Gold Creek	Gold Creek	ID17010214PN034_02	Gold Creek – Source to Pack River. First and 2 nd order portions of Gold Creek.	Cause Unknown ¹
Rapid Lightning Creek	Rapid Lightning Creek	ID17010214PN033_03	Rapid Lightning Creek – Trapper Creek to Pack River. Third order portion of Rapid Lightning Creek.	Cause Unknown ³

Watershed Name	Water Body Name	Assessment Unit	Impairment Boundaries	Pollutant of Concern
North Gold Creek	North Gold Creek	ID17010214PN025_02	North Gold Creek – Source to Pend Oreille Lake. First and 2 nd order portions of North Gold Creek and Branch North Gold Creek.	Sediment
		ID17010214PN025_03	North Gold Creek – Branch North Gold Creek to Pend Oreille Lake. Third order portion of North Gold Creek.	Sediment

¹The stressor identification and Subbasin Assessment identified sediment as a cause of impairment.

²Stressor identification determined that sediment was not a likely cause of beneficial use impairment (TerraGraphics 2006).

³Although the stressor identification identified sediment as a likely cause of impairment, the Subbasin Assessment determined that sediment was not causing beneficial use impairment.

⁴ The Sand Creek watershed also includes the additional assessment units of Sand Creek (ID17010214PN048_03 and _03a) as well as assessment units for Jack Creek (ID17010214PN050_02), Swede Creek (ID17010214PN051_02), and Little Sand Creek (ID17010214PN053_02).

The Rapid Lightning Creek watershed covers 48 square miles, or 30,985 acres. Vegetation type is similar to the Upper Pack River watershed. Rapid Lightning Creek is a 3rd order tributary to the Pack River. The drainage is predominantly oriented in a westerly direction. Elevation ranges from 2080 to 6,735 feet with an average elevation of 3,612 feet. The average slope throughout the drainage is 24 percent, with a dominant slope of 16 percent. Over 47 percent of the area contains slopes greater than 30 percent. The Beneficial Use Reconnaissance Program (BURP) results documented a lack of stable fish cover (<10%). Sinuosity and width-to-depth ratios for the sub-reaches are medium and 66.5, respectively.

The North Gold Creek on the southeast shore of Pend Oreille Lake covers 16 square miles, or 10,519 acres. North Gold Creek is a 1st order tributary to Pend Oreille Lake. The drainage is predominantly oriented in a southeasterly direction. Elevation ranges from 2,066 to 6,358 feet with an average elevation of 3,933 feet. The average slope throughout the drainage is 47 percent, with a dominant slope of 55 percent. Over 80 percent of the area contains slopes greater than 30 percent. The elevation at the headwater of North Gold Creek is 4,555 feet, and at its outfall into Pend Oreille Lake the elevation is 2,067 feet. The instream cover diminishes from upstream (10-30%) to downstream (<10%). Sinuosity is medium and the average gradient is 4 percent. Width-to-depth ratios for the sub-reaches range from 37.2 (upper portion) to 74.3 (lower portion).

Key Findings

The beneficial uses for water bodies included in this TMDL are cold water aquatic life, salmonid spawning, primary contact recreation, and domestic water supply (Table ES-2). Beneficial uses are typically protected by a set of numeric and narrative criteria. Idaho's water quality standard for sediment is narrative, "*Sediment shall not exceed quantities specified in Sections 250 and 252, or, in the absence of specific sediment criteria, quantities*

which impair designated beneficial uses. Determinations of impairment shall be based on water quality monitoring and surveillance and the information utilized as described in Section 350” (IDAPA 58.01.02.200.08).

Table ES-2. Pend Oreille Subbasin Beneficial Uses of Select Sediment-Impaired Waterbodies

Water Body	Uses*	Type of Use
Upper Pack River	CWAL, SS, PCR, DWS	Designated
Sand Creek	CWAL, PCR, DWS	Presumed
Schweitzer Creek	CWAL, PCR,	Presumed
Gold Creek	CWAL, PCR, SS**	Presumed
Rapid Lightning Creek	CWAL, PCR	Presumed
North Gold Creek	CWAL, SS, PCR	Existing

*CWAL – cold water aquatic life, SS – salmonid spawning, PCR – primary contact recreation, SCR – secondary contact recreation, AWS – agricultural water supply, DWS – domestic water supply, SRW – special resource water

**Salmonid spawning was added as a beneficial use August 14, 2007 based on Idaho Department of Fish and Game fisheries data (see page 50).

Idaho DEQ annual stream monitoring data, other stream surveys, and water quality samples were used in an assessment process to determine whether the beneficial uses are being fully supported. Further, DEQ determined whether water quality in the water bodies is meeting Idaho’s water quality standards. The assessment process identified 11 assessment units that are water quality impaired and do not fully support their beneficial uses (Table ES-1). When excess sediment was identified as the pollutant causing impairment, sediment TMDLs were developed in accordance with State of Idaho water quality standards. The TMDLs included in this document address sediment reduction goals to maintain or restore cold water aquatic life and salmonid spawning in impaired tributaries. The TMDLs quantify needed improvements and management actions to address water quality improvement measures and timelines.

The pollutant source inventory did not identify any point sources of sediment within the watersheds of concern. Nonpoint sources of sediment above natural background conditions may include urban or developed land use, livestock grazing, timber harvest, mass wasting, roadway impacts, and in-stream bank erosion. It is extremely difficult to partition current stream bank erosion rates to related factors such as: 1) naturally occurring (background); 2) remnants of effects from historic fires followed by increased flows; 3) remnant effects of historic timber harvesting in the riparian zone and construction of a transportation network; 4) excess stream energy of peak flows related to hydrologic openings from timber harvesting; 5) channel straightening and conversion of wetlands and wet meadows for agriculture purposes; 6) excess current sediment loads which lead to a decrease in stream depth; and 7) the effect of floodplain encroaching roads, as the roads can interfere with the stream’s natural tendency to seek a steady state gradient, and at high discharge periods may cause the stream to erode stream banks and the stream bed. For these reasons, sediment loading from stream bank erosion was not quantified in the TMDL calculations presented in Section 5 of this report.

Past and present pollution control efforts include regulatory and voluntary activities to manage sediment loading. The Forest Practices Act (FPA) governs the harvest and

reforestation of all timberlands in Idaho. These rules are, in part, requirements for BMPs designed to abate erosion and retard sediment delivery to streams. The Idaho Department of Lands (IDL) implemented FPA rules and regulations aggressively over the past 15 years. All harvests managed by the USFS must meet the federal Inland Native Fish Strategy guidelines. These guidelines prescribe 300-foot-wide buffers for streams with fish uses. Current and proposed timber sales within the basin include various road projects aimed at improving water quality. Road projects include road obliteration, resurfacing, slope stabilization, stream crossings, and drainage improvements.

Determination of the sediment load capacity at which full support of beneficial uses is exhibited has been set at various levels in TMDLs developed by the DEQ. These have ranged from an interim load capacity at the natural background level to a load capacity more than 200 percent above background in some areas of the state. Since Idaho sediment criteria are narrative, a critical step in development of sediment TMDLs is development of a numeric translator for narrative criteria to serve as the water quality target. To determine the most appropriate target, each subbasin must be evaluated on an individual basis. Although it is well understood that streams have the ability to process sediment levels above natural background levels, it is not well understood to what level this is possible before impairment occurs. As a result, a reference watershed was chosen to help derive a water quality target or numeric translator. Trestle Creek, a tributary to Pend Oreille Lake, was selected as the reference stream for the development of sediment TMDLs in the Pend Oreille Subbasin. Trestle Creek was chosen as a reference watershed because it supports one of the highest number of bull trout redds in the Pend Oreille Lake system (Corsi, *et al.* 1998), the stream is supports beneficial uses, and because the stream is considered undisturbed or “least impacted.”

A method was developed to estimate the sediment load to select streams within the Pend Oreille Subbasin. Six types of modeling or estimation techniques were used, depending on the source of eroded sediment, and these are described in Section 5.1 and Appendix A of this report. Monitoring points were selected from the existing DEQ BURP network for long-term evaluation of water quality compliance for the assessment units in this TMDL. The load capacity was estimated for the five watersheds (Table ES-3). Existing sediment loads were estimated for each watershed and land type (Table ES-4). Based on the modeling results from the reference watershed (Trestle Creek), a sediment load capacity target of 42 percent above natural background conditions was established.

Table ES-3. Load Capacity Summary

Watershed	Load Type	Area (acres)	Estimated Existing Load (tons/year)	Natural Background Load (tons/year)	Load Capacity at 42% above Background (tons/year)
Gold Creek	Sediment	7,747	390	181	257
North Gold Creek	Sediment	10,519	762	246	349
Rapid Lightning Creek	Sediment	30,985	1,014	717	1,018
Sand Creek	Sediment	24,209	2,039	562	798
Upper Pack River	Sediment	48,467	2,309	970	1,377

Table ES-4. Estimated Annual Average Existing Sediment Loads for Each Watershed by Land Type

Land Type	EXISTING SEDIMENT LOAD ¹ (tons/year)				
	Gold Creek	North Gold Creek	Rapid Lightning Creek	Sand Creek	Upper Pack River
Forest ²	151	210	690	376	584
Forest - Harvested	0	435	4	0	398
Forest - Burned	0	0	0	0	0
Grassland-Agriculture	170	0	78	406	0
Grassland-Permanent	0	3	0	261	386
Shrubland ²	3	1	13	18	241
Urban	18	2	9	465	23
Unpaved Roads	31	72	108	347	255
Paved Roads	0	0	0	73	0
Mass Wasting-Natural ²	0	0	0	0	34
Mass Wasting-Anthropogenic	0	0	0	0	296
Road Encroachment	17	39	112	93	92
Total Existing Load	390	762	1,014	2,039	2,309

¹ Existing Sediment Load = Natural Background Load + Anthropogenic Nonpoint Sources Load

² Sediment sources defined as natural.

All sediment load allocations within the Pend Oreille Subbasin are to nonpoint sources. No allocation is allotted for point sources of sediment. Sediment load allocations were assigned to resource managers and landowners based on the amount of sediment load from their land and the modeled land use types within the watershed. This report provides the required outcomes necessary to meet federal regulations and guidance for TMDLs. The outcomes are summarized in Table ES-5. Since the TMDLs are established based on land use categories and land management responsibilities, the sediment TMDL required for Hellroaring Creek is incorporated within the TMDL calculations for the Upper Pack River. Likewise, while a sediment TMDL for McCormick Creek was deemed unnecessary as an outcome of the stressor identification reports, pollutant load reductions for McCormick Creek are nonetheless included in the sediment TMDL calculations for Upper Pack River since the entire Upper Pack River watershed was modeled as one watershed. Any reductions in sediment loading from the McCormick Creek watershed will further advance the sediment load reductions set by the TMDL for the Upper Pack River.

Based on available data, stressor identification, and the Subbasin Assessment, DEQ has concluded that excessive sediment is not a likely cause of beneficial use impairment for Rapid Lightning Creek. Modeling results show that the existing sediment load for Rapid Lightning Creek is approximately equal to the load capacity target. With regard to sediment, water quality in Rapid Lightning Creek is meeting Idaho water quality standards and a sediment TMDL is not necessary for this assessment unit. Sediment allocations have been established for Rapid Lightning Creek in the 2001 DEQ Clark Fork/Pend Oreille Subbasin Assessment and TMDLs and Rapid Lightning Creek land managers must adhere to these

allocations. Rapid Lightning Creek is on the border of being impaired and additional land disturbance is likely to result in non attainment of the use. While only the mainstem of Sand Creek and Schweitzer Creek were validated as impaired, thus warranting TMDLs, additional TMDLs were established for other assessment units in the Sand Creek watershed including Sand Creek (ID17010214NP048_03 and _03a), Jack Creek (ID17010214NP050_02), Swede Creek (ID17010214NP051_02), and Little Sand Creek (ID17010214NP053_02). Sediment reductions in these assessment units will advance the success of achieving the sediment load allocations established for the Sand Creek watershed.

DEQ, designated management agencies responsible for TMDL implementation, and partners will make every effort to address past, present, and future pollution problems in an attempt to link them to watershed characteristics and management practices designed to improve water quality and restore the beneficial uses of the water body. Any and all solutions to help restore beneficial uses of a stream will be considered as part of a TMDL implementation plan.

Table ES-5. Sediment TMDL Outcomes

Water Body Name	Assessment Unit	Pollutant	TMDL(s) Complete	Recommended Changes to Integrated Report	Justification
Upper Pack River	ID17010214PN041_02 ID17010214PN041_03	Sediment	Yes	Move to Section 4a*	TMDL Completed
McCormick Creek	ID17010214PN042_02	Sediment	No	Remove unknown as pollutant	Stressor ID report verified that sediment was not the cause of nonsupport of CWAL
Hellroaring Creek	ID17010214PN044_02	Sediment	Yes	Move to Section 4a*	TMDL Completed
Sand Creek	ID17010214PN049_02 ID17010214PN049_03 ID17010214PN048_03 ID17010214PN048_03a	Sediment	Yes	Move to Section 4a*	TMDL Completed
Jack Creek	ID17010214PN050_02	Sediment	Yes	Move to Section 4a*	TMDL Completed
Swede Creek	ID17010214PN051_02	Sediment	Yes	Move to Section 4a*	TMDL Completed
Schweitzer Creek	ID17010214PN052_02	Sediment	Yes	Move to Section 4a*	TMDL Completed
Little Sand Creek	ID17010214PN053_02	Sediment	Yes	Move to Section 4a*	TMDL Completed
Gold Creek	ID17010214PN034_02	Sediment	Yes	Move to Section 4a*	TMDL Completed
North Gold Creek	ID17010214PN025_02 ID17010214PN025_03	Sediment	Yes	Move to Section 4a*	TMDL Completed

*Section 4a of the Integrated Report is "Impaired Waters with a Completed TMDL."