# St. Joe and St. Maries River
# Subbasin Assessment and Total Maximum Daily Load
## Five-Year Review

**State of Idaho**
**Department of Environmental Quality**

**September 2011**

# St. Joe and St. Maries River Subbasin Assessment and Total Maximum Daily Loads

**Five-Year Review**

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# Acknowledgments

Cover photos are of a culvert replacement project within the Soldier Creek watershed and bank stabilization work completed along Santa Creek upstream of Emida, Idaho. The Soldier Creek photo was taken by Sherry Klaus of the Benewah Soil and Water Conservation District, and the Santa Creek photo was taken by Tyson Clyne, Idaho Department of Environmental Quality, Coeur d'Alene Regional Office.

This five-year review was completed with cooperation and contributions from the St. Joe/St. Maries Watershed Advisory Group.

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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 |
| **AU** | assessment unit |
| **BSWCD** | Benewah Soil and Water Conservation District |
| **BIA** | Bureau of Indian Affairs |
| **BLM** | U.S. Bureau of Land Management |
| **BMP** | best management practice |
| **BURP** | Beneficial Use Reconnaissance Program |
| **C** | Celsius |
| **CFR** | Code of Federal Regulations |
| **CW** | cold water |
| **CWA** | Clean Water Act |
| **CWE** | cumulative watershed effects |
| **DEQ** | Idaho Department of Environmental Quality |
| **DMA** | designated management agency |
| **DO** | dissolved oxygen |
| **DWS** | domestic water supply |
| **EPA** | United States Environmental Protection Agency |
| **F** | Fahrenheit |
| **ft** | feet |
| **FPA** | Idaho Forest Practices Act |
| **GIS** | geographic information systems |
| **IDAPA** | Refers to citations of Idaho administrative rules |
| **IDL** | Idaho Department of Lands |
| **mg/L** | milligrams per liter |
| **mL** | milliliter |
| **MWMT** | maximum weekly maximum temperature |
| **NA** | not applicable |
| **$NO_2$** | nitrite |
| **$NO_3$** | nitrate |
| **NH3** | ammonia |
| **NPDES** | National Pollutant Discharge Elimination System |
| **NRCS** | Natural Resources Conservation Service |
| **NTU** | nephelometric turbidity unit |
| **PCR** | primary contact recreation |
| **PNV** | potential natural vegetation |
| **RUSLE** | Revised Universal Soil Loss Equation |
| **SBA** | subbasin assessment |
| **SCR** | secondary contact recreation |
| **SFI** | stream fish index |
| **SHI** | stream habitat index |
| **SMI** | stream macroinvertebrate index |
| **SRW** | special resource water |
| **SS** | salmonid spawning |
| **TMDL** | total maximum daily load |
| **USFS** | United States Forest Service |
| **WAG** | watershed advisory group |
| **WATSED** | Water and Sediment Yield Model |
| **WEPP** | Water and Erosion Prediction Project |
| **WWTP** | wastewater treatment plant |

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# Executive Summary

This document presents a five-year review of the St. Joe and St. Maries River subbasin assessments and total maximum daily loads (TMDLs) (DEQ 2003a, 2003b). This review addresses the water bodies in the St. Joe River subbasin that are in Category 4a of Idaho's 2008 Integrated Report (i.e., those water bodies with an approved TMDL). This five-year review has been developed to comply with Idaho Statute 39-3611(7). The review describes current water quality status, pollutant sources, and recent pollution control efforts in the St. Joe River subbasin (hydrologic unit code 17010304), located in northern Idaho.

The TMDLs subject to five-year review are shown in Table A and were approved by the U.S. Environmental Protection Agency (EPA) in July 2003. During the development of the *St. Joe River Subbasin Assessment and Total Maximum Daily Loads* and *St. Maries River Subbasin Assessment and Total Maximum Daly Loads* (DEQ 2003a, 2003b), sediment and temperature were found to be impairing beneficial uses. Pollutant (sediment and temperature) load reductions were developed to restore beneficial uses to those watersheds not supporting beneficial uses at the time the TMDLs were developed. This review will look at the loads developed in the TMDLs, beneficial use status, and current water quality data. The findings of this review will be used to recommend changes to the water quality listing status and potential re-evaluation or recalculation of pollutant loads.

**Table A. Existing EPAapproved TMDLs in the St. Joe River subbasin**

| Stream | Assessment Unit (AU) | Pollutant(s) |
|---|---|---|
| **St. Joe River Watershed** | | |
| Tributaries to St. Joe River—North Fork St. Joe to St. Maries River | 17010304PN027_02 TMDL developed for Blackjack, Harvey, and Tank Creeks | Temperature |
| Mica Creek | 17010304PN030_02 | Sediment |
| | 17010304PN030_03 | Sediment |
| Bear and Little Bear Creek | 17010304PN033_02 | Temperature, Sediment |
| Fishhook Creek | 17010304PN039_02—AU not in Category 4a but should be | Temperature |
| | 17010304PN039_03 | Temperature, Sediment |
| | 17010304PN039_04 | Temperature, Sediment |
| Sherlock Creek—mining impacted reach | 17010304PN041_02a | Temperature |
| East and West Fork Bluff Creek | 17010304PN045_02 | Temperature |
| Bluff Creek | 17010304PN045_03 | Temperature |
| Mosquito Creek | 17010304PN046_02 | Temperature |
| Fly Creek | 17010304PN047_02 | Temperature |
| Beaver Creek | 17010304PN048_02 | Temperature |
| Simmons Creek | 17010304PN052_02 | Temperature |
| | 17010304PN052_03 | Temperature |
| Gold Creek | 17010304PN053_02 | Temperature |
| Loop Creek | 17010304PN060_02 | Temperature |
| | 17010304PN060_03 | Temperature |
| **St. Maries River Watershed** | | |
| St. Maries River—Santa Creek to mouth | 17010304PN007_05 | Temperature, Sediment |
| Alder Creek | 17010304PN008_02 | Sediment |
| John Creek | 17010304PN009_02 | Sediment |

| Stream | Assessment Unit (AU) | Pollutant(s) |
|---|---|---|
| Santa Creek | 17010304PN010_02 | Temperature, Sediment |
| | 17010304PN010_03 | Temperature, Sediment |
| | 17010304PN010_04 | Temperature, Sediment |
| Charlie Creek | 17010304PN011_02 | Sediment |
| | 17010304PN011_03 | Temperature, Sediment |
| St. Maries River—Carpenter to Santa Creek | 17010304PN012_05 | Temperature, Sediment |
| Tyson Creek | 17010304PN013_02 | Sediment |
| | 17010304PN013_03 | Sediment |
| Carpenter Creek | 17010304PN014_02 | Sediment |
| | 17010304PN014_03 | Sediment |
| St. Maries River—confluence of West and Middle Forks | 17010304PN015_05 | Temperature, Sediment |
| Emerald Creek | 17010304PN016_02 | Temperature, Sediment |
| Emerald Creek—East Fork Emerald to St. Maries River | 17010304PN016_03 | Temperature, Sediment |
| West Fork St. Maries River | 17010304PN017_02 | Temperature, Sediment |
| | 17010304PN017_03 | Temperature, Sediment |
| | 17010304PN017_04 | Temperature, Sediment |
| Middle Fork St. Maries River | 17010304PN018_02 | Temperature, Sediment |
| | 17010304PN018_03 | Temperature, Sediment |
| | 17010304PN018_04 | Temperature, Sediment |
| | 17010304PN018_05 | Temperature, Sediment |
| Gold Center Creek | 17010304PN019_02 | Temperature |
| | 17010304PN019_03 | Temperature |
| Crystal Creek | 17010304PN023_02 | Sediment |
| Renfro Creek | 17010304PN024_02 | Sediment |
| | 17010304PN024_03 | Sediment |
| Thorn Creek | 17010304PN026_02 | Sediment |
| | 17010304PN026_03 | Sediment |

# Section 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. 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. This list is currently published every 2 years as the list of Category 5 waters in the Integrated Report. 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 Statute 39-3611(7) requires a five-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.

This report is intended to meet the intent and purpose of Idaho Statue 39-3611(7). The report documents the review of approved Idaho TMDLs and implementation plans in the St. Joe River subbasin by considering the most current and applicable information in conformance with Idaho Statute 39-3607, evaluating the appropriateness of the TMDL to current watershed conditions, evaluating the implementation plan, and consulting with the watershed advisory group (WAG). This document includes an evaluation of the recommendations. Final decisions for TMDL modifications are decided by the Idaho Department of Environmental Quality (DEQ) director. Approval of TMDL modifications is decided by the U.S. Environmental Protection Agency (EPA), with consultation by DEQ.

# Section 2: TMDL Review and Status

EPA-approved TMDLs in the St. Joe River subbasin include the following:

- *St. Joe River Subbasin Assessment and Total Maximum Daily Loads* (DEQ 2003a)
- *St. Maries River Subbasin Assessment and Total Maximum Daily Loads* (DEQ 2003b)

The St. Joe and St. Maries River subbasin assessments (SBAs) and TMDLs were developed to comply with Idaho's TMDL schedule. The TMDLs were set to meet a court-appointed settlement agreement by which the state was obligated to finish TMDLs for impaired waters. The streams addressed in the St. Joe and St. Maries River TMDL documents were a product of this settlement agreement. Both TMDL five-year reviews will be addressed in this document because the TMDLs were completed within the same subbasin.

The St. Joe and St. Maries River SBAs and TMDLs were both approved by EPA in July 2003 (DEQ 2003a, 2003b). The TMDL documents described the physical, biological, and cultural setting; water quality status; pollutant sources; and pollution control actions in the St. Joe River subbasin, which includes both the St. Maries and St. Joe River watersheds. The first part of each document, the SBA, was an important first step in TMDL development that detailed the watershed characteristics, reviewed beneficial uses, and assessed water quality data. Subbasin characteristics are summarized in Table 1 and Figure 1. The starting point for the SBAs was Idaho's 1998 §303(d) list of water quality limited water bodies; 35 assessment units (AUs) within the St. Joe River subbasin were included on this list. The SBA portion of the document defined the extent of impairment as well as causes of water quality limitation throughout the subbasin. The second portion of the TMDL document, the loading analysis, quantified pollutant sources and allocated responsibility for load reductions needed to return listed waters to a condition meeting water quality standards.

**Table 1. St. Joe River subbasin characteristics**

| | |
|---|---|
| Hydrologic unit code | 17010304 |
| Water bodies addressed in 2003 TMDLs | 35 |
| Beneficial uses | Cold water aquatic life, salmonid spawning, primary and secondary contact recreation |
| Pollutants addressed in 2003 TMDLs | Sediments, nutrients, bacteria, dissolved oxygen, temperature |
| Land uses | Silviculture, agriculture, recreation, urban and rural development |
| Watershed size | St. Joe River watershed: 1,849 square miles<br>St. Maries River watershed: 490 square miles (within St. Joe River subbasin) |
| Population centers | St. Maries, Plummer, Santa, Emida, Fernwood, St. Joe City, Calder, Avery, Clarkia |
| Counties | Benewah, Shoshone, Kootenai, Latah, Clearwater |

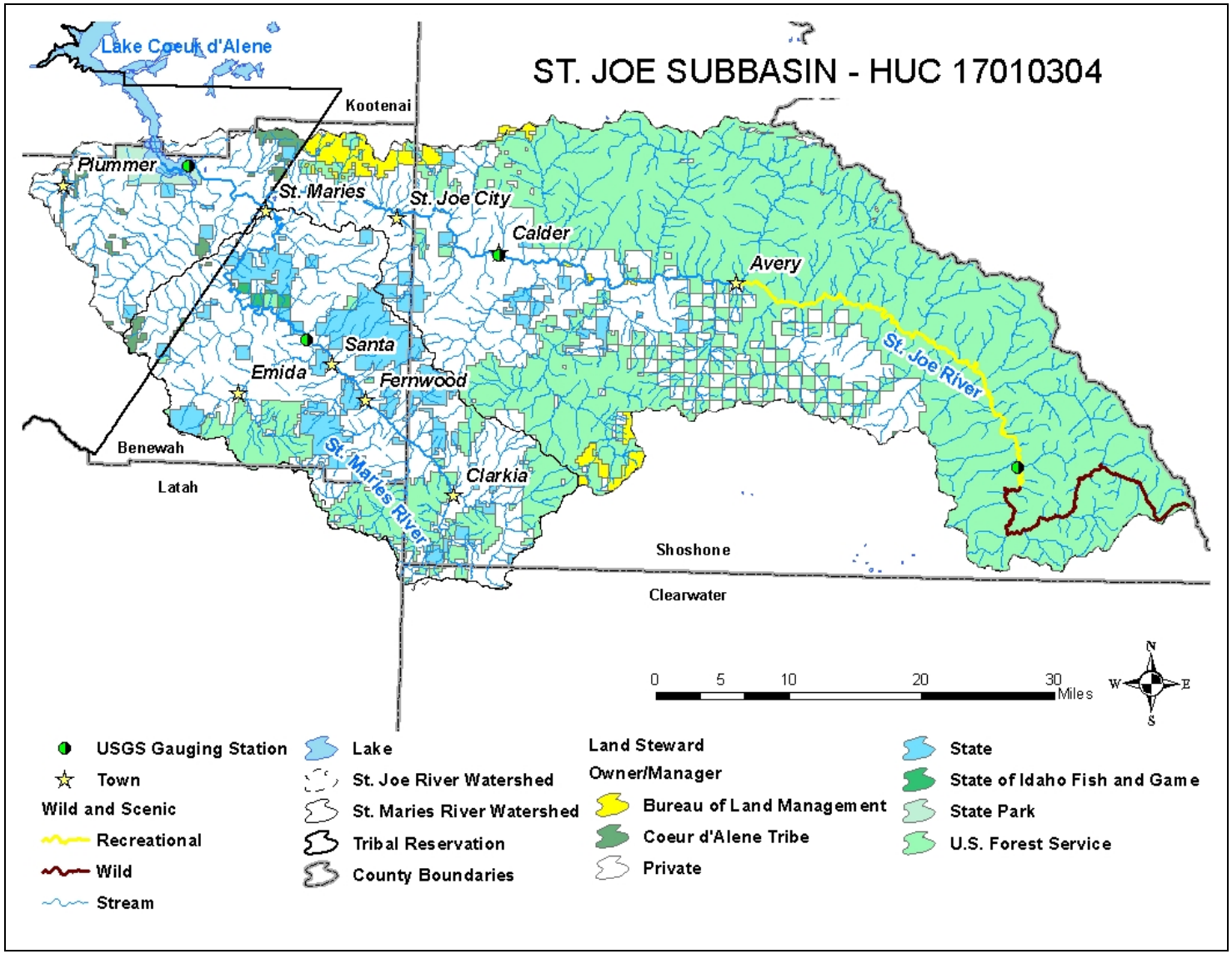


**Figure 1. St. Joe River subbasin at a glance**

Copies of the final St. Joe and St. Maries River TMDL documents are kept on file at DEQ's Coeur d'Alene Regional Office. Interested parties can view the TMDLs online at DEQ's website or obtain a paper copy from the Coeur d'Alene Regional Office.

Sediment and temperature were identified in the St. Joe and St. Maries Rivers as impairing beneficial uses, and TMDLs were developed to address each pollutant. During the TMDL process, a current load and load capacity (target load) for each stream were identified. The difference between the two results in the necessary pollutant load reductions. The pollutant load reduction represents the estimated amount of pollutant that needs to be removed to restore water quality to a level capable of supporting all beneficial uses. Load reductions are only estimates derived from the techniques utilized during TMDL development, and the final goal of the TMDLs is support of all beneficial uses.

Setting pollutant target loads is a critical part of TMDL development. Pollutant target loads were developed using similar methods for both the St. Joe and St. Maries River TMDLs. Pollutant target loads were pollutant specific, but all targets were set to restore all beneficial uses to full support.

## Overview of Sediment TMDLs

Sediment TMDLs were developed for 32 impaired AUs in the St. Joe River subbasin (Table 2). The sediment load capacity was set at 50% above natural background sediment levels. Background sediment rates reflect a watershed entirely vegetated with coniferous forest and devoid of roads.

Sediment modeling was conducted by characterizing the current land-use practices and assigning a sediment yield coefficient to each land-use practice. Sediment yield coefficients were derived using the following information:

- Idaho Department of Lands (IDL) cumulative watershed effects (CWE) survey road scores were used to estimate sediment contributions from roads. CWE scores were also used to estimate sediment contributions from road failures and encroaching roads (roads within 200 feet of a stream).
- The Revised Universal Soil Loss Equation (RUSLE) was used to estimate sediment contributions from pasture and agricultural lands.
- The Water and Sediment Yield Model (WATSED) was used to estimate sediment contributions from forest lands.

Modeled current sediment yield was compared to Beneficial Use Reconnaissance Program (BURP) scores of all streams to determine the most appropriate target. During TMDL development, data collected within the St. Joe River subbasin appeared to support the target of 50% above background (DEQ 2003a). Current monitoring and modeling data from within the Idaho Panhandle also support the use of 50% above background as a reasonable pollutant target. Pollutant targets set in the St. Joe and St. Maries River TMDLs will not be adjusted during the five-year review.

Once all appropriate implementation actions have been installed, an anticipated period of 20–30 years may be required for the watershed to reduce its current sediment load (DEQ 2003a, 2003b). Sediment load estimates will be reexamined following the completion of sediment-reduction projects and following collection of data failing to show support of beneficial uses. If

beneficial uses are not supported and sediment-reduction projects have been completed, loads set in the TMDL might not have been protective enough of beneficial uses and new sediment reduction estimates would need to be calculated.

**Table 2. Applicable sediment TMDLs in the St. Joe and St. Maries River watersheds**

| Stream | Assessment Unit | Pollutant | Numeric Criteria | Narrative Target |
|---|---|---|---|---|
| **St. Joe River Watershed** | | | | |
| Mica Creek | ID17010304PN030_02<br>ID17010304PN030_03 | Sediment | Not applicable* | 50% above natural background |
| Bear Creek | ID17010304PN033_02 | | | |
| Fishhook Creek | ID17010304PN039_03<br>ID17010304PN039_04 | | | |
| **St. Maries River Watershed** | | | | |
| St. Maries River | ID17010304PN007_05 | Sediment | Not applicable* | 50% above natural background |
| Alder Creek | ID17010304PN008_02 | | | |
| John Creek | ID17010304PN009_02 | | | |
| Santa Creek | ID17010304PN010_02<br>ID17010304PN010_03<br>ID17010304PN010_04 | | | |
| Charlie Creek | ID17010304PN011_02<br>ID17010304PN011_03 | | | |
| St. Maries River | ID17010304PN012_05 | | | |
| Tyson Creek | ID17010304PN013_02<br>ID17010304PN013_03 | | | |
| Carpenter Creek | ID17010304PN014_02<br>ID17010304PN014_03 | | | |
| St. Maries River | ID17010304PN015_05 | | | |
| Emerald Creek | ID17010304PN016_02<br>ID17010304PN016_03 | | | |
| West Fork St. Maries River | ID17010304PN017_02<br>ID17010304PN017_03<br>ID17010304PN017_04 | | | |
| Middle Fork St. Maries River | ID17010304PN018_02<br>ID17010304PN018_03<br>ID17010304PN018_04<br>ID17010304PN018_05 | | | |
| Crystal Creek | ID17010304PN023_02 | | | |
| Renfro Creek | ID17010304PN024_02<br>ID17010304PN024_03 | | | |
| Thorn Creek | ID17010304PN026_02<br>ID17010304PN026_03 | | | |

* The Idaho water quality standard addressing sediment is a narrative criteria: “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).

Load allocations identify the portion of the pollutant load generated from an identified pollutant (sediment in this case). The load allocation was divided among the different land management agencies. A portion of the load allocation was then identified as a reduction needed to meet the TMDL targets (Table 3).

## Table 3. Sediment TMDL load reductions in the St. Joe and St. Maries River watersheds

| Stream Name/ Assessment Unit | Pollutant | Point Sources | Nonpoint Sources | Load Reduction | | Control Location |
|---|---|---|---|---|---|---|
| | | | | Land Mgmt.[a] | (tons/yr) | |
| **St. Joe River Watershed above St. Maries River confluence** | | | | | | |
| Mica Creek<br>ID17010304PN030_02<br>ID17010304PN030_03 | Sediment | None | Forest, unstocked forest, double fires, road failures, roads, mass failures | BLM | 10 | Mica Creek below Mica Meadows |
| | | | | USFS | 10 | |
| | | | | IDL | 63 | |
| | | | | Private | 235 | |
| | | | | **Total** | **318** | |
| Bear Creek/Little Bear Creek<br>ID17010304PN033_02 | Sediment | None | Forest, unstocked forest, double fires, road failures, roads, mass failures | BLM | 3 | Mouth of Bear Creek |
| | | | | USFS | 14 | |
| | | | | Private | 4 | |
| | | | | **Total** | **21** | |
| Fishhook Creek<br>ID17010304PN039_03<br>ID17010304PN039_04 | Sediment | None | Forest, unstocked forest, double fires, road failures, roads, mass failures | BLM | 0 | 1 mile upstream of confluence with St. Joe River |
| | | | | USFS | 47 | |
| | | | | Private | 39 | |
| | | | | **Total** | **86** | |
| **St. Maries River Watershed** | | | | | | |
| St. Maries River<br>ID17010304PN007_05 | Sediment | None | Agricultural land, forest, unstocked forest, double fires, roads, mass failures | USFS | 63 | Near confluence with Thorn Creek |
| | | | | IDL | 448 | |
| | | | | Private (forest) | 2,114 | |
| | | | | Private (ag.) | 107 | |
| | | | | BLM | 6 | |
| | | | | BIA | 6 | |
| | | | | IDL | 382 | |
| | | | | Water | 6 | |
| | | | | **Total** | **3,132** | |
| Alder Creek<br>ID17010304PN008_02 | Sediment | None | Agricultural land, forest, unstocked forest, double fires, roads, mass failures | USFS | 0.1 | Confluence with St. Maries River |
| | | | | IDL | 0.9 | |
| | | | | Private (forest) | 18 | |
| | | | | Private (ag.) | 5 | |
| | | | | BIA | 2 | |
| | | | | **Total** | **26** | |
| John Creek<br>ID17010304PN009_02 | Sediment | None | Agricultural land, forest, unstocked forest, double fires, roads, mass failures | __[b] | __[b] | None set in 2003 TMDL |
| Santa Creek<br>ID17010304PN010_02<br>ID17010304PN010_03<br>ID17010304PN010_04 | Sediment | None | Agricultural land, forest, unstocked forest, double fires, roads, mass failures | USFS | 535 | Confluence with St. Maries River |
| | | | | IDL | 52 | |
| | | | | Private (forest) | 471 | |
| | | | | Private (ag.) | 212 | |
| | | | | **Total** | **1,270** | |
| Charlie Creek<br>ID17010304PN011_02<br>ID17010304PN011_03 | Sediment | None | Agricultural land, forest, unstocked forest, double fires, roads, mass failures | __[c] | __[c] | None set in 2003 TMDL |
| St. Maries River<br>ID17010304PN012_05 | Sediment | Santa/ Fernwood WWTP (ID0022845)[d] | Agricultural land, forest, unstocked forest, double fires, roads, mass failures | USFS | 44 | Near confluence with Tyson Creek |
| | | | | IDL | 950 | |
| | | | | Private (forest) | 1,294 | |
| | | | | Private (ag.) | 2 | |
| | | | | **Total** | **2,290** | |
| Tyson Creek<br>ID17010304PN013_02<br>ID17010304PN013_03 | Sediment | None | Agricultural land, forest, unstocked forest, double fires, roads, mass failures | USFS | 7 | Confluence with St. Maries River |
| | | | | IDL | 19 | |
| | | | | Private (forest) | 9 | |
| | | | | Private (ag.) | 3 | |
| | | | | **Total** | **38** | |
| Carpenter Creek<br>ID17010304PN014_02<br>ID17010304PN014_03 | Sediment | None | Agricultural land, forest, unstocked forest, double fires, roads, mass failures | USFS | 11 | Confluence with St. Maries River |
| | | | | IDL | 70 | |
| | | | | Private | 123 | |
| | | | | **Total** | **204** | |

| Stream Name/ Assessment Unit | Pollutant | Point Sources | Nonpoint Sources | Load Reduction | | Control Location |
|---|---|---|---|---|---|---|
| | | | | Land Mgmt.[a] | (tons/yr) | |
| St. Maries River ID17010304PN015_05 | Sediment | Clarkia WWTP (ID0025071)[d] | Agricultural land, forest, unstocked forest, double fires, roads, mass failures | USFS | 481 | Near confluence with Emerald Creek |
| | | | | IDL | 142 | |
| | | | | Private | 890 | |
| | | | | **Total** | **1,513** | |
| Emerald Creek ID17010304PN016_02 ID17010304PN016_03 | Sediment | None | Agricultural land, forest, unstocked forest, double fires, roads, mass failures | USFS | 0 | Confluence with St. Maries River |
| | | | | IDL | 0 | |
| | | | | Private | 0 | |
| | | | | BLM | 0 | |
| | | | | **Total** | **0[e]** | |
| West Fork St. Maries River ID17010304PN017_02 ID17010304PN017_03 ID17010304PN017_04 | Sediment | None | Agricultural land, forest, unstocked forest, double fires, roads, mass failures | USFS | 180 | Confluence with Middle Fork St. Maries River |
| | | | | IDL | 37 | |
| | | | | Private | 131 | |
| | | | | **Total** | **348** | |
| Middle Fork St. Maries River ID17010304PN018_02 ID17010304PN018_03 ID17010304PN018_04 ID17010304PN018_05 | Sediment | None | Agricultural land, forest, unstocked forest, double fires, roads, mass failures | USFS | 32 | Confluence with West Fork of St. Maries River |
| | | | | IDL | 10 | |
| | | | | Private | 66 | |
| | | | | BLM | 8 | |
| | | | | **Total** | **116** | |
| Crystal Creek ID17010304PN023_02 | Sediment | None | Agricultural land, forest, unstocked forest, double fires, roads, mass failures | __[f] | __[f] | None set in 2003 TMDL |
| Renfro Creek ID17010304PN024_02 ID17010304PN024_03 | Sediment | None | Agricultural land, forest, unstocked forest, double fires, roads, mass failures | __[f] | __[f] | None set in 2003 TMDL |
| Thorn Creek ID17010304PN026_02 ID17010304PN026_03 | Sediment | None | Agricultural land, forest, unstocked forest, double fires, roads, mass failures | __[b] | __[b] | None set in 2003 TMDL |

[a] BLM = Bureau of Land Management; USFS = U.S. Forest Service; IDL = Idaho Department of Lands; BIA = Bureau of Indian Affairs; Water = areas of surface water with no sediment generation
[b] Load reduction is included in the load allocation and reductions developed for the St. Maries River assessment unit ID17010304PN007_05.
[c] Load reduction is included in the load allocation and reductions developed for the Santa Creek assessment unit.
[d] WWTP = wastewater treatment plant. Sediment contributions from point sources are 0.10% of those estimated for the watershed. Since the contribution from point sources is negligible, the wasteload allocation is set at current permit limits (DEQ 2003b).
[e] No load reduction is assigned for Emerald Creek. The water body was modeled at the time of TMDL development to be meeting sediment target.
[f] Load reduction is included in the load allocation and reductions developed for the St. Maries River assessment unit ID17010304PN012_05.

The sediment load allocations for the St. Maries River watershed were developed to include the entire watershed because of the sediment contributions to the lower reaches of the river, which were identified as impaired by sediment. All land use types were characterized within the watershed using GIS software, and a sediment yield coefficient was applied accordingly. The sediment load allocations and reductions were calculated and tallied to provide cumulative reductions along the mainstem St. Maries River working from the headwaters downstream to the mouth. Individual load allocations and reductions were developed for the larger streams exceeding the 50% above background sediment target load. Those smaller streams (1st-order and unnamed 2nd-order streams) to the St. Maries River were included in the “sidewall” load development and included in the overall sediment load allocation and reduction for the mainstem. Load reductions were not set and not included in the overall load reductions for those individual watersheds not exceeding the sediment load target (50% above background). The load allocations identified in the watersheds not exceeding the sediment load target were included in the overall sediment load allocation for the mainstem St. Maries River.

In 2005, the U.S. Forest Service (USFS) relinquished ownership of approximately 3,500 acres in the upper Santa Creek watershed to the IDL as part of the Boise Foothills Land Exchange. The sediment load reduction set in the 2003 St. Maries River TMDL was split amongst landowners based on the relative percentage of land owned or managed within a watershed. Due to the land exchange, the USFS's and IDL's share of the sediment load reduction in the watershed has been adjusted (Table 4).

**Table 4. Adjusted sediment load allocation for Santa Creek**

| Source | Percent of load source | | Load allocation (tons/year) | | Load reduction required (tons/year) | | Time frame for meeting allocation |
|---|---|---|---|---|---|---|---|
| | Before[a] | After[b] | Before[a] | After[b] | Before[a] | After[b] | |
| U.S. Forest Service | 42.1 | 35.3 | 686 | 575 | 535 | 448 | 50 years |
| Idaho Dept. of Lands | 4.1 | 10.9 | 67 | 177 | 52 | 138 | |
| Private Land (Forest) | 37.1 | | 604 | | 471 | | |
| Private Land (Ag.) | 16.7 | | 272 | | 212 | | |
| **Total** | **100** | | **1,629** | | **1,270** | | **—** |

[a] Load allocation and load reduction before land exchange
[b] Load allocation and load reduction after land exchange

# Overview of Temperature TMDLs

The original St. Joe and St. Maries River SBA and TMDLs included 32 AUs listed with temperature impairments (Table 5). Point sources were determined to be an insignificant source of temperature due to their small discharge. Load allocations were attributed to nonpoint sources of solar loading, calling for increases in stream shading. The applicable water quality criterion is numeric and the critical periods are site-specific (Table 6).

The water quality temperature criteria were developed to protect aquatic life within the St. Joe River subbasin (Table 6). Water bodies for which temperature TMDLs were developed in the St. Joe River watershed are located within the St. Joe River bull trout recovery area and are subject to federal bull trout criteria. Water temperature data were evaluated against the Idaho water quality criteria and when they exceeded these criteria, the associated stream segment (AU) was listed as temperature limited and a temperature TMDL was developed (Table 5).

**Table 5. Applicable temperature TMDLs in the St. Joe River subbasin**

| Stream | Assessment Unit | Numeric Criteria | Narrative Target | Critical Period |
|---|---|---|---|---|
| **St. Joe River Watershed above St. Maries River confluence** | | | | |
| Tributaries to St. Joe River | ID17010304PN027_02 | See Table 6 | Not applicable | Salmonid spawning windows, and Bull Trout temperature criteria where applicable |
| Bear and Little Bear Creeks | ID17010304PN033_02 | See Table 6 | | |
| Fishhook Creek | ID17010304PN039_03<br>ID17010304PN039_04 | See Table 6 | | |
| Sherlock Creek | ID17010304PN041_02a | See Table 6 | | |
| Bluff Creek | ID17010304PN045_02<br>ID17010304PN045_03 | See Table 6 | | |
| Mosquito Creek | ID17010304PN046_02 | See Table 6 | | |
| Fly Creek | ID17010304PN047_02 | See Table 6 | | |
| Beaver Creek | ID17010304PN048_02 | See Table 6 | | |
| Simmons Creek | ID17010304PN052_02<br>ID17010304PN052_03 | See Table 6 | | |

| Stream | Assessment Unit | Numeric Criteria | Narrative Target | Critical Period |
|---|---|---|---|---|
| Gold Creek | ID17010304PN053_02 | See Table 6 | | |
| Loop Creek | ID17010304PN060_02<br>ID17010304PN060_03 | See Table 6 | | |
| **St. Maries River Watershed** | | | | |
| St. Maries River | ID17010304PN007_05 | See Table 6 | Not applicable | Salmonid spawning windows |
| Santa Creek | ID17010304PN010_02 | See Table 6 | | |
| | ID17010304PN010_03 | | | |
| | ID17010304PN010_04 | | | |
| Charlie Creek | ID17010304PN011_03 | See Table 6 | | |
| St. Maries River | ID17010304PN012_05 | See Table 6 | | |
| St. Maries River | ID17010304PN015_05 | See Table 6 | | |
| Emerald Creek | ID17010304PN016_02<br>ID17010304PN016_03 | See Table 6 | | |
| West Fork St. Maries River | ID17010304PN017_02<br>ID17010304PN017_03<br>ID17010304PN017_04 | See Table 6 | | |
| Middle Fork St. Maries River | ID17010304PN018_02<br>ID17010304PN018_03<br>ID17010304PN018_04<br>ID17010304PN018_05 | See Table 6 | | |
| Gold Center Creek | ID17010304PN019_02<br>ID17010304PN019_03 | See Table 6 | | |

**Table 6. State and federal water quality temperature criteria in the St. Joe River subbasin**

| Beneficial Use | Location | Criteria | Dates | |
|---|---|---|---|---|
| Cold Water Aquatic Life | Applies to entire subbasin | 22 ºC (71.6 ºF) Maximum Instantaneous Temperature | Applies entire year | |
| | | 19 ºC (66.2 ºF) Maximum Daily Average Temperature | | |
| Salmonid Spawning | Applies to entire subbasin where beneficial use is designated or existing | | Spring Spawning | Fall Spawning |
| | | 13 ºC (55.4 ºF) Maximum Instantaneous Temperature | >4,000 ft Jun 1–July 31 | Aug 15–Nov 15 |
| | | 9 ºC (48.2 ºF) Maximum Daily Average Temperature | 3,000–4,000 ft May 15–July 15<br><3,000 ft May 1–July 1 | |
| Idaho Bull Trout Criteria | Watershed above and including Mica Creek | 13 ºC (55.4 ºF) Maximum Weekly Maximum Temperature | Rearing Jun 1–Aug 31 | N/A |
| | | 9 ºC (48.2 ºF) Maximum Daily Average Temperature | N/A | Spawning Sep 1–Oct 31 |

| Beneficial Use | Location | Criteria | Dates |
|---|---|---|---|
| EPA Bull Trout Criteria | Bad Bear, Bean, Bear, Beaver, Bedrock, Berge, Bird, Blue Grouse, Boulder, Broadaxe, Bruin, California, Cherry, Clear, Color, Copper, Dolly, Dump, Eagle, East Fork Bluff, East Fork Gold, Emerald, Fishhook, Float, Fly, Fuzzy, Gold, Heller, Indian, Kelley, Malin, Marble, Medicine, Mica, Mill, Mosquito, North Fork Bean, North Fork St. Joe River, North Fork Simmons, Nugget, Packsaddle, Periwinkle, Prospector, Quartz, Red Cross, Red Ives, Ruby, St. Joe River (above Siwash Creek), Setzer, Sherlock, Simmons, Siwash, Skookum, Thomas, Thorn, Three Lakes, Timber, Tinear, Trout, Tumbledown, Wahoo, Washout, Wilson and Yankee Bar Creek | 10 ºC (50 ºF) Maximum Weekly Maximum Temperature | Jun 1–Sep 30 |

Temperature TMDL load allocations are reach-specific and vary according to elevation and orientation. The goal of the temperature TMDL is to achieve 100% canopy cover for streams under 4,000 feet elevation; lesser amounts of shade are progressively necessary above 4,000 feet. In many locations, the modeling results predicted greater than 100% canopy cover to achieve the required stream temperatures. Since this is not possible, canopy cover was defaulted to 100% in these instances. No point sources of thermal load were accounted for in the TMDLs. All nonpoint sources were attributed to openings in the canopy immediately adjacent to the stream.

## Pollutant Targets

**Sediment**

Water quality criteria supportive of beneficial uses are specified in the Idaho water quality standards. The water quality standard protecting against excess sediment is a narrative standard:

> 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)

Additional water quality standards applicable to sediment are found in sections 250 and 252:

> Turbidity, below any applicable mixing zone set by the Department, shall not exceed background turbidity by more than fifty (50) NTU [nephelometric turbidity units] instantaneously or more than twenty-five (25) NTU for more than ten (10) consecutive days. (IDAPA 58.01.02.250.02.e)

For those surface waters identified in Subsection 252.01.b.i, turbidity as measured at the public intake shall not be:

(1) Increased by more than five (5) NTU above natural background, measured at a location upstream from or not influenced by any human induced nonpoint source activity, when background turbidity is fifty (50) NTU or less.

(2) Increased by more than ten percent (10%) above natural background, measured at a location upstream from or not influenced by any human induced nonpoint source activity, not to exceed twenty-five (25) NTU, when background turbidity is greater than fifty (50) NTU. (IDAPA 58.01.02.252.01.b.ii)

The instream target set in the TMDLs is full support of the cold water designated uses. Specifically, sediment must be reduced to a level where full support of beneficial uses is demonstrated using the current assessment method accepted by DEQ at the time the water body is reassessed. Assessments conducted using BURP survey information collected following the completion of the TMDLs will be used to evaluate this goal.

To develop numeric sediment load allocations and reductions, sediment modeling was conducted and compared to data collected during BURP surveys. Nonpoint sources of sediment (e.g., roads, unstocked forests, mass failures, and burned areas) were allocated a sediment yield value that was multiplied by the extent (acres) of the activity to develop a current sediment load for each watershed. Current sediment loads were compared to watersheds supporting beneficial uses and watersheds not supporting beneficial uses to identify an approximate assimilative capacity. For the St. Joe and St. Maries River watersheds, that capacity was set at 50% above natural background conditions, which was set as the numeric target. The rationales supplied in the TMDLs to support a 50% above background target are as follows:

- Sediment yield below 50% above background will fully support the beneficial uses of cold water aquatic life and salmonid spawning.
- The stream has some finite yet not-quantified ability to process a sediment yield rate greater than 50% above background.
- Beneficial uses (cold water aquatic life and salmonid spawning) will be fully supported when the finite yet not-quantified ability of the stream system to process (attenuate) sediment is met.

The goal was identified as being attainable following 3 high-flow events after sediment load reduction projects have been completed. A time frame of 30 years was set as necessary for 3 high-flow events to occur (DEQ 2003a, 2003b). This time frame was identified as being necessary for channel-forming events to export sediment and create pool structures.

**Temperature**

Riparian vegetation manipulation (i.e., reduction in stream shading) was identified as the cause of stream temperature changes. Increases in and maintenance of stream shade was determined to be the most manageable way of achieving the desired instream water temperatures.

Pollutant targets were set by estimating the existing stream shade through aerial photograph interpretation and target shade using potential shade curves generated from known vegetation characteristics. Potential shade curves represent the maximum amount of shade provided to

streams of varying widths and vegetation composition. Data collected in the field and compiled by the USFS was used to develop shade curves to represent the forest types within the St. Joe River subbasin. Full potential shade is the target necessary to reduce stream temperatures.

# Compliance Points

**Sediment**

Compliance or monitoring points were established in the 2003 TMDLs as locations to monitor TMDL compliance (Table 7). Although these points only represent a small portion of the watershed, they were selected to be representative of watershed health as a whole. These locations also represent locations of BURP surveys, and by revisiting the same location and using the same protocol, it is anticipated that BURP scores can be compared across years to evaluate water quality trends. Demonstration of beneficial use support and attainment of water quality standards at these locations is an indicator of progress or compliance with the load reductions identified in the TMDL.

**Table 7. Sediment TMDL compliance points**

| Stream | BURP ID | Latitude | Longitude | Location Description |
|---|---|---|---|---|
| **St. Joe River Watershed above St. Maries River confluence** | | | | |
| Fishhook Creek | 1995SCDAA025 | N 47° 14’ 11.99” | W -115° 50’ 48.03” | 1 mile upstream from mouth |
| Bear Creek | 1995SCDAA061 | N 47° 08’ 21.83” | W -116° 09’ 51.31” | Near mouth |
| Little Bear Creek | 1995SCDAA060 | N 47° 07’ 57.24” | W -116° 09’ 06.87” | Near mouth |
| Mica Creek | 1996SCDAB011 | N 47° 15’ 50.37” | W -116° 07’ 57.71” | Near mouth |
| Mica Creek | 1996SCDAB008 | N 47° 12’ 28.86” | W -116° 12’ 19.55” | Below Mica Meadows |
| **St. Maries River Watershed** | | | | |
| Middle Fork St. Maries River | 1996SCDAA040 | N 47° 00’ 48.91” | W -116° 14’ 50.25” | Near mouth |
| West Fork St. Maries River | 1998SCDAA021 | N 46° 57’ 19.90” | W -116° 18’ 38.25” | Near mouth |
| Emerald Creek | 1995SCDAB008 | N 47° 03’ 57.44” | W -116° 19’ 32.30” | Near mouth |
| St. Maries River | 1997SCDAA033 | N 47° 02’ 59.33” | W -116° 17’ 10.38” | Near confluence with Cedar Creek |
| Carpenter Creek | 1995SCDAB054 | N 47° 04’ 37.19” | W -116° 22’ 58.47” | Near mouth |
| St. Maries River | Not applicable | N 47° 08’ 09.91” | W -116° 25’ 34.62” | Near confluence with Tyson Creek |
| Tyson Creek | 1995SCDAB055 | N 47° 07’ 25.07” | W -116° 26’ 00.69” | Near mouth |
| Santa Creek | 1995SCDAB005 | N 47° 10’ 22.81” | W -116° 29’ 38.61” | Near mouth |
| Alder Creek | 1995SCDAB004 | N 47° 12’ 24.15” | W -116° 41’ 40.05” | Near mouth |
| St. Maries River | Not applicable | N 47° 17’ 27.81” | W -116° 32’ 41.00” | Near below Thorn Creek |

The sediment loads developed for the St. Joe and St. Maries River TMDLs do not differentiate between coarse and fine material. The TMDLs do state that “the sediment interfering with the beneficial use (cold water) is most likely coarse sand bed load particles” (DEQ 2003/2003b, p. 54&60/62). This is most likely the case in streams with sufficient energy to move the larger bed load material. In lower-gradient streams and rivers (depositional reaches) with significantly less energy, suspended sediment is most likely causing beneficial use impairment. Implementation activities aimed at reducing sediment loading to streams typically do not discern between bed load and suspended load; therefore, activities to reduce one will also reduce the other.

Rosgen B and C channel types were noted in the TMDLs as critical reaches. These stream types can also represent areas where sediment is deposited. Along with lessening stream gradient, these reaches generally exhibit the most desirable fish habitat, with diversified pools, riffles, and runs. Sediment impacts would be expected to manifest in these locations as pool filling, increased embeddedness, and stream widening. Impacts to aquatic communities from excess sediment include reductions in spawning success (egg survival), reductions in macroinvertebrates, and altered feeding behaviors due to increased turbidity.

**Temperature**

Because shade along individual stream reaches is identified as the TMDL target, there are many compliance points. Changes in stream width, elevation, and vegetation type impact stream shade; therefore, each reach is an individual point of compliance. See Figures 10a–10c and 12a–12g for the target percent canopy cover for streams in the St. Joe River watershed (DEQ 2003a, pp. 85–87, 125–131) and Figures 9a–9e (DEQ 2003b, pp. 89–93) for streams in the St. Maries River watershed. BURP sites were selected for monitoring the water quality status and stream temperatures of streams addressed in the temperature TMDL (Table 8).

**Table 8. Temperature TMDL compliance points**

| Stream | BURP ID | Latitude | Longitude | Location description |
|---|---|---|---|---|
| **St. Joe River Watershed above St. Maries River confluence** | | | | |
| Beaver Creek | 1995SCDAB029[a]<br>1994SCDAA052[b] | N 47° 04’ 57.95” | W -115° 21’ 26.85” | Near mouth |
| Bluff Creek | To be determined | N 47° 11’ 03.02” | W -115° 29’ 23.96” | Near mouth |
| Fly Creek | 1994SCDAA044 | N 47° 06’ 44.12” | W -115° 23’ 07.66” | Near mouth |
| Gold Creek | 1994SCDAA048 | N 47° 09’ 06.22” | W -115° 24’ 21.08” | Near mouth |
| Heller Creek | To be determined | N 47° 03’ 51.86” | W -115° 13’ 05.54” | Near mouth |
| Loop Creek | 1997SCDAA028 | N 47° 21’ 15.51” | W -115° 39’ 36.73” | Near mouth |
| Mosquito Creek | 1994SCDAA046 | N 47° 09’ 16.56” | W -115° 24’ 50.43” | Near mouth |
| Simmons Creek | To be determined | N 47° 08’ 18.26” | W -115° 23’ 37.73” | Near mouth |
| Bear Creek | 1995SCDAA063 | N 47° 07’ 53.13” | W -116° 09’ 15.79” | Near mouth |
| Little Bear Creek | 1995SCDAA009 | N 47° 07’ 57.24” | W -116° 09’ 06.87” | Near mouth |
| Blackjack Creek | 1996SCDAA057 | N 47° 15’ 11.34” | W -115° 59’ 05.03” | Near mouth |
| Fishhook Creek | 1995SCDAA025 | N 47° 14’ 11.99” | W -115° 50’ 48.03” | Near mouth |
| Fishhook Creek | 1995SCDAA024 | N 47° 09’ 28.55” | W -115° 51’ 33.29” | At Lick Creek confluence |
| Harvey Creek | 1996SCDAB012 | N 47° 15’ 08.87” | W -115° 59’ 24.17” | Near mouth |
| Tank Creek | 1996SCDAB017 | N 47° 15’ 12.75” | W -116° 01’ 03.21” | Near mouth |
| **St. Maries River Watershed** | | | | |
| Gramp Creek | 1996SCDAA047 | N 47° 01’ 05.90” | W -116° 08’ 45.64” | Near mouth |
| Gold Center Creek | 1996SCDAA045 | N 47° 00’ 17.09” | W -116° 10’ 01.29” | Near mouth |
| Flewsie Creek | 1996SCDAA048 | N 47° 00’ 43.23” | W -116° 11’ 28.29” | Near mouth |
| Middle Fork of the St. Maries River | 1996SCDAA040 | N 47° 00’ 48.91” | W -116° 14’ 50.25” | Near mouth |
| West Fork of the St. Maries River | 1998SCDAA021 | N 46° 57’ 19.90” | W -116° 18’ 38.25” | Near mouth |
| Emerald Creek | 1995SCDAB008 | N 47° 03’ 57.44” | W -116° 19’ 32.30” | Near mouth |
| Santa Creek | 1995SCDAB005 | N 47° 10’ 22.81” | W -116° 29’ 38.61” | Near mouth |
| St. Maries River | 1997SCDAA033 | N 47° 02’ 59.33” | W -116° 17’ 10.38” | At Cedar Creek |
| St. Maries River | To be determined | N 47° 04’ 07.70” | W -116° 19’ 32.59” | At Emerald Creek |

[a] BURP ID noted in TMDL was misidentified. 1995SCDAB029 is located within the Beaver Creek watershed in the St. Maries River drainage.
[b] BURP location near the mouth of Beaver Creek, St. Joe River watershed.

The St. Joe and St. Maries River temperature TMDLs state that the primary monitoring will be done using aerial photography interpretation of canopy recovery. This method will continue to be employed to determine progress towards meeting TMDL targets. Solar Pathfinder monitoring will also be conducted to help validate aerial photography interpretations. Canopy cover has been re-assessed using aerial photograph data collected in summer 2009. The canopy cover was evaluated to determine stream shading following protocols outlined in *The Potential Natural Vegetation (PNV) Temperature Total Maximum Daily Load (TMDL) Procedures Manual* (DEQ 2009). Potential natural vegetation (PNV) and the analysis results are discussed in the Load Capacity section.

## Evaluation of Data Collected at or Near Identified Compliance Points

A limited amount of BURP data have been collected at or near the compliance points following the completion of the TMDLs (Table 9).

**Table 9. Data collected at or near compliance points following TMDL development**

| Stream | Assessment Unit | Compliance Point and TMDL Type | New Site ID | Comment |
|---|---|---|---|---|
| **St. Joe River Watershed above St. Maries River confluence** | | | | |
| Mica Creek | ID17010304PN030_03 | 1996SCDAA0B08, Sediment | 2007SCDAA042 | New data suggest full support of beneficial uses |
| Fishhook Creek | ID17010304PN039_02 | Not set in TMDL, Temperature | 2003SCDAA047 | |
| Fishhook Creek | ID17010304PN039_03 | Not set in TMDL, Temperature | 2001SCDAE023 | |
| Fishhook Creek | ID17010304PN039_04 | 1995SCDAA025, Sediment and Temperature | 2001SCDAE024 | |
| Fly Creek | ID17010304PN041_02 | 1994SCDAA044, Temperature | 2005SCDAA008 | |
| | | | 2006SCDAA022 | |
| | | | 2007SCDAA039 | |
| | | | 2008SCDAA031 | |
| Bluff Creek | ID17010304PN045_03 | Near mouth, Temperature | 2002SCDAA060 | |
| Mosquito Creek | ID17010304PN046_02 | 1994SCDAA046, Temperature | 2001SCDAA030 | |
| | | | 2001SCDAE020 | |
| | | | 2001SCDAV003 | |
| | | | 2002SCDAA038 | |
| | | | 2002SCDAV003 | |
| | | | 2003SCDAA037 | |
| | | | 2004SCDAA029 | |
| | | | 2005SCDAA007 | |
| | | | 2006SCDAA020 | |
| Simmons Creek | ID17010304PN052_03 | Near mouth, Temperature | 2002SCDAA063 | |
| Gold Creek | ID17010304PN053_02 | 1994SCDAA048, Temperature | 2002SCDAA047 | |
| | | | 2007SCDAA040 | |
| Heller Creek | ID17010304PN070_02 | Near mouth, Temperature | 2002SCDAA065 | |
| **St. Maries River Watershed** | | | | |
| Tyson Creek | ID17010304PN013_03 | 1995SCDAB055, Sediment | 2001SCDAF013 | New data suggest **not** full support of beneficial uses |
| | | | 2001SCDAF014 | |
| | | | 2008SCDAA034 | |
| Gold Center Creek | ID17010304PN019_03 | 1996SCDAA045, Temperature | 2001SCDAF015 | |

Many of the streams included in the St. Joe and St. Maries River TMDLs failed to meet Idaho water quality temperature criteria and were included on the §303(d) list as temperature impaired. Some streams that failed to meet the temperature criteria in 2003 showed support of aquatic beneficial uses based on BURP scores. All of the water bodies in the St. Joe River watershed that had temperature TMDLs developed indicate support of aquatic beneficial uses through BURP monitoring.

The following streams were recommended to be removed from the impaired waters list as a result of the reevaluation of the temperature TMDL using the PNV methodology. The watersheds were recommended to be removed because stream shading is meeting or exceeded TMDL targets and BURP data suggests full support of beneficial use. Beaver, Fly, Mosquito, and portions of Heller Creek are recommended to be removed from the impaired waters list during the 2012 Integrated Report assessment cycle.

During this review, stream shading was evaluated and compared to modeled shade values derived from the PNV within each temperature-listed watershed. The evaluation identified sections of stream that are lacking shade and absorbing excess solar load, resulting in elevated stream temperatures. Watersheds within the St. Joe River watershed were shown to be closer to having full potential shade than those evaluated in the St. Maries River watershed.

# Load Capacity

**Sediment**

Sediment loads were developed in the St. Joe and St. Maries River watersheds using an empirically based model. The model predicted the background and current sediment load based on the land-use types and geology within the applicable watershed. The area altered by each land-use type was multiplied by a sediment yield coefficient to determine the amount of sediment contributed to the stream from a given area. The sediment yield coefficients were derived from other modeling techniques, such as Revised Universal Soil Loss Equation (RUSLE), Water and Sediment Yield (WATSED), and Water and Erosion Prediction Project (WEPP). The outputs of the model were intended to provide a relative rather than exact estimate of sediment yield. The model did not provide an exact sediment load capacity; rather, the current modeled sediment load was compared between streams supporting beneficial uses and those not supporting beneficial uses. The comparison between the supporting and nonsupporting streams identified a sediment load capacity of 50% above natural background sediment load as a target. Those streams supporting beneficial uses modeled below 50% above natural background and those not supporting beneficial uses exceeded 50% above natural background.

The sediment load calculations (model results) relied on many different modeling techniques used by other agencies and external data sources. The model also relied on GIS analysis to classify and locate different land-use types. Sediment yield coefficients were applied to each land use to calculate a sediment load in tons per unit area (tons per acre per year). The model assumed 100% delivery from all modeled land-use types, which is a conservative overestimate of sediment delivery and is accounted for in the TMDL's margin of safety. Overall, the TMDLs predicted that the model used to develop sediment loads was 164% conservative when used in watersheds underlain by a granitic geology and 231% conservative when used in watersheds underlain by belt supergroup rocks. The conservative overestimates were also factored into the TMDL margins of safety.

For a detailed description of modeling assumptions, see Appendix C in the St. Joe and St. Maries River TMDLs (DEQ 2003a, 2003b).

**Temperature**

Instream temperatures recorded within the St. Maries River watershed failed to meet Idaho water quality standards. A temperature TMDL for the entire watershed was developed to try to reduce stream temperatures in the lower reaches of the St. Maries River to comply with Idaho water quality criteria. In the St. Maries River watershed, stream temperatures are affected by natural weather conditions and adjacent plant communities, including disturbance and recovery (DEQ 2003b). Grazing, agricultural activities, mining, and vegetation removal along private recreational lots have also resulted in stream shading reductions.

The environmental factors affecting stream temperatures are local air temperatures, stream depth, ground water inflow, and stream shading by riparian cover and/or topography (DEQ 2009; Sullivan and Adams 1990; Theurer et al. 1984; Beshcta and Weatherred 1984). Changes in topography directly affect ambient air temperature, cooling with increases in elevation. In forest streams, ambient temperature and stream shading are believed to account for up to 90% of stream temperature variability (DEQ 2003a; Brown 1971). Because stream shading is the only one of the two factors that can be modified by land management, stream shade was identified and characterized for load allocation development.

The temperature TMDLs developed in 2003 were equation-based values that resulted in most stream segments needing over 100% shade to meet TMDL goals. This target is impossible to achieve, so values were reduced to 100% when this was the case. Even 100% shading is unattainable in most scenarios due to stream width, plant community, natural disturbance, and topography.

In the St. Joe and St. Maries River temperature TMDLs, the shade needed to produce the required stream temperatures was back calculated using the CWE empirical model. The model uses elevation, stream temperature, and riparian canopy cover to calculate a maximum weekly maximum temperature. Because only shade can be modified, the equation was rewritten to solve for canopy cover to predict the required canopy cover at a given elevation:

**Original equation**: $MWMT = 29.1 – 0.00262*E – 0.0849*C$

Where:

MWMT = maximum weekly maximum temperature (°C)
E = stream reach elevation (feet)
C = riparian canopy cover (%)

**Equation rewritten:** $C = (29.1/0.0849) – (MWMT/0.0849) – (E*0.0026/0.0849)$

To meet Idaho water quality standards, the required stream temperature was set at 10 °C in the St. Maries River watershed. Because the needed temperature is known, the equation was simplified to determine the required shade percentage:

**Final equation:** $C = 224.7 – 0.031*E$

Water bodies for which temperature TMDLs were developed in the St. Joe River watershed are located within the St. Joe River bull trout recovery area. This area includes the St. Joe River

watershed above Mica Creek (Panhandle Bull Trout Technical Advisory Team 1998). The governing temperature standards for these creeks and their tributaries are the federal 10 °C 7-day running average from May 1 to September 1 and the state 9 °C daily maximum spawning standard from September 1 through October 31. After October 31, water temperature is expected to be well below 9 °C in the St. Joe River subbasin. In practice, the two standards are essentially the same (Dupont 2002): a standard 10 °C 7-day running average from May 1 through October 31 will meet both federal and state requirements.

Following completion of the St. Joe and St. Maries River temperature TMDLs, EPA has promulgated temperature criteria for bull trout protection (40 CFR § 131.33). The following is the applicable federal bull trout temperature criteria and applicable watersheds in the St. Joe subbasin.

> (1) Except for those streams or portions of streams located in Indian country, or as may be modified by the Regional Administrator, EPA Region X, pursuant to paragraph (a)(3) of this section, a temperature criterion of 10 °C, expressed as an average of daily maximum temperatures over a seven-day period, applies to the waterbodies identified in paragraph (a)(2) of this section during the months of June, July, August and September.
>
> (xxxi) ST. JOE R. BASIN: Bad Bear Creek, Bean Creek, Bear Creek, Beaver Creek, Bedrock Creek, Berge Creek, Bird Creek, Blue Grouse Creek, Boulder Creek, Broadaxe Creek, Bruin Creek, California Creek, Cherry Creek, Clear Creek, Color Creek, Copper Creek, Dolly Creek, Dump Creek, Eagle Creek, East Fork Bluff Creek, East Fork Gold Creek, Emerald Creek, Fishhook Creek, Float Creek, Fly Creek, Fuzzy Creek, Gold Creek, Heller Creek, Indian Creek, Kelley Creek, Malin Creek, Marble Creek, Medicine Creek, Mica Creek, Mill Creek, Mosquito Creek, North Fork Bean Creek, North Fork Saint Joe River, North Fork Simmons Creek, Nugget Creek, Packsaddle Creek, Periwinkle Creek, Prospector Creek, Quartz Creek, Red Cross Creek, Red Ives Creek, Ruby Creek, Saint Joe River (above Siwash Creek), Setzer Creek, Sherlock Creek, Simmons Creek, Siwash Creek, Skookum Creek, Thomas Creek, Thorn Creek, Three Lakes Creek, Timber Creek, Tinear Creek, Trout Creek, Tumbledown Creek, Wahoo Creek, Washout Creek, Wilson Creek, Yankee Bar Creek.

Using the CWE equation resulted in unattainable targets in some areas. Given the elevation of most streams in the upper reaches of the watershed, the calculated shade target exceeded 100% and was truncated at 100% shade. Variations in natural stream characteristics (e.g., stream width, riparian community, disturbance, and topography) alter canopy cover making 100% shade unachievable.

Idaho water quality standards includes a provision (IDAPA 58.01.02.200.09) establishing that if water quality criteria are exceeded concurrently with natural conditions, the exceedance is not considered to be a violation of water quality standards. In these situations, natural conditions essentially become the water quality standard, and the natural level of shade becomes the target of the TMDL. The instream temperature that results from attaining these conditions is consistent with the water quality standards, even if it exceeds numeric temperature criteria.

DEQ began developing temperature TMDLs using a different methodology in 2005. Using the newer PNV method, many of the natural variations discussed above are taken into consideration. Similar to the CWE equations, the PNV method characterizes stream shade for reductions in

stream temperature and develops a solar load based on stream shade. The steps for developing a temperature TMDL using the PNV methodology include the following:

1) Classify existing shade using aerial and/or satellite imagery
2) Determine natural bankfull width
3) Characterize the surrounding riparian community
4) Apply target shade values based on riparian community and stream width
5) Calculate solar load

For detailed information about the PNV methodology, refer to *The Potential Natural Vegetation (PNV) Temperature Total Maximum Daily Load (TMDL) Procedures Manual* (DEQ 2009). Similar to the CWE methodology, PNV load capacity represents the desire to achieve a natural riparian corridor (i.e., natural vegetation). The watersheds included in the St. Joe and St. Maries River temperature TMDLs have been reevaluated using the PNV method.

# Load Allocations

**Sediment**

Sediment load allocations were assigned to land managers/owners within each watershed for which sediment TMDLs were developed. Allocations were assigned to each designee based on the percentage of land owned or managed. The reductions were based on a goal of 50% above natural background levels. The load reductions are based on the difference between the existing sediment contribution and the load capacity at 50% above natural background levels.

Allocating sediment load reductions based on the amount of land owned or managed in a watershed may overestimate or underestimate the load reduction needed from the land steward. The load allocation does not consider the type of land-use activity occurring on each property. A large landowner/manager may minimally manage the land, resulting in little disturbance, but because that person owns/manages a majority of the watershed, he or she may be responsible for a majority of the load reduction. To better allocate load reductions, reductions should be assigned by land use and owner/manager type, not solely on the amount of land owned/managed.

Although the load allocation portion of the TMDL may over- or underestimate individual allocated sediment loads, the overall load allocations and associated load reductions for each watershed will remain. The goal of the TMDLs is to restore beneficial uses, and a reduction in sediment regardless of landowner is vital to this goal. The load allocation was generated using the best available data at the time the TMDLs were developed. These data were reviewed by the WAG and approved by EPA (Figures 2 and 3).

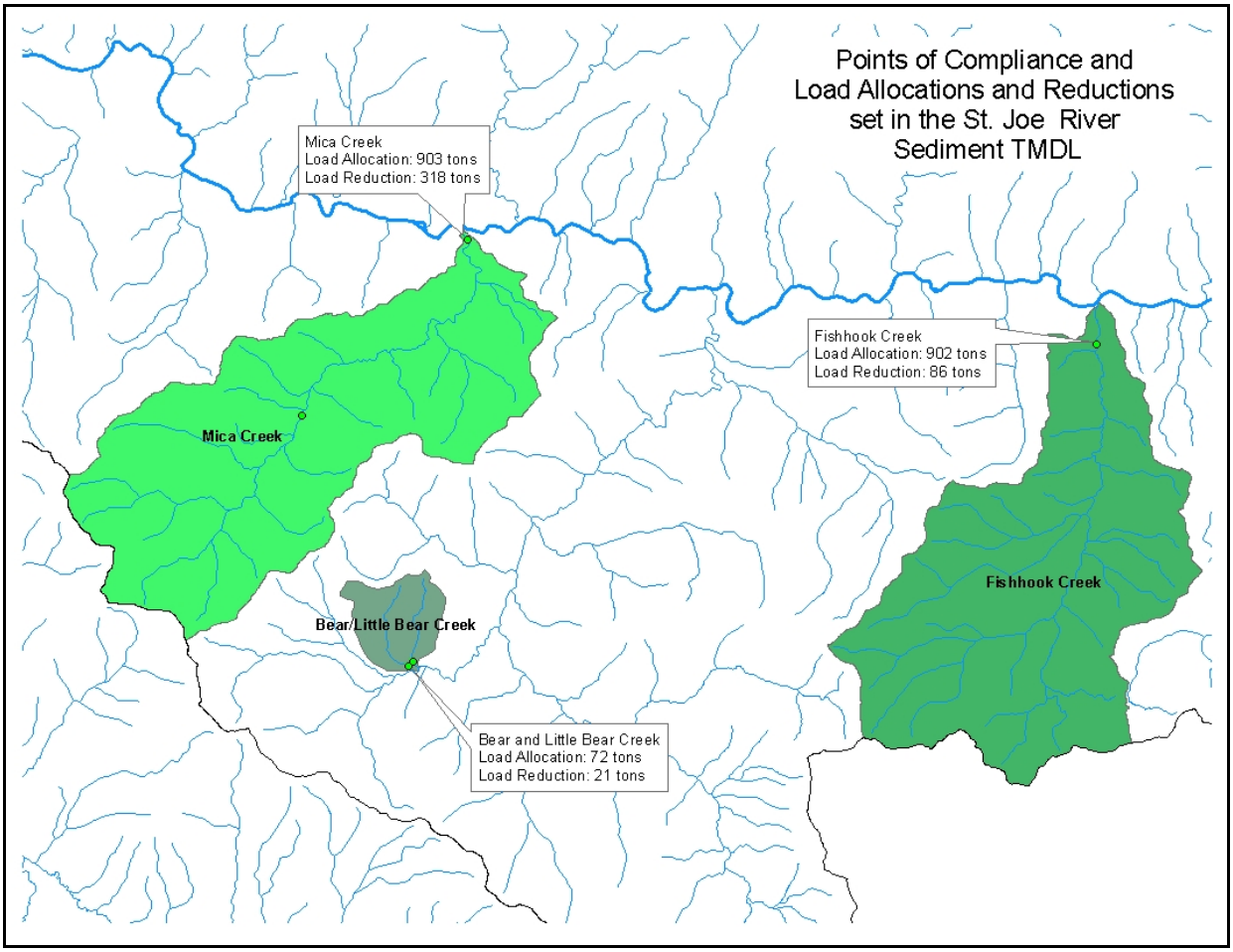


**Figure 2. Points of compliance and load allocations and reductions set in the St. Joe River sediment TMDL**

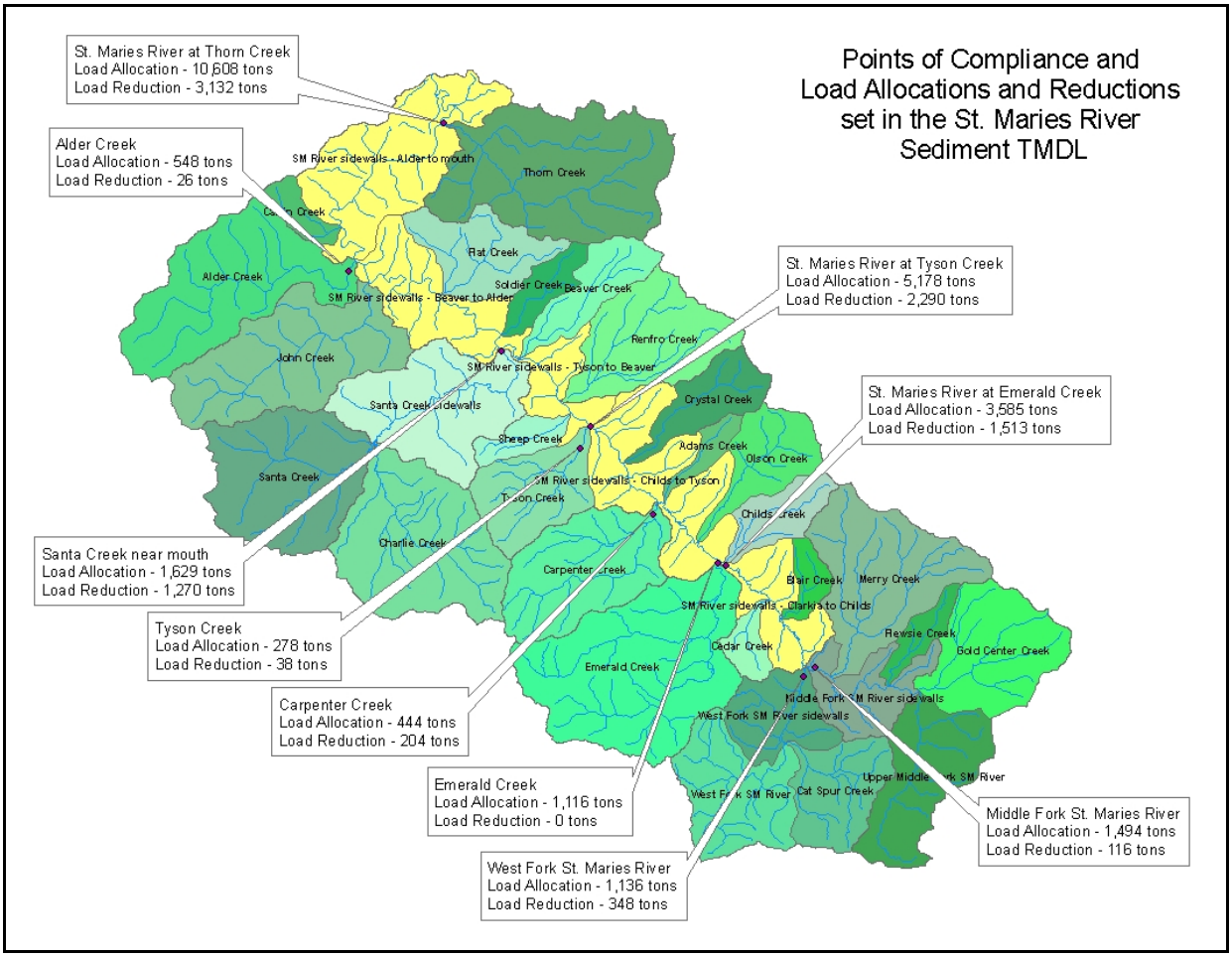


**Figure 3. Points of compliance and load allocations and reductions set in the St. Maries River sediment TMDL**

### Temperature

Due to reasons discussed above, the temperature TMDLs developed in the St. Joe and St. Maries River watersheds have been reassessed using the PNV methodology. This conversion will result in a TMDL that is more applicable with better implementation potential by evaluating each stream reach independently. Evaluating each stream reach will more accurately identify those reaches that need shade increases. Load allocations will be reach-specific and are the responsibility of the land manager/owner for each segment to attain.

## Margin of Safety

### Sediment

The margin of safety is implicit for the model used in the St. Joe and St. Maries Rivers sediment TMDLs. The model is estimated to be 231% conservative when applied in areas underlain by belt supergroup geologies and 164% conservative when applied to granitic geologies. The overestimate is identified as the implicit margin of safety. The conservative margin of safety

helps to compensate for the lack of data and ensure that pollutant targets are protective of beneficial uses.

**Temperature**

The margin of safety developed for the temperature TMDLs was taken into consideration when setting the desired canopy cover. The desired canopy cover percentages are assumed to be the greatest shade available at the location to satisfy the thermal equations.

## Seasonal Variation

**Sediment**

Sediment loading from nonpoint sources was identified in the TMDLs as occurring episodically, primarily during high discharge events when streams and rivers swell with snowmelt and precipitation runoff increases stream velocities. During this period, the increased stream velocities mobilize stream bed and bank material, increasing the stream sediment load. Also during this time, overland flow is prevalent due to increased precipitation, snowmelt, frozen soils, and low infiltration rates. The increase in overland flow transports soil to streams and rivers, adding to the sediment load. The critical period—most often spring—poses the greatest risk to surface waters. If streams are protected during this critical period, it is anticipated they will be protected throughout the year.

**Temperature**

Temperature TMDLs in the St. Joe River watershed were developed taking into account seasonal variation related to the bull trout and salmonid spawning temperature standard. The St. Maries River watershed is not included in the bull trout protection area, but salmonid spawning standards are applicable.

The warm summer months are the time when temperature criteria are most likely to be exceeded. This period also coincides with the beginning of fall spawning and the end of spring spawning for native trout. The summer months include the time after spawning and during egg incubation and rearing. It is critical during this time that stream temperatures stay cool.

## Reserve

**Sediment**

No part of the load allocations were held in reserve in either the St. Joe or St. Maries River sediment TMDLs. All new infrastructure projects should be constructed or mitigated to allow no net increase in sediment yield to surface water.

**Temperature**

No part of the load allocations were held in reserve in either the St. Joe or St. Maries River temperature TMDLs. Point sources do exist within the St. Maries River watershed but are currently considered to have insignificant impacts on river temperature. If future data suggest the discharges are increasing the temperature of the St. Maries River and impacting beneficial uses, a wasteload allocation will be developed and incorporated into the TMDL.

# Section 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) gives a detailed description of 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 water bodies in Idaho in tables in the Idaho water quality standards (see IDAPA 58.01.02.110.11 in addition to citations for existing and presumed uses).

Undesignated uses are to be designated. In the interim, and without 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 the "presumed uses," DEQ will apply the numeric cold water aquatic life criteria and primary or secondary contact recreation criteria to undesignated waters.

## Beneficial Uses

The beneficial uses addressed in the St. Joe and St. Maries River SBAs and TMDLs are listed below (Table 10). Beneficial uses are an important part of Idaho water quality standards and identify the water quality criteria applicable to specific water bodies. Beneficial uses in the St. Joe River watershed are currently defined as "existing," along with the majority of the water bodies in the St. Maries River watershed. The mainstem of the St. Maries River and Santa Creek are the only water bodies addressed in the TMDLs with designated uses. Beneficial uses assessed in 2003 agree with current beneficial uses and will not be adjusted.

**Table 10. Beneficial uses of TMDL water bodies**

| Stream Name | Assessment Unit | Beneficial Uses[a] | Type of Use (Designated, Existing, Presumed) |
|---|---|---|---|
| **St. Joe River Watershed above St. Maries River confluence** | | | |
| Tributaries to St. Joe River—North Fork St. Joe to St. Maries River | 17010304PN027_02 | CW, SS, SCR/PCR | Existing |
| Mica Creek | 17010304PN030_02 | CW, SS, SCR/PCR | Existing |
| | 17010304PN030_03 | CW, SS, SCR/PCR | Existing |
| Bear and Little Bear Creeks | 17010304PN033_02 | CW, SS, SCR/PCR | Existing |
| Fishhook Creek | 17010304PN039_03 | CW, SS, SCR/PCR | Existing |
| | 17010304PN039_04 | CW, SS, SCR/PCR | Existing |
| Sherlock Creek | 17010304PN041_02a | CW, SS, SCR/PCR | Existing |
| East and West Fork Bluff Creek | 17010304PN045_02 | CW, SS, SCR/PCR | Existing |
| Bluff Creek | 17010304PN045_03 | CW, SS, SCR/PCR | Existing |
| Mosquito Creek | 17010304PN046_02 | CW, SS, SCR/PCR | Existing |
| Fly Creek | 17010304PN047_02 | CW, SS, SCR/PCR | Existing |
| Beaver Creek | 17010304PN048_02 | CW, SS, SCR/PCR | Existing |
| Simmons Creek | 17010304PN052_02 | CW, SS, SCR/PCR | Existing |
| | 17010304PN052_03 | CW, SS, SCR/PCR | Existing |

| Stream Name | Assessment Unit | Beneficial Uses[a] | Type of Use (Designated, Existing, Presumed) |
|---|---|---|---|
| Gold Creek | 17010304PN053_02 | CW, SS, SCR/PCR | Existing |
| Loop Creek | 17010304PN060_02 | CW, SS, SCR/PCR | Existing |
| | 17010304PN060_03 | CW, SS, SCR/PCR | Existing |
| **St. Maries River Watershed** | | | |
| St. Maries River—Santa Creek to mouth | 17010304PN007_05 | CW, PCR | Designated |
| Alder Creek | 17010304PN008_02 | CW, SS, SCR/PCR | Existing |
| John Creek | 17010304PN009_02 | CW, SS, SCR/PCR | Existing |
| Santa Creek | 17010304PN010_02 | CW, SS, PCR | Designated |
| | 17010304PN010_03 | CW, SS, PCR | Designated |
| | 17010304PN010_04 | CW, SS, PCR | Designated |
| Charlie Creek | 17010304PN011_02 | CW, SS, SCR/PCR | Existing |
| | 17010304PN011_03 | CW, SS, SCR/PCR | Existing |
| St. Maries River—Carpenter to Santa Creek | 17010304PN012_05 | CW, PCR | Designated |
| Tyson Creek | 17010304PN013_02 | CW, SS, SCR/PCR | Existing |
| | 17010304PN013_03 | CW, SS, SCR/PCR | Existing |
| Carpenter Creek | 17010304PN014_02 | CW, SS, SCR/PCR | Existing |
| | 17010304PN014_03 | CW, SS, SCR/PCR | Existing |
| St. Maries River—confluence of West and Middle Fork | 17010304PN015_05 | CW, PCR, DWS, SRW | Designated |
| Emerald Creek | 17010304PN016_02 | CW, SS, SCR/PCR | Existing |
| Emerald Creek—East Fork Emerald to St. Maries River | 17010304PN016_03 | CW, SS, SCR/PCR | Existing |
| West Fork St. Maries River | 17010304PN017_02 | CW, SS, SCR/PCR | Existing |
| | 17010304PN017_03 | CW, SS, SCR/PCR | Existing |
| | 17010304PN017_04 | CW, SS, SCR/PCR | Existing |
| Middle Fork St. Maries River | 17010304PN018_02 | CW, SS, SCR/PCR | Existing |
| | 17010304PN018_03 | CW, SS, SCR/PCR | Existing |
| | 17010304PN018_04 | CW, SS, SCR/PCR | Existing |
| | 17010304PN018_05 | CW, SS, SCR/PCR | Existing |
| Gold Center Creek | 17010304PN019_02 | CW, SS, SCR/PCR | Existing |
| | 17010304PN019_03 | CW, SS, SCR/PCR | Existing |
| Crystal Creek | 17010304PN023_02 | CW, SS, SCR/PCR | Existing |
| Renfro Creek | 17010304PN024_02 | CW, SS, SCR/PCR | Existing |
| | 17010304PN024_03 | CW, SS, SCR/PCR | Existing |
| Thorn Creek | 17010304PN026_02 | CW, SS, SCR/PCR | Existing |
| | 17010304PN026_03 | CW, SS, SCR/PCR | Existing |

[a] CW – cold water communities, SS – salmonid spawning, PCR – primary contact recreation, SCR – secondary contact recreation, SRW – special resource water, DWS – domestic water supply

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, ammonia, temperature, and turbidity (IDAPA 58.01.02.250). Table 11 includes the most common numeric criteria used in TMDLs. Figure 4 outlines the steps for determining support status of beneficial uses in wadeable streams.

**Table 11. Common numeric criteria supportive of designated beneficial uses in Idaho water quality standards**

| Designated and Existing Beneficial Uses | | | | |
|---|---|---|---|---|
| **Water Quality Parameter** | **Primary Contact Recreation** | **Secondary Contact Recreation** | **Cold Water Aquatic Life** | **Salmonid Spawning (During Spawning and Incubation Periods for Inhabiting Species)** |
| **Water Quality Standards: IDAPA 58.01.02.250** | | | | |
| Bacteria, pH, and dissolved oxygen | Less than 126 *E. coli*/100 mL[a] as a geometric mean of 5 samples over 30 days; no sample greater than 406 *E. coli* /100 mL | Less than 126 *E. coli*/100 mL as a geometric mean of 5 samples over 30 days; no sample greater than 576 *E. coli*/100 mL | • pH between 6.5 and 9.0<br>• DO[b] exceeds 6.0 mg/L[c] | • pH between 6.5 and 9.5<br>• Water column DO: DO exceeds 6.0 mg/L in water column or 90% saturation, whichever is greater<br>• 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[d] | | | 22 °C or less daily maximum; 19 °C or less daily average | • 13 °C or less daily maximum; 9 °C or less daily average<br>• 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 NTU[e] 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] *Escherichia coli* organisms per 100 milliliters
[b] Dissolved oxygen
[c] Milligrams per liter
[d] 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.
[e] Nephelometric turbidity units

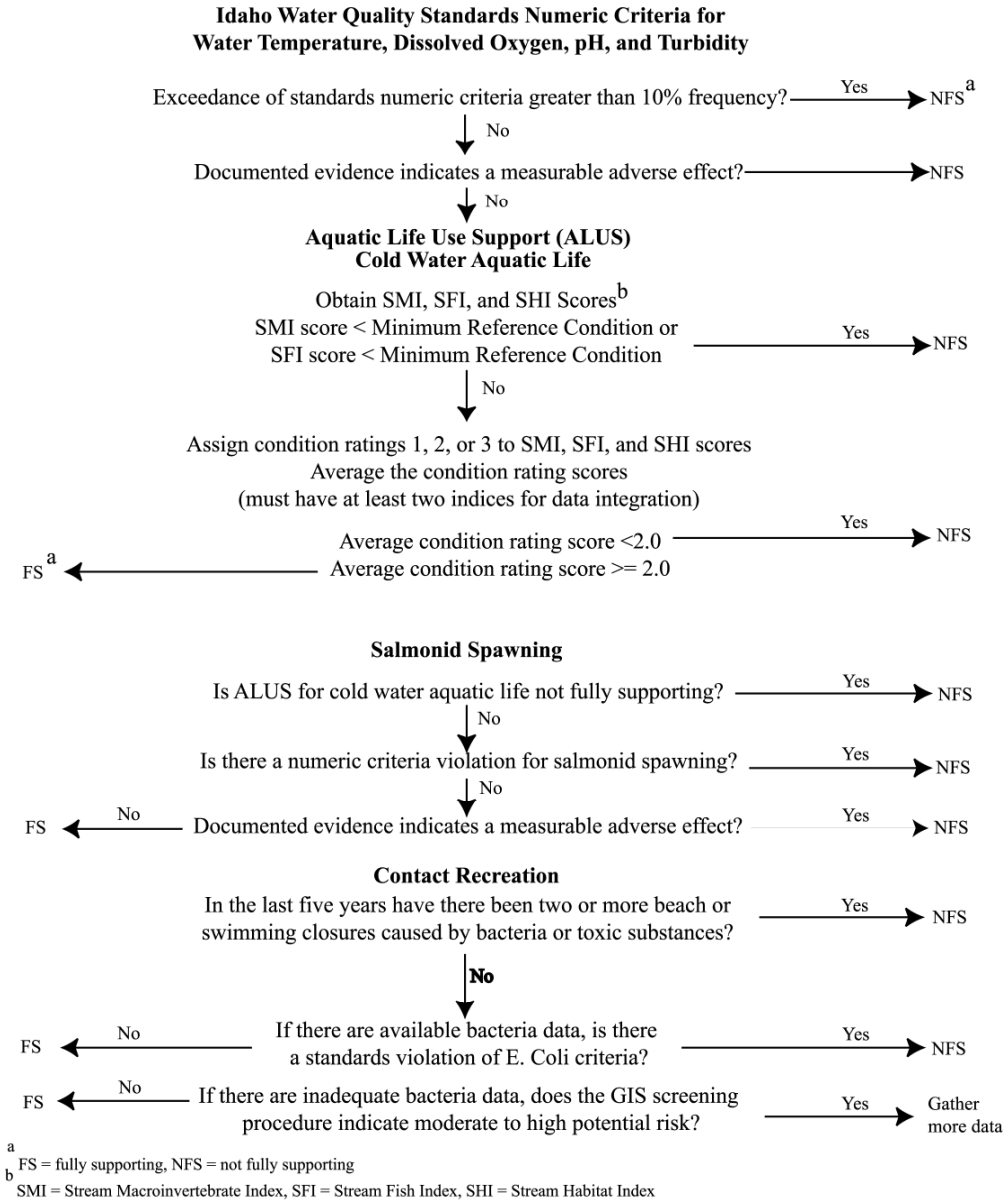


**Figure 4. Determination steps and criteria for determining support status of beneficial uses in wadeable streams (Grafe et al. 2002)**

The designated and existing uses evaluated in the TMDL are appropriate. Changes to the beneficial uses are not recommended. Continued monitoring will help to track the progress of the TMDLs and implementation goals toward reaching full support of beneficial uses.

## Changes to Subbasin Characteristics

The St. Joe and St. Maries River watersheds harbor a robust timber industry. Much of the watersheds has been and will continue to be logged. Historic logging practices utilized the river and stream network to store and transport logs to mills, railroads, or other points of commerce.

This use of the waterways as a transport mechanism resulted in long-term damage to fish habitat, riparian communities, and natural stream channel features.

The Idaho Forest Practices Act (FPA) governs timber harvest practices in Idaho (IDAPA 20.02.01). Under the FPA, the practices that were once used to log Idaho's forests are no longer legal. Rules and regulations of the FPA outline BMPs that will be taken by timber harvesters to mitigate impacts to surface water and the surrounding ecosystem. The FPA identifies standards for logging, road building, reforestation, streamside protection, and other forestry practices.

Landownership in the St. Joe and St. Maries River watersheds is mixed between federal and state agencies, timber companies, private landowners, and the Coeur d'Alene Indian Tribe (Table 12). The USFS, the largest single land steward in the St. Joe River watershed, manages approximately 524,228 acres in the St. Joe River watershed and 66,800 acres in the St. Maries River watershed. Landownership/management has remained relatively unchanged since TMDL completion in 2003.

**Table 12. Acres by land manager/owner in the St. Joe River subbasin**

| Land Manager/Owner | Acres | Percent of Watershed (%) |
|---|---|---|
| U.S. Forest Service | 591,028 | 50 |
| Idaho Department of Lands | 73,795 | 6 |
| Idaho State Parks | 7,645 | 1 |
| Idaho Department of Fish and Game | 2,980 | <1 |
| Bureau of Land Management | 17,165 | 1 |
| Coeur d'Alene Tribe | 8,217 | 1 |
| Private | 479,931 | 41 |
| **Total** | **1,180,761** | **100** |

Post TMDL development, the USFS has been working to finalize a travel management plan. The plan was developed by a local advisory committee with the guidance and oversight of the USFS St. Joe Ranger District. The plan is a requirement of the USFS following the 2005 Travel Management Rule and identifies roads, trails, and areas that will be open to the public; identifies the type of wheeled motorized vehicles that are allowed to use the designated routes; and publishes this information on a motorized vehicle use map.

The plan does not create or remove roads or trails from the landscape, but it does put limits on vehicle usage in or near sensitive areas such as stream crossings. Resource damage caused by offroad vehicles has been a reoccurring issue within the subbasin and contributes to increases in sediment and temperature. Limiting and controlling access to surface water will help to restore riparian vegetation resulting in increased stream shading and reductions in sediment loading.

## Summary and Analysis of Current Water Quality Data

Since completion of the St. Joe and St. Maries River TMDLs, 153 BURP surveys have been completed within the St. Joe River subbasin. Each summer, the DEQ Coeur d'Alene Regional Office completes 30–60 BURP surveys in northern Idaho; anywhere between 4 to 15 of these are completed in the St. Joe River watershed (with fewer completed in the St. Maries River watershed). TMDLs completed in the St. Joe and St. Maries River watersheds in 2003 were written to address waters included on the 1998 §303(d) list. BURP data used in the evaluation of

beneficial use support status in the 2003 TMDLs and 1998 §303(d) list were collected in 1996 or earlier. Since the completion of the TMDLs in 2003, 112 of the 153 BURP sites fit the monitoring protocol and had data collected from them. The remaining 41 were determined to be dry, inaccessible (due to location or landowner permission), or too large to be monitored using the BURP methodology.

During each completed BURP survey, stream macroinvertebrates were collected and a habitat assessment was conducted. Depending on staff availability, fish were also collected and identified, measured, and released back into the stream. When determining the beneficial use support status of a stream using BURP data, only two of the three variables (macroinvertebrates, habitat, and fish) are needed to make an assessment. The data is run through an assessment matrix to determine a score relative to reference streams in similar ecological regions, and the raw scores are converted and scored as 0, 1, 2, or 3, with 3 indicating the best condition and 0 the worst. Scores of 2 or greater are considered to indicate support of beneficial uses, and scores less than 2 are an indication of use nonsupport. The scores from at least two variables are averaged to determine the overall score and support status. If any of the three variables score a 0, regardless of how the other variables score, the site is considered to be nonsupportive of beneficial uses. See the *Water Body Assessment Guidance* for a detailed discussion of using BURP data in determining beneficial use support determination status (Grafe et al. 2002).

Of the 112 completed BURP surveys following TMDL completion, 36 were conducted in AUs addressed in the TMDLs (Table 13).

**Table 13. BURP data collected in watersheds assessed in the 2003 St. Joe and St. Maries River TMDLs following EPA approval**

| Stream | Assessment Unit | BURP Site ID | SMI[a] (Score) | SHI[b] (Score) | SFI[c] (Score) | Average Score |
|---|---|---|---|---|---|---|
| **St. Joe River Watershed above St. Maries River confluence** | | | | | | |
| Tributaries to St. Joe River—North Fork St. Joe to St. Maries River | 17010304PN027_02 | No new data | — | — | — | — |
| Mica Creek | 17010304PN030_02 | No new data | — | — | — | — |
| | 17010304PN030_03 | 2007SCDAA042 | 80.20 (3) | 74 (3) | 98.35 (3) | 3 |
| Bear/Little Bear Creek | 17010304PN033_02 | No new data | — | — | — | — |
| Fishhook Creek | 17010304PN039_03 | 2001SCDAE023 | 73.33 (3) | 53 (1) | 90.60 (3) | 2.33 |
| | 17010304PN039_04 | 2001SCDAE024 | 58.78 (2) | 54 (1) | 90.72 (3) | 2 |
| Sherlock Creek | 17010304PN041_02a | 2002SCDAA066 | 74.36 (3) | 63 (2) | Not collected | 2.50 |
| East and West Fork Bluff Creek | 17010304PN045_02 | No new data | — | — | — | — |
| Bluff Creek | 17010304PN045_03 | 2002SCDAA060 | 78.59 (3) | 54 (1) | Not collected | 2 |
| Mosquito Creek | 17010304PN046_02 | 1999SCDAA019 | 60.59 (2) | 72 (3) | 98.26 (3) | 2.67 |
| | | 2001SCDAA030 | 64.98 (3) | 77 (3) | 98.66 (3) | 3 |
| | | 2001SCDAE020 | 66.03 (3) | 79 (3) | 98.33 (3) | 3 |
| | | 2001SCDAV003 | 69.30 (3) | 76 (3) | Not collected | 3 |
| | | 2002SCDAA038 | 76.55 (3) | 75 (3) | 98.33 (3) | 3 |
| | | 2002SCDAV003 | 71.48 (3) | 75 (3) | Not collected | 3 |
| | | 2003SCDAA037 | 66.55 (3) | 79 (3) | Not collected | 3 |
| | | 2004SCDAA029 | 73.47 (3) | 81 (3) | 92.59 (3) | 3 |
| | | 2005SCDAA007 | 59.03 (2) | 74 (3) | Not collected | 2.50 |
| | | 2006SCDAA020 | 72.41 (3) | 77 (3) | Not collected | 3 |

| Stream | Assessment Unit | BURP Site ID | SMI[a] (Score) | SHI[b] (Score) | SFI[c] (Score) | Average Score |
|---|---|---|---|---|---|---|
| Fly Creek | 17010304PN047_02 | 2005SCDAA008 | 69.25 (3) | 83 (3) | 84.35 (3) | 3 |
| | | 2006SCDAA022 | 78.15 (3) | 71 (3) | Not collected | 3 |
| | | 2007SCDAA039 | 80.00 (3) | 73 (3) | 98.74 (3) | 3 |
| | | 2008SCDAA031 | 66.33 (3) | 76 (3) | Not collected | 3 |
| Beaver Creek | 17010304PN048_02 | No new data | — | — | — | — |
| Simmons Creek | 17010304PN052_02 | No new data | — | — | — | — |
| | 17010304PN052_03 | 2002SCDAA063 | 76.15 (3) | 73 (3) | Not collected | 3 |
| Gold Creek | 17010304PN053_02 | 2002SCDAA047 | 70.53 (3) | 65 (2) | 98.33 (3) | 2.67 |
| | | 2007SCDAA040 | — | — | — | Inaccessible |
| Loop Creek | 17010304PN060_02 | No new data | — | — | — | — |
| | 17010304PN060_03 | No new data | — | — | — | — |
| **St. Maries River Watershed** | | | | | | |
| St. Maries River—Santa Creek to mouth | 17010304PN007_05 | | | | | |
| Alder Creek | 17010304PN008_02 | No new data | — | — | — | — |
| John Creek | 17010304PN009_02 | 2001SCDAF010 | 59.89 (2) | 66 (3) | Not collected | 2.50 |
| Santa Creek | 17010304PN010_02 | No new data | — | — | — | — |
| | 17010304PN010_03 | No new data | — | — | — | — |
| | 17010304PN010_04 | No new data | — | — | — | — |
| Charlie Creek | 17010304PN011_02 | No new data | — | — | — | — |
| | 17010304PN011_03 | No new data | — | — | — | — |
| St. Maries River—Carpenter to Santa Creek | 17010304PN012_05 | No new data | — | — | — | — |
| Tyson Creek | 17010304PN013_02 | 2001SCDAF012 | 50.91 (1) | 43 (1) | 97.94 (3) | 1.67 |
| | 17010304PN013_03 | 2001SCDAF013 | 36.89 (0) | 42 (1) | 16.76 (0) | 0 |
| | | 2001SCDAF014 | 28.72 (0) | 43 (1) | 11.00 (0) | 0 |
| | | 2008SCDAA034 | 50.14 (1) | 17 (1) | 21.54 (0) | 0 |
| Carpenter Creek | 17010304PN014_02 | No new data | — | — | — | — |
| | 17010304PN014_03 | No new data | — | — | — | — |
| St. Maries River—confluence of West and Middle Fork | 17010304PN015_05 | | | | | |
| Emerald Creek | 17010304PN016_02 | 2004SCDAA033 | 49.50 (1) | 44 (1) | Not collected | 1 |
| Emerald Creek—East Fork Emerald to St. Maries River | 17010304PN016_03 | 2004SCDAA032 | 62.88 (2) | 49 (1) | 29.22 (0) | 0 |
| West Fork St. Maries River | 17010304PN017_02 | No new data | — | — | — | — |
| | 17010304PN017_03 | 2006SCDAA023 | 74.49 (3) | 61 (2) | Not collected | 2.50 |
| | 17010304PN017_04 | No new data | — | — | — | — |
| Middle Fork St. Maries River | 17010304PN018_02 | No new data | — | — | — | — |
| | 17010304PN018_03 | No new data | — | — | — | — |
| | 17010304PN018_04 | No new data | — | — | — | — |
| | 17010304PN018_05 | 2008SCDAA044 | — | — | — | Non-wadeable |
| Gold Center Creek | 17010304PN019_02 | 2001SCDAF011 | 69.79 (3) | 78 (3) | 85.42 (3) | 3 |
| | | 2007SCDAA025 | — | — | — | Dry |
| | 17010304PN019_03 | 2001SCDAF015 | 52.94 (1) | 57 (1) | 89.36 (3) | 1.67 |
| Crystal Creek | 17010304PN023_02 | 2007SCDAA035 | — | — | — | Dry |
| Renfro Creek | 17010304PN024_02 | No new data | — | — | — | — |
| | 17010304PN024_03 | 2004SCDAA074 | 65.38 (3) | 51 (1) | 83.84 (3) | 2.33 |
| Thorn Creek | 17010304PN026_02 | No new data | — | — | — | — |
| | 17010304PN026_03 | No new data | — | — | — | — |

[a] SMI = stream macroinvertebrate index
[b] SHI = stream habitat index
[c] SFI = stream fish index

Water quality criteria are the conditions presumed to support or protect designated uses (Karr 1991 in Grafe et al. 2002). These conditions may be expressed as numeric values or narrative statements. When sufficient data exist to assess either numeric or narrative criteria, this information supersedes the monitoring data collected during BURP protocols (Grafe et al. 2002). Stream water temperatures are an example of when this caveat is applied. Many of the streams exceeding the numeric temperature criteria in the St. Joe River watershed show beneficial use support when evaluating BURP data, but recorded stream water temperatures exceed the numeric water quality criteria. Therefore, the streams are failing Idaho water quality criteria for excessive water temperature.

The 2003 temperature TMDLs were reevaluated using the PNV approach because of improvements in TMDL methods. PNV methodology involves developing effective shade targets for streams in the St. Joe River subbasin based on the concept of maximum shading under PNV resulting in natural stream temperatures. Shade targets were derived from effective shade curves developed for similar vegetation types as those found in the St. Joe River subbasin.

Four subwatersheds within the St. Joe River watershed were found to be meeting TMDL shade targets: Beaver (ID17010304PN048_02), Fly (ID17010304PN041_02/ID17010304PN047_02), Mosquito (ID17010304PN046_02), and Heller/upper Sherlock (ID17010304PN041_02) Creeks exhibit riparian vegetation communities at or near potential. These watersheds are relatively undisturbed and have land-use practices (lack of road development, timber harvest, or other anthropogenic removal of riparian vegetation) consistent with developing and maintaining full PNV. BURP data collected within these watersheds also indicate a level of water quality supportive of beneficial uses.

Although Bear/Little Bear (ID17010304PN033_02), Fishhook (ID17010304PN039_03/ ID17010304PN039_04), Bluff (ID17010304PN045_02/ ID17010304PN045_03), Simmons (ID17010304PN052_02/ ID17010304PN052_03), Gold (ID17010304PN053_02), and Loop (ID17010304PN060_02/ ID17010304PN060_03) Creeks have passing BURP scores, the PNV analysis showed areas needing improvements in stream shading to meet TMDL targets.

Additional BURP data are needed to assess any water quality trends in the St. Maries River watershed. Most streams addressed in the previous TMDL effort have not been monitored in the years following TMDL completion. The St. Maries River watershed was also reassessed using the PNV methodology and all streams assessed were lacking shade.

BURP data collected within AUs that were included in the St. Joe River sediment TMDL—Mica (ID17010304PN030_03) and Fishhook (ID17010304PN039_03/ ID17010304PN039_04) Creeks—have passing scores from recent surveys. Sediment reduction activities have been implemented in both subwatersheds and may explain the improvement in BURP scores. A reoccurring mass failure area was mitigated in 2006 by Forest Capital Partners and the Benewah Soil and Water Conservation District (BSWCD).

Mica Creek is the focus of a joint study between the University of Idaho and Potlatch Corporation focused on impacts to water quality from modern timber harvest practices. Throughout the study, water quality has been monitored following many different timber harvest and post-harvest treatment practices. Forest roads have been made hydrologically inert. Additional sediment reduction projects have also contributed to the improvement in BURP scores.

No new BURP surveys have been completed on upper Mica (ID17010304PN030_02) and Bear/Little Bear (ID17010304PN033_02) Creeks. Additional monitoring is needed to evaluate beneficial use support status within these AUs.

## Recommended Integrated Report Changes

This review was conducted by using Idaho's 2010 Integrated Report as a starting point. The report identifies water bodies not assessed, attaining beneficial uses, and not attaining beneficial uses. The report is the starting point for TMDL development and helps DEQ fulfill its CWA requirements. The report incorporates TMDL findings and data collected by DEQ and other agencies. The 2003 EPA-approved TMDLs were incorporated into the 2008 Integrated Report. The reevaluation of the St. Joe and St. Maries River temperature TMDLs resulted in recommended changes to the 2012 report (Table 14).

The recommended changes in Table 14 only represent those changes following the completion and reevaluation of the St. Joe and St. Maries temperature TMDLs. The temperature TMDL review was completed in September 2011 and submitted to EPA for review the same month. Some watersheds listed in Table 14 have not been discussed previously, and represent those watersheds that were assessed following the completion of the TMDLs in 2003. The newly assessed watersheds include Big, Slate, Marble, and Merry Creeks.

**Table 14. Summary of recommended changes for evaluated assessment units**

| Stream | Assessment Unit | Pollutant | Recommended Changes to 2012 Integrated Report | Justification |
|---|---|---|---|---|
| **St. Joe River Watershed above St. Maries River confluence** | | | | |
| Beaver Creek | ID17010304PN048_02 | Temperature | Move to Category 3 | Meets temperature TMDL shade targets |
| Fly Creek | ID17010304PN047_02<br>ID17010304PN041_02 | Temperature | Move to Category 2 | Meets temperature TMDL shade targets and has passing BURP scores |
| Heller and Sherlock Creek | ID17010304PN041_02 | Temperature | Move to Category 2 | Meets temperature TMDL shade targets and has passing BURP scores |
| Mosquito Creek | ID17010304PN046_02 | Temperature | Move to Category 2 | Meets temperature TMDL shade targets and has passing BURP scores |
| Big Creek | ID17010304PN063_02<br>ID17010304PN063_03 | Temperature | Move to Category 4a | Completed TMDL |
| Sherlock Creek | ID17010304PN041_02a | Temperature | Move to Category 4a | Completed TMDL |
| Marble Creek | ID17010304PN031_04 | Temperature | Move to Category 4a | Completed TMDL |
| Slate Creek | ID17010304PN062_03 | Temperature | Move to Category 4a | Completed TMDL |
| **St. Maries River Watershed** | | | | |
| John Creek | ID17010304PN009_02 | Temperature | Move to Category 4a | Completed TMDL |
| Tyson Creek | ID17010304PN013_03 | Temperature | Move to Category 4a | Completed TMDL |
| Carpenter Creek | ID17010304PN014_02 | Temperature | Move to Category 4a | Completed TMDL |
| Merry Creek | ID17010304PN020_03 | Temperature | Move to Category 4a | Completed TMDL |
| Thorn Creek | ID17010304PN026_02<br>ID17010304PN026_03 | Temperature | Move to Category 4a | Completed TMDL |

# Section 4: Review of Implementation Plan and Activities

The *St. Maries River and Tributaries Agricultural TMDL Implementation Plan* (BSWCD et al. 2003) was developed jointly by the BSWCD, Idaho Soil Conservation Commission, and the Idaho Association of Soil Conservation Districts. At the time the plan was developed, the IDL, USFS, county and state road departments, and private timber companies had not responded to requests to participate. The implementation plan outlined site-specific projects to reduce sediment and temperature in areas altered by agricultural practices. The implementation plan identified critical areas for project activity. The critical areas were grouped into three different tiers, with project priority given to tier 1 proposals:

- Tier 1—Streambanks and adjacent fields having a direct and substantial influence on a stream (200 foot corridor width)
- Tier 2—Fields with an indirect yet substantial influence on a stream
- Tier 3—Upland fields in a subwatershed that indirectly influence a stream

The plan identified 10 projects classified under tier 1 for the St. Maries River watershed. No specific projects for pollutant load reductions were identified in the plan for the St. Joe River watershed. A similar agricultural implementation plan for the St. Joe River watershed has not been developed.

An implementation plan for the St. Joe River watershed is under development. The plan will be developed through the St. Joe/St. Maries WAG and will identify actions needed to achieve load reductions set in the TMDL. Similar to the St. Maries River implementation plan, the St. Joe River plan will identify projects and potential funding sources. Both plans will be considered living documents that are subject to review and modification.

## Responsible Parties

Implementation actions are developed and achieved though the private, state, and federal entities who own or manage land within the St. Joe River subbasin and were assigned a load reduction. DEQ and other DMAs responsible for TMDL implementation will make every effort to address past, present, and future pollution problems in an attempt to link them to watershed characteristics and management practices designated to improve water quality and restore beneficial uses. Any and all solutions to help restore beneficial uses will be considered as part of the TMDL implementation plan in an effort to make the process as efficient and cost-effective as possible. Adjustments to the implementation plans may needed if progress towards the TMDL goals is not being made.

The regulatory or oversight activities of Idaho DMAs include the following:

- The IDL for timber harvest activities, oil and gas exploration and development, and mining activities
- The Idaho Soil Conservation Commission for grazing and agricultural activities
- The Idaho Transportation Department for public road construction
- The Idaho State Department of Agriculture for aquaculture
- DEQ for all other activities

## Accomplished Pollutant Reduction Activities

To achieve the goals of restoring beneficial uses and reducing nonpoint source pollutant loads identified in the TMDL, a feedback loop was identified in the *St. Maries River and Tributaries Agricultural TMDL Implementation Plan* (BSWCD et al. 2003). An implementation plan is a road map for reducing pollutant loads identified in a TMDL and focuses on developing projects to reduce pollutant loads. The feedback loop concept consists of continuing the role and involvement of the WAG, tracking projects, and conducting both best management practice (BMP) effectiveness monitoring and instream biological monitoring. When monitoring determines that beneficial uses are supported, the stream is at its assimilative capacity. This process is ongoing, and the TMDL implementation plan is considered a living document that is subject to review and modification. The initial implementation plan identified three features or objectives in the feedback loop process:

- Active long-term commitment and participation of the WAG
- Long-term commitment of identified responsible agencies to carry out actions listed in the implementation plan
- Annual progress reports reviewed by the WAG at follow-up meetings with the intent of modifying the implementation plan

Staffing limitations at DEQ shortly after completion of the TMDL and implementation plan made it difficult for DEQ to continue participating in and facilitating WAG activities. Between 2005 and 2009, no St. Joe River WAG meetings were held. During this time, some designated management agencies (DMAs) continued to work on implementation activities, but no widespread effort was organized. Through the five-year review process, implementation activities were inventoried and assessed with regard to the TMDL goals.

Pollutant reduction activities have been completed following approval of the 2003 TMDLs and have been completed as part of larger projects (timber sales) or as individual projects. Funding for the projects has been supplied by state and federal agencies. Projects completed utilizing §319 money administered by DEQ and supplied by EPA required a 40% match from local landowners or other non-federal funding sources.

**Santa Creek**

The BSWCD, Idaho Soil Conservation Commission, and Natural Resources Conservation Service (NRCS) began implementing BMPs along Santa Creek in 2001 and continued through 2006. This project included installing exclusionary fencing, hardening cattle stream crossings, stabilizing banks, planting riparian trees, and constructing stream habitat. The project was funded through landowner contributions and DEQ's §319 program and was administered by the BSWCD.

During the four phases of implementation, the following projects were completed:

- Phase 1 (fall 2002–spring 2003): 1 stream mile of exclusionary fencing, 2 hardened crossings, planted riparian areas
- Phase 2 (2004–2005): 2,000 feet of riparian exclusionary fencing, 3 hardened crossings, 5 acres of tree planting, 600 willows planted, 4,200 feet of bank shaping, 7 rock chutes, and 12 log/rock drop structures
- Phase 3 (2005): 2,700 stream feet of riparian exclusionary fencing, 3 hardened crossings, 12 log/rock barbs, 6 rock weirs, 966 feet of bank shaping, and 12 rock chutes
- Phase 4 (2006): 2,250 stream feet of riparian exclusionary fencing, 1.5 hardened crossings, 4 log/rock barbs, 4 rock weirs, 935 feet of bank shaping, 3 rock chutes, and 410 feet of bank protection

The total sediment load reduction following completion of the four phases was 761 tons per year at a total project cost of approximately $109,000.

The USFS is a major land manager within the Santa Creek watershed, and since the completion of the TMDL in 2003, approximately 11.4 miles of road have been decommissioned within the Santa Creek watershed. This decommissioning has resulted in an anticipated reduction of 10.5 tons of sediment per year.

**Fishhook Creek Slide Stabilization Project**

The project focused on stabilizing a chronic mass wasting area. Before the project, the area contributed sediment to Fishhook Creek every year from the road, cut bank, and fill slope. The project focused on long-term stabilization of the area while maintaining the road for safe passage. DEQ §319 monies funded approximately $18,000 of the total $33,000 project. The remaining $15,000 was provided by the landowner in the form of equipment, laborer hours, and hard match (dollars). When completed, the project included long-term stabilization by removing overburden, installing rock structures/barriers, installing sediment traps, seeding, and mulching. The overall long-term benefits of the project were identified to be reduced streambank erosion and improved riparian and stream channel habitat. The total load reduction estimated in the St. Joe River sediment TMDL to restore beneficial uses in Fishhook Creek was modeled to be 86 tons per year.

**Soldier Creek Road Improvement Project**

Prior to project completion, the area in question consisted of native surface roads and undersized culverts that were resulting in high erosion rates and increased sediment contribution to nearby streams. The project included installation of ditch-relief culverts and properly sized culverts where needed. The project included resurfacing of approximately 6 miles of roads using crushed rock to reduce road surface erosion rates. The project cost approximately $322,000, of which $197,000 was funded using DEQ §319 monies.

As part of the project, extensive pre- and post-monitoring was conducted to determine the sediment reduction effectiveness of road rocking and culvert replacement. Sediment was measured in the treated areas by installing sediment traps in the road ditches and measuring the amount of sediment captured. This measurement was a direct measurement of the amount of sediment being generated from the road that would have ultimately been transported to nearby streams. The project monitored roadside ditches before and after the road surfaces were rocked and before and after the installation of ditch-relief culverts. The results showed dramatic

sediment reductions from rocking the road surface and installing ditch-relief culverts. Sediment was reduced by 79–93% in the study area, indicating that road rocking and ditch-relief culverts are effective at reducing sediment generated from forest roads.

**West Fork–Middle Fork St. Maries River Culvert Replacement Project**

The project replaced 7 undersized culverts in the West Fork and Middle Fork watersheds of the St. Maries River and improved road surfaces on 3.4 miles of forest roads. Culverts were contributing sediment to the stream, impeding or reducing fish passage, and were at risk of failing. The culverts were removed and replaced with larger culverts to allow for flood flows and movement of bed load material. Culverts were made "fish friendly" by installing fish ladders or installing the culverts below the streambed to minimally impact the natural stream gradient. Partners in the project included the Idaho Department of Fish and Game, IDL, USFS, and Potlatch Corporation. The total project cost approximately $161,000, with approximately $97,000 paid for by DEQ §319 funds.

**Idaho Department of Lands and the Timber Industry**

IDL and the timber industry have been actively implementing the TMDL by improving the forest road system. Forest roads were modeled to be a large contributor of sediment to watersheds during the 2003 TMDL effort. Road crossings and near-stream roads were modeled as generating the largest load from the forest road network. Forest roads generate sediment due to their semi-impervious running surface and cross-cutting the hill slope. The captured water is diverted onto the forest floor or in other cases inside ditches that transport the sediment to nearby streams. Implemented road improvement projects focus on improving the running surface, replacing undersized culverts, restricting traffic, and redirecting water off the roadway in an effort to reduce sediment transport to surface waters.

Following completion of the St. Maries River sediment TMDL, IDL and the timber industry have spent approximately $1,150,000 and $61,000, respectively, to improve forest roads (Table 15). For more information about completed activities by IDL and the timber industry, see Appendix A.

**Table 15. Forest road improvement projects completed by the Idaho Department of Lands and Forest Capital Partners in the St. Maries River watershed**

| Stream | Assessment Unit | Practice | Location TRS[a] | Date Completed | Project Cost ($) |
|---|---|---|---|---|---|
| **Work completed by Idaho Department of Lands** | | | | | |
| Benewah Creek | ID17010304PN004_02 | Replaced 4 undersized culverts | 45N,04W,S36 | 2009 | 3,763 |
| Syringa/Thorn Creek | ID17010304PN026_02 | Rocked 2.7 miles of road | 45N,02W,S13 | 2008 | 119,092 |
| Beaver/Soldier Creek | ID17010304PN025_02<br>ID17010304PN026_02<br>ID17010304PN007_02 | Rocked 5.9 miles of road, installed 20 new ditch-relief culverts, replaced 6 damaged or undersized culverts, 0.08 miles of road obliterated | 45N,01W,S23,26, 27,28,33 | 2005–2006 | 272,981 |
| Flat Creek | ID17010304PN007_02 | Installed ditch-relief culverts | 45N,02W,S24 | 2010 | 700 |
| Davis/Renfro Creek | ID17010304PN024_02 | Rocked 6.5 miles of road | 44N,01W,S12,13 | 2006–2007 | 252,895 |
| Renfro Creek | ID17010304PN024_02 | Rocked 4.5 miles of road | 44N,01E,S7,8,9 | 2005–2006 | 143,325 |

| Stream | Assessment Unit | Practice | Location TRS[a] | Date Completed | Project Cost ($) |
|---|---|---|---|---|---|
| Davis Creek | ID17010304PN024_02<br>ID17010304PN012_02 | Rocked 2.1 miles of road | 44N,01W,S13,24 | 2006–2007 | 22,068 |
| Renfro/Rock Creek | ID17010304PN024_02 | Rocked 2.0 miles of road | 44N,01W,S13 | 2009 | 20,000 |
| Finn Creek | ID17010304PN013_02 | Rocked 0.8 miles of road | 44N,01W,S32 | 2009 | 10,000 |
| Tyson Creek | ID17010304PN013_03 | Ditch rock 0.6 miles, rocked 2.6 miles of road, installed 4 new culverts | 43N,01W,S4,9,15, 16 | 2006 | 132,427 |
| Little Carpenter Creek | ID17010304PN014_02 | Rocked 2.8 miles of road | 43N,01W,S14,15 | 2006 | 139,798 |
| Carpenter Creek | ID17010304PN014_02 | Rocked 0.2 miles of road, installed 3 ditch-relief culverts | 43N,01W,S22 | 2006 | 11,392 |
| Little Carpenter Creek | ID17010304PN014_02 | Obliterated 0.3 miles of road | 43N,01W,S10 | 2008 | 2,300 |
| St. Maries River | ID17010304PN016_02 | Gated road to restrict access | 43N,01W,S36 | 2010 | 2,000 |
| Tyson Creek | ID17010304PN013_02 | Gated road to restrict access | 43N,01W,S9 | 2010 | 2,000 |
| Heineman Creek | ID17010304PN014_02 | Gated road to restrict access | 43N,01W,S26 | 2010 | 2,000 |
| Carpenter Creek | ID17010304PN014_02 | Gated road to restrict access | 43N,01W,S22 | 2010 | 2,000 |
| West Fork St. Maries River | ID17010304PN017_02 | Rocked 0.45 miles of road | 42N,02E,S30 | 2008 | 14,628 |
| **Work completed by Forest Capital Partners** | | | | | |
| Bond Creek | ID17010304PN028_02 | Obliterated 0.3 miles of road | 45N,01E S33 | 2010 | 1,320 |
| John Creek | ID17010304PN009_02 | Rocked 0.6 miles of road | 44N,03W,S22 | 2010 | 5,700 |
| Canyon Creek | ID17010304PN026_02<br>ID17010304PN026_03 | Rocked 4 miles of road and replaced 2 ditch-relief culverts | 45N,01W,S06 - 45N,01W,S03 | 2010 | 54,000 |
| Burton Creek | ID17010304PN027_02 | Recontoured portions of spur road to reduce failure | 45N,04E,S15 | 2008 | 4,500 |
| Flemming Creek | ID17010304PN027_02 | Recontoured portions of spur road to reduce failure | 45N,05E,S19 | 2007 | 3,000 |
| Boulder Creek | ID17010304PN038_02<br>ID17010304PN038_03 | Recontoured portions of spur road to reduce failure | 45N,04E,S33 | 2007 | 3,000 |
| | | Recontoured stream crossings and removed culverts | 45N,04E,S34 | 2007 | 2,500 |
| | | Obliterated road | 45N,04E,S29 | 2007 | 1,200 |
| | | Recontoured stream crossings and removed culverts | 44N,04E,S3 | 2007 | 3,500 |
| Benewah Creek | ID17010304PN004_02 | Spot rocked main haul road and installed dips in Echo Springs | 46N,03W,S26,21 | 2006 | 8,500 |
| Alpine Creek | ID17010304PN042_02 | Removed culvert | 44N,06E,S35 | 2008 | 400 |
| John Creek | ID17010304PN009_02 | Abandoned 12 miles of road | 44N,03W,S22,14,7, 20 | 2005–2007 | 29,000 |
| | | Abandoned 2 log landings adjacent to stream | 44N,02W,S19 | 2005 | 4,000 |
| | | Road rocking | 44N,02W,S2,11,13, 14 | 2006–2007 | 25,000 |

| Stream | Assessment Unit | Practice | Location TRS[a] | Date Completed | Project Cost ($) |
|---|---|---|---|---|---|
| | | Replaced bridge, reset abutments, and installed riprap | 44N,02W,S7,4 | 2007 | 55,000 |
| | | Installed rolling dips | 44N,02W,S2,3,10 | 2007 | 18,000 |

[a] Township, Range, Section

**United States Forest Service**

The USFS has been active in reducing sediment and temperature sources through maintaining and improving the forest road network and improving instream habitat (Table 16).

**Table 16. Implementation projects completed by the U.S. Forest Service**

| Watershed | Activity |
|---|---|
| Middle Fork St. Maries River | 2 miles of large woody debris placement to improve instream fish habitat |
| | 2,300 streamside conifers planted adjacent to Gold Creek |
| | 1 mile of road decommissioning |
| West Fork St. Maries River | 2 miles of large woody debris placement to improve instream fish habitat |
| | 2,500 streamside conifers planted adjacent to the West Fork St. Maries River |
| | 7 miles of road decommissioning |
| Charlie Creek | 11 miles of road decommissioning |
| | 4 miles of road put into storage. Road closed to vehicles, culverts pulled, and running surface vegetated. |
| Emerald Creek | 5 aquatic organism passage culverts installed |

# Future Strategy for TMDL Review and Monitoring

Continued monitoring will determine if implementation actions have been sufficient to restore all beneficial uses. A considerable amount of time will be necessary for the net benefit of nonpoint source load reductions to be seen in improved water quality and beneficial use support. Continuing to reduce nonpoint sources of sediment and increase stream shading will be a priority on those streams covered by the TMDLs that do not support all beneficial uses. A timeline for vegetation growth, stream channel morphological changes, and transport of channel-stored sediments is impossible to identify, but monitoring for beneficial use support will continue and will provide helpful benchmarks.

DEQ will assess water quality status during the development of the 2012 Integrated Report and five-year TMDL review processes. DEQ will also continue to collected water quality data to determine beneficial use support.

# Section 5: Summary of Five-Year Review

Due to the lack of change in management, land use, and landownership within the St. Joe River subbasin, load allocations and load reductions identified in the St. Joe and St. Maries River sediment TMDLs will remain unchanged. Findings of the PNV analysis conducted in 2010 should be incorporated into Idaho's 2012 Integrated Report.

## Review Process

The St. Joe/St. Maries WAG began meeting February 26, 2010, to discuss the TMDL five-year review and development of TMDLs for newly listed waters (water bodies identified as impaired or not meeting water quality standards after completion of the 2003 TMDLs). WAG meetings were advertised in local newspapers and public participation was sought by DEQ throughout the process. Meetings were open to the public and complied with Idaho open meeting laws.

During WAG involvement, DEQ solicited data to evaluate during the five-year review process and development of new TMDLs. Data supplied to DEQ included water temperature, water chemistry, discharge, and other observations (Table 17).

**Table 17. Data supplied to DEQ by watershed advisory group participants**

| Data Supplier | Data Type | Collection Location | Date Supplied to DEQ |
|---|---|---|---|
| U.S. Forest Service | • Stream temperature<br>• Electrofishing survey results | | |
| Santa/Fernwood Sewer District | • Discharge volume<br>• Water temperature<br>• Water chemistry | Water samples collected from wastewater treatment plant outfall (discharges to St. Maries River) | Supplied to DEQ monthly during reporting requirements set forth by NPDES permit[a] |
| Clarkia Sewer District | • Discharge volume<br>• Water temperature<br>• Water chemistry | Water samples collected from wastewater treatment plant outfall (discharges to St. Maries River) | Supplied to DEQ monthly during reporting requirements set forth by NPDES permit[a] |
| Idaho Association of Soil Conservation Districts | Water chemistry<br>• Total phosphorus<br>• *E. coli*<br>• Nitrogen—$NO_2$, $NO_3$, $NH_3$<br>• Total suspended solids<br>• Temperature<br>• Turbidity<br>• Dissolved oxygen<br>• Dissolved oxygen (%) saturation<br>• Total dissolved solids | • Middle Fork St. Maries River (upper)<br>• Middle Fork St. Maries River (lower)<br>• St. Maries River (lower)<br>• West Fork St. Maries River (lower)<br>• Little Carpenter Creek<br>• Tyson Creek<br>• Renfro Creek<br>• Santa Creek (lower)<br>• Santa Creek (upper)<br>• Charlie Creek | Report completed in 2004 |
| Idaho Department of Lands | Inventory of sediment-reduction projects | St. Maries River watershed | September 2010 |

[a] NPDES = National Pollutant Discharge Elimination System

Data were determined to be relevant to the TMDL if they were collected within a watershed with a completed TMDL; the sample collected a parameter of interest (sediment, temperature, bacteria, nutrients, riparian community composition, shade, aquatic life); and the sample was collected using scientific methods.

Data submitted to DEQ were used to help track the implementation progress of the TMDL and will be used to help direct future monitoring efforts. Water chemistry data were evaluated to determine compliance with Idaho water quality criteria and to evaluate water quality trends. Evaluation of submitted data did not warrant any water quality listing changes and was consistent with the TMDL.

# TMDL Analysis Review

**Sediment**

The 2003 sediment TMDLs were developed using the most current land uses and best available data. Conclusions from the modeling effort will remain in place until a newer sediment assessment is completed or the completion of sediment-reduction projects and multiple years of data show support of beneficial uses. The development of sediment loads relied heavily on model outputs. In the future, more on-the-ground measurements will be used to determine sediment impairment and to quantify current and target sediment loads.

The methods used to allocate load reductions oversimplified the allocation process. During load allocations, each land manager/owner was allotted a percentage of the load reduction dependent on the percentage of land managed/owned within the watershed. This method for allocating sediment load reductions does not allocate loads based on the type of land use occurring within the watershed and as a result could over allocate or under allocate to a particular land steward. Load capacities were developed to represent a relative load and not an exact load, and because of this, load reductions within a watershed will be used as guidelines to improve beneficial uses. The final test to determine if the nonpoint source pollutant has been reduced to sufficient quantities will be the support of beneficial uses and compliance with water quality criteria.

Sediment load allocations will not be reassessed. The modeling techniques used to develop the sediment TMDLs of the St. Joe and St. Maries River TMDL documents will remain unchanged until further assessments warrant the need for new sediment load quantification. The implementation of nonpoint source projects to reduce sediment may warrant the need for a new sediment load calculation if beneficial use support is not attained after all implementation projects have been installed.

**Temperature**

The assumptions used in developing the original temperature TMDLs were valid at the time the TMDLs were developed in 2003, but new methodologies better represent temperature TMDLs on the landscape. The original TMDL utilized an equation to determine the appropriate amount of shade required to elicit a temperature change. The equation did not take into consideration the vegetation types adjacent to the stream and because of this, relied heavily on elevation to determine the desired riparian canopy cover percentage. As a result, many of the areas addressed by the temperature TMDLs required 100% canopy cover, which is not achievable or realistic in natural stream reaches given the complexities of riparian vegetation.

Another invalid assumption was that canopy cover increases as you descend in a watershed. In fact, just the opposite is true. Streams widen from headwaters to mouth, and the ability of the neighboring riparian community to shade the stream decreases. Headwater portions of streams are narrow and can be entirely shaded by very little riparian vegetation. For these reasons, the streams originally assessed using the CWE equation have been reassessed using the PNV methodology.

## Watershed Advisory Group Consultation

The St. Joe/St. Maries WAG began meeting to discuss water quality within the St. Joe River subbasin in 2001 and continued to meet until EPA approval of the St. Joe and St. Maries River TMDLs in 2003. The St. Joe/St. Maries WAG began meeting again in February 2010. The new group consisted of existing and new members. Meetings were held every third Friday of the month at the St. Maries Fire Station from 9–11 a.m. Meetings were and will continue to be open to the public and advertised in local papers and on the St. Joe/St. Maries WAG webpage. At the time this review was completed, 12 meetings had been held.

During the meetings, water quality standards, beneficial uses, TMDLs, TMDL implementation plans, and the TMDL five-year review were discussed. WAG members include state and federal agency representatives, private landowners, timber company representatives, environmental interests, mining representatives, recreational enthusiasts, local government officials, and concerned citizens.

## Recommendations for Further Action

TMDL implementation needs to continue. Temperature TMDLs need to be converted to PNV TMDLs and results implemented. Continued beneficial use monitoring will help to determine progress towards meeting TMDL targets and help prioritize implementation efforts.

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# Appendix A. Report of Implementation Activities

A detailed discussion of implementation projects can be found in Section 4. The figures below (Figures A-1 and A-2) are spreadsheets that were supplied to the Idaho Department of Environmental Quality from the Idaho Department of Lands and Forest Capital Partners, a timber company in north Idaho. The projects completed below are forest road-related projects and are anticipated to reduce sediment in nearby streams, but a load reduction associated with each project is not feasible. To calculate a sediment load reduction for each project, road-specific information—such as running surface type, amount of travel, road slope, and road ditch information—and local weather data are needed pre- and post-project completion to model sediment reductions. Forest roads near streams and crossing streams were modeled to be a significant source of sediment, but the information used to estimate these sediment contributions is not applicable to every project; each project is unique. To estimate future sediment load reductions, the U.S. Forest Service Water and Erosion Prediction Project (WEPP) may be used to calculated sediment generation pre- and post-project completion.

ST JC EA

IDL COMPLETED PROJECTS FOR TMDL REDUCTION (7/1/2003 - 7/1/2010) WITHIN ST MARIES RIVER DRAINAGE

| Item No. | Agency Landowner | Stream/ Watershed | Practice | Location | Pollutant | Estimated Reduction | Actual Date | Actual Cost $ | Co-op Partners | % Completed | FIC |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | IDL | C-II/Benewah Cr | Replace 4 undersized CMP's | S36 45N 4W | S | | 2009 | 3,763 | None | 100% | JRM |
| 2 | IDL | Syringa Cr/Thorn Cr | Rock 2.7 miles of road | S13 45N 2W | S | | 2008 | 119,092 | None | 100% | JRM |
| 3 | IDL | Flat Cr/SMR | Ditch relief CMP installed | S24 45N 2W | S | | 2010 | 700 | None | 100% | JRM |
| 4 | IDL | Beaver-Soldier/SMR | Rock 5.9 miles of road, 20 new ditch relief CMP's, 6 replaced damaged or undersized CMP's, .08 miles road obliteration | S23,26,27,28 S33, 45N 1W | S | | 2005/06 | 272,981 | PFH/IEP/FCP | 100% | ALB |
| 5 | IDL | Davis-Renfro/SMR | Rock 6.5 miles of road | S12 S13 44N 1W | S | | 2006/07 | 252,895 | None | 100% | ALB |
| 6 | IDL | Renfro/SMR | Rock 4.5 miles of road | S7 S8 S9 44N 1E | S | | 2005/06 | 143,325 | PFH | 100% | ALB |
| 7 | IDL | Davis/SMR | Rock 2.1 miles of road | S13 S24 44N 1W | S | | 2006/07 | 22,068 | None | | ALB |
| 8 | IDL | Renfro-Rock Cr/SMR | Rock 2.0 miles of road | S13 44N 1W | S | | 2009 | 20,000 | None | 100% | RMV |
| 9 | IDL | Finn Cr/SMR | Rock 0.8 mile of road | S32 44N 1W | S | | 2009 | 10,000 | None | 100% | RMV |
| 10 | IDL | Tyson CR/SMR | Ditch rock 0.6 mi, rock rd 2.6 mi. 4 CMP's | S4 S9 S15 S16 43N 1W | S | | 2006 | 132,427 | None | 100% | MRB |
| 11 | IDL | Little Carpenter Cr/SMR | Rock 2.8 mi road | S14 S15 43N 1W | S | | 2006 | 139,798 | None | 100% | MRB |
| 12 | IDL | Carpenter Cr/SMR | Rock 0.2 mile, 3 ditch relief CMP's | S22 43N 1W | S | | 2006 | 11,392 | None | 100% | MRB |
| 13 | IDL | L. Carpenter Cr/SMR | Obliterate 0.3 mile road | S10 43N 1W | S | | 2008 | 2,300 | None | 100% | MRB |
| 14 | IDL | SMR | Gate | S36 43N 1W | S | | 2010 | 2,000 | None | 100% | MRB |
| 15 | IDL | Tyson Cr/SMR | Gate | S9 43N 1W | S | | 2010 | 2,000 | None | 100% | MRB |
| 16 | IDL | Heineman/SMR | Gate | S26 43N 1W | S | | 2010 | 2,000 | None | 100% | MRB |
| 17 | IDL | Carpenter Cr/SMR | Gate | S22 43N 1W | S | | 2010 | 2,000 | None | 100% | MRB |
| 18 | IDL | W. Fork SMR | Rock 0.45 mile of road | S30 42N 2E | S | | 2008 | 14,628 | None | 100% | RMA |
| | | **TOTALS** | **30.1 Miles road rocking**<br>**0.6 Miles ditch rocking**<br>**0.3 Miles road obliteration**<br>**Replace 14 undersized CMP's**<br>**Install 23 ditch relief CMP's**<br>**Install 4 gates** | | | | | **$1,153,369.00** | | | |

SMR = St. Maries River
CMP = Corrugated metal pipe
PFH = Potlatch Forest Holdings
IEP = Inland Empire Paper
FCP = Forest Capital Partners

M-Drive: Timber/TMDL/St. Maries
TMDL Work Completed 7-03 to 7-10

**FigureA-1. Implementation data supplied by the Idaho Department of Lands**

**ST JOE AREA**
**FCP COMPLETED PROJECTS FOR TMDL REDUCTION (8/10-12/10) WITHIN ST MARIES/ST JOE RIVER DRAINAGES**

| Item No. | Agency Landowner | Stream/ Watershed | Practice | Location | | | Pollutant | Estimated Reduction | Actual Date | Actual Cost $ | Co-op Partners | % Completed |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCP | Bond Creek/St. Joe | Obliterate 0.32 mile of road | S33 | 45N | 1E | S | | 2010 | $1,320 | none | 100% |
| | FCP | Canyon Creek/SMR | Rock about 0.6 mile of road | S22 | 44N | 3W | S | | 2010 | $5,648 | none | 100% |
| | FCP | John Cr./SMR | Rock about 4 miles of Raod, replaced (2) new ditch relief CMP's | S6 | 45N | 1W | S | | 2010 | $53,997 | none | 100% |
| | FCP | John Cr./SMR | Abandoned 1.2 mile Road stream Adjacent | 22 | 44n | 3w | S | | 8/1/05 | $7,000 | none | 100% |
| | FCP | John Cr./SMR | Abandoned 1 mile Road stream Adjacent | 14 | 44n | 3w | S | | 8/1/06 | $5,000 | none | 100% |
| | FCP | John Cr./SMR | Abandoned 1.8 mile Road stream Adjacent | 7 | 44n | 2w | S | | 8/1/07 | $12,000 | none | 100% |
| | FCP | John Cr./SMR | Abandoned 8 mile Road stream Adjacent | 20 | 44n | 2w | S | | 8/1/07 | $5,000 | none | 100% |
| | FCP | John Cr./SMR | Abandoned log 2 landing stream adjacent | 19 | 44n | 2w | S | | 7/1/05 | $4,000 | none | 100% |
| | FCP | John Cr./SMR | Slide Stabilization riprap | 4 | 44n | 2w | S | | 8/1/06 | $13,000 | none | 100% |
| | FCP | John Cr./SMR | Rock road | 2 &11 | 44n | 2w | S | | 9/1/06 | $11,000 | none | 100% |
| | FCP | John Cr./SMR | Rock road | 13 & 14 | 44n | 2w | S | | 7/1/07 | $14,000 | none | 100% |
| | FCP | John Cr./SMR | Replace Bridge reset abutments & riprap | 7 | 44n | 2w | S | | 6/1/07 | $24,000 | none | 100% |
| | FCP | John Cr./SMR | Replace Bridge reset abutments & riprap | 4 | 44n | 2w | S | | 6/1/07 | $31,000 | none | 100% |
| | FCP | John Cr./SMR | Install & Rock rolling dips | 2,3,10 | 44n | 2w | S | | 7/1/07 | $18,000 | none | 100% |
| 5 | FCP | Burton Cr/St Joe | Recontour protions of spur road to reduce failure | 15 | 45 | 4e | s | | 2008 | 4,500 | none | 100% |
| 6 | FCP | Flemming Cr/St Joe | Recontour protions of spur road to reduce failure | 19 | 45 | 5e | s | | 2007 | 3,000 | None | 100% |
| 7 | FCP | Boulder Cr/St Joe | Recontour protions of spur road to reduce failure | 33 | 45 | 4e | s | | 2007 | 3,000 | None | 100% |
| 8 | FCP | Boulder Cr/St Joe | Recontour stream crossings and remove CMP's | 34 | 45 | 4e | s | | 2007 | 2,500 | None | 100% |
| 9 | FCP | Boulder Cr/St Joe | Obliterate road | 29 | 45 | 4e | s | | 2007 | 1,200 | None | 100% |
| 10 | FCP | Boulder Cr/St Joe | Recontour stream crossings and remove CMP's | 3 | 44 | 4e | s | | 2007 | 3,500 | None | 100% |
| 11 | FCP | Benewah Cr/St Joe | Spot Rocked Main Haul and dips in Echo Springs | 26 | 46 | 3w | s | | 2006 | 4,500 | None | 100% |
| 12 | FCP | Benewah Cr/St Joe | Up graded cmps and rocked crossings 3 mile system | 21 | 46 | 3w | s | | 2006 | 4,000 | None | 100% |
| 13 | FCP | Alpine Cr/St Joe | Remove CMP's on 1 spur in s35 | 35 | 44 | 6e | s | | 2008 | 400 | None | 100% |
| | | | | | | | | | | | | |
| **TOTALS** | | | | | | | | | | **$231,565.00** | | |

SMR = St. Maries River
CMP = Corrugated metal pipe
PFH = Potlatch Forest Holdings
IEP = Inland Empire Paper
FCP = Forest Capital Partners

**Figure A-2. Implementation data supplied by Forest Capital Partners**