Total Maximum Daily Loads for Brownlee Reservoir (Weiser Flat) Subbasin

TMDL Five-Year Review

HUC 17050201



State of Idaho
Department of Environmental Quality

August 2015



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Prepared by
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Our sincerest thanks go to all the landowners who allowed DEQ access to sample the water quality.

Cover photo of Warm Springs Creek at Snake River confluence.

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Executive Summary

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

This 5-year review describes current water quality status, pollutant sources, and recent pollution control efforts in the Brownlee Reservoir subbasin, located in southwestern Idaho. Five water bodies in the Brownlee Reservoir subbasin are included in the approved in the *Total Maximum Daily Loads (TMDL) for the Brownlee Reservoir (Weiser Flat) Subbasin* (DEQ 2003) and are now subject to 5-year review in compliance with Idaho Code §39-3611(7). This document addresses the sediment and total phosphorus TMDLs for these assessment units (AUs). Additional *Escherichia coli* (*E.coli*) bacteria data collected for AUs that are §303(d) listed (Category 5 in the Integrated Report [DEQ 2014]) will be addressed in a separate TMDL. More information about these watersheds and the subbasin as a whole is provided in the Brownlee Reservoir subbasin TMDL (DEQ 2003) and *Wildhorse River Subbasin Assessment and Total Maximum Daily Load* (DEQ 2007).

These TMDL analyses have been developed to comply with Idaho's water quality standards (IDAPA 58.01.02). A TMDL analysis determines instream water quality targets, calculates load capacities, estimates existing pollutant sources, and allocates responsibility for load reductions needed to return listed waters to a condition meeting water quality standards.

Subbasin at a Glance

The Brownlee Reservoir subbasin, hydrologic unit code 17050201, encompasses Weiser Flat, including Jenkins, Scott, Warms Springs, and Hog Creeks, which drain into the Snake River as it becomes Brownlee Reservoir downstream of the Weiser River inflow. Dennett Creek drains into Brownlee Reservoir below Weiser Flat. This subbasin is located along the central portion of the Idaho-Oregon border (Figure A). The headwaters for these creeks originate in extreme western Idaho in the Hitt Mountains. It is a rural watershed dominated by agricultural land and rangeland. Table A summarizes the pollutants, approved TMDLs, and associated implementation plans.

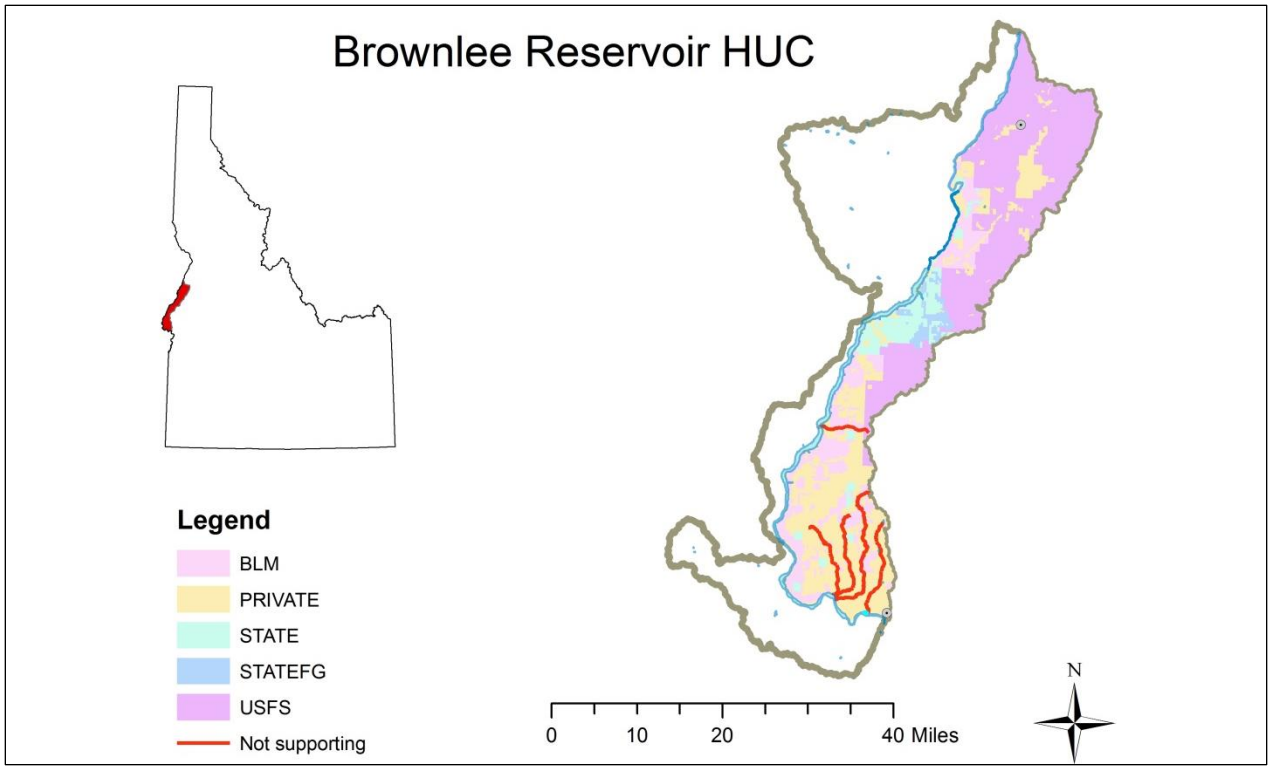


Figure A. Location of the Brownlee Reservoir subbasin, landownership, and impaired water bodies Jenkins, Scott, Warm Springs, Hog, and Dennett Creeks.

Table A. Subbasin at a glance

Approved TMDLs	Pollutants Within Watershed
Sediment Total phosphorus	Sediment Total phosphorus *Escherichia coli* (*E. coli*)
Implementation Plans	**Implementation Actions**
Weiser Flat TMDL Implementation Plan for Agriculture (ISWCC 2004, revised 2014)	Approved best management practices, sedimentation basins, wetlands (section 4.0 of the implementation plan) *deq.idaho.gov/media/1118029/weiser-flat-implementation-plan-0904-revised-2014.pdf*

Key Findings

In 2014, total phosphorus (TP) and total suspended sediment (TSS) were sampled weekly or biweekly between May and September to gather information during spring runoff and document changing agricultural and cattle grazing patterns throughout the season. Target and existing concentrations were compared to determine the amount of sediment or nutrient reduction needed to bring the water bodies into compliance with Idaho's water quality standards (IDAPA 58.01.02). Daily loads for TP and TSS were calculated using streamflow measurements collected during each sampling event at each water body. A summary of assessment outcomes, including recommended changes to listing status in the next Integrated Report, is presented in Table B.

Table B. Existing TMDLs general status.

Assessment Unit Name	Assessment Unit Number	Pollutant	TMDL Approval Year	Recommended Changes to Next Integrated Report	Justification
Jenkins Creek	ID17050201SW005_02	Total phosphorus, sedimentation/ siltation	2003	Remain in Category 4a	Excess total phosphorus concentration
Scott Creek—2nd order	ID17050201SW006_02	Total phosphorus, sedimentation/ siltation	2003	Remain in Category 4a	Excess total phosphorus concentration
Scott Creek—3rd order	ID17050201SW006_03	Total phosphorus, sedimentation/ siltation	2003	Remain in Category 4a	Excess total phosphorus concentration
Warm Springs Creek—1st and 2nd order	ID17050201SW007_02	Total phosphorus, sedimentation/ siltation	2003	Remain in Category 4a	Excess total phosphorus concentration
Warm Springs Creek—3rd order	ID17050201SW007_03	Total phosphorus, sedimentation/ siltation	2003	Remain in Category 4a	Excess total phosphorus and sediment concentration
Hog Creek—1st and 2nd order	ID17050201SW008_02	Total phosphorus	2003	Remain in Category 4a	Excess total phosphorus concentration
Hog Creek—3rd order	ID17050201SW008_03	Total phosphorus	2003	Remain in Category 4a	Excess total phosphorus concentration
Dennett Creek—1st and 2nd order	ID17050201SW012_02	Sedimentation/ siltation	2003	Assess potential to move to Category 2	Meets sediment concentration target

The 5-year review data collection involved intensive sampling with greater frequency and overall season duration than was collected for the original TMDL. Further, the Idaho Department of Environmental Quality (DEQ) sampled Dennett Creek, which was not possible during the original TMDL data collection period. Comparing current conditions with data presented in the original 2003 TMDL shows that all listed AUs (Jenkins, Scott, Warm Springs, and Hog Creeks) continue to be impaired for TP, while Jenkins Creek (June, July, and August), Scott Creek (May, June, and August), and Warm Springs Creek (July and August) continue to be impaired for TSS. Restoration efforts in Weiser Flat should be directed towards these AUs for TSS and TP to improve overall watershed stream health. Galloway Canal is the primary source of water to Hog Creek after spring runoff and continued restoration efforts to remove TP in waters of this canal will improve Hog Creek.

The targets established and load reductions determined in this 5-year review, with the implementation process, will ensure that these water bodies support beneficial uses. Aside from Dennett Creek, the §303(d)-listed water bodies in the Brownlee Reservoir subbasin all exhibit monitored concentrations of their respective contaminant (e.g., TP and/or TSS) above the target identified to improve water quality in the Snake River reach of the *Snake River – Hells Canyon Total Maximum Daily Load (TMDL)* (SR-HC TMDL) (DEQ/ODEQ 2004). TSS and TP goals identified in this review with the SR-HC TMDL implementation measures (DEQ/ODEQ 2004) will ensure that the Brownlee Reservoir subbasin water bodies will support cold water aquatic

life and other beneficial uses. Implementation of some agriculture and domestic livestock grazing best management practices (BMPs) are already underway or are in the planning stages. BMPs implemented as part of this effort will have long-reaching effects in terms of wildlife habitat, recreation, and aesthetic improvements.

Support of cold water aquatic life uses cannot be determined specific to sediment and nutrient concentrations due to the lack of aquatic life data, however, there is a strong connection between sediment and nutrients and the attainment of full support of downstream waters (DEQ/ODEQ 2004) shown to be impaired due to excessive sediment and nutrient loads. To reduce degradation to downstream waters, the targets for TSS and TP for the SR-HC TMDL (DEQ/ODEQ 2004) must be met in discharging waters (Table B).

Elevated concentrations of TP observed in Jenkins, Scott, Warm Springs, and Hog Creeks contribute to impairment of downstream waters in the Snake River. High concentrations of TSS during spring and summer months in Jenkins, Scott, and Warm Springs Creeks also contribute to impairment of downstream waters in the Snake River. Agricultural practices and livestock are the most common sources of TSS and TP loads within these watersheds, but wildlife populations, roadways, and natural erosion also impact these AUs.

Public Participation

The creeks evaluated in this 5-year review are in proximity to the Weiser River and many of the landowners involved in the Weiser River TMDL process also manage lands within or adjacent to these creeks. Throughout this process, the local experience and participation of these landowners have been and will continue to be invaluable in identifying water quality issues and implementing pollutant reduction strategies appropriate on a local scale. The public committee, known as the Weiser River Watershed Advisory Group, was involved in the TMDL assessment documented in this TMDL 5-year review.

1 Introduction

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

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

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

To meet the intent and purpose of Idaho Code §39-3611(7), this report reviews of the *Total Maximum Daily Loads (TMDL) for the Brownlee Reservoir (Weiser Flat) Subbasin* (DEQ 2003) and addresses water bodies in the Brownlee Reservoir subbasin that are in Idaho's most recent Category 4a of the Integrated Report (DEQ 2014). This report reviews the approved TMDL and implementation plan, considers the most current and applicable information in conformance with Idaho Code §39-3607, evaluates the appropriateness of the TMDL to current watershed conditions, evaluates the implementation plan, and consults with the watershed advisory group (WAG). An evaluation of the recommendations presented is provided. Final decisions for TMDL modifications are decided by the Idaho Department of Environmental Quality (DEQ) director. Approval of TMDL modifications is decided by the US Environmental Protection Agency (EPA), with consultation by DEQ.

1.1 Assessment Units

Assessment units (AUs) are groups of similar streams that have similar land use practices, ownership, or land management. Stream order is the main basis for determining AUs—even if ownership and land use change significantly, the AU usually remains the same for the same stream order.

Using AUs to describe water bodies offers many benefits, primarily that all waters of the state are defined consistently. AUs are a subset of water body identification numbers, which allows them to relate directly to the water quality standards.

2 TMDL Review and Status

This document is a 5-year review of the sediment (total suspended solids [TSS]) and total phosphorus (TP) TMDLs contained in the original Brownlee Reservoir subbasin TMDL (DEQ 2003). The five water bodies examined within the Brownlee Reservoir subbasin's Weiser Flat area include Jenkins, Scott, Warm Springs, and Hog Creeks, which drain into the Snake River downstream of the Weiser River inflow and upstream of the reservoir, and Dennett Creek, which drains directly into Brownlee Reservoir (Figure 1). The TMDLs for these creeks were completed in 2003 (Table 1). In 2004, the Idaho Association of Soil Conservation Districts (IASCD), Idaho Soil and Water Conservation Commission (ISWCC), and Weiser River WAG developed the *Weiser Flat TMDL Implementation Plan for Agriculture* (ISWCC 2004).

Escherichia coli (*E. coli*) is §303(d) listed (Category 5 of the Integrated Report [DEQ2014]) for Jenkins, Scott, Warm Springs, Hog, and Rock Creeks, but *E.coli* concentrations will not be included in this review because an *E.coli* TMDL has not been written. A complete list Idaho's subbasin assessments, TMDLs, and implementation plans can be accessed at *deq.idaho.gov/water-quality/surface-water/tmdls/table-of-sbas-tmdls.aspx*.

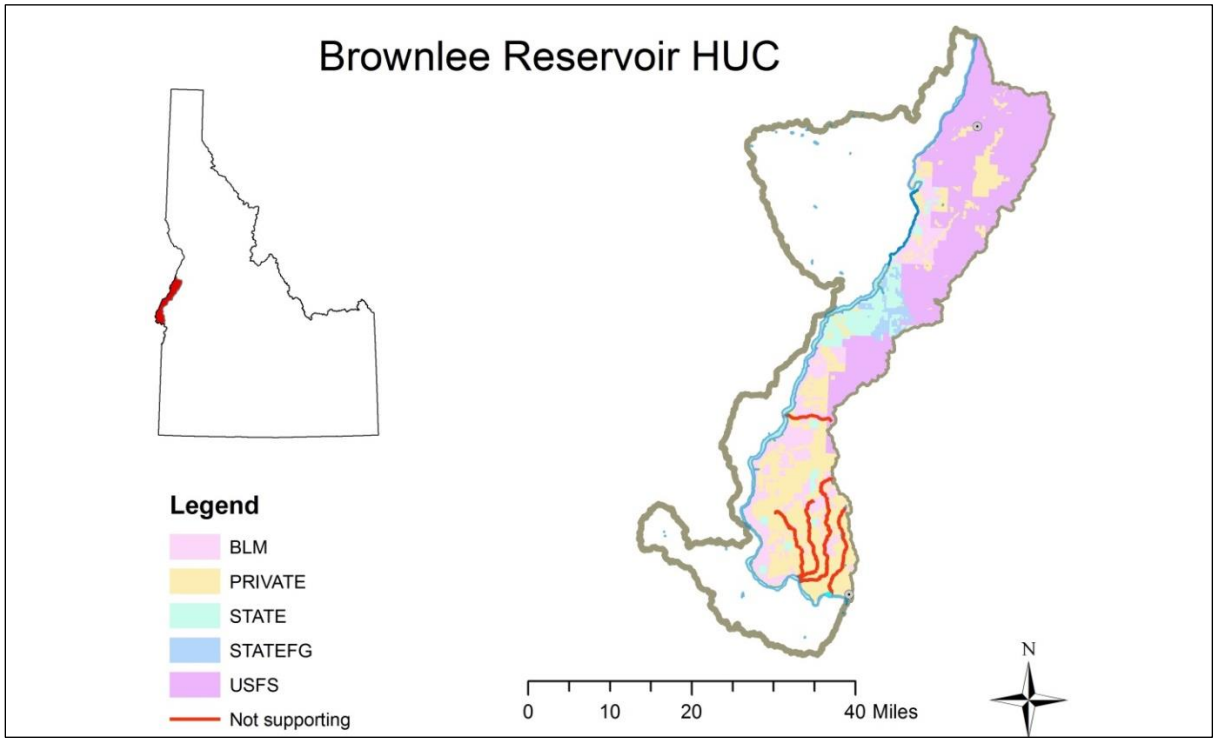


Figure 1. Brownlee Reservoir subbasin location, landownership, and impaired water bodies.

Table 1. Assessment units, pollutants, and TMDL approval status.

Assessment Unit Name	Assessment Unit Number	Pollutant	TMDL Approval Year
Jenkins Creek	ID17050201SW005_02	Sedimentation/ siltation, total phosphorus	2003
Scott Creek—2nd order	ID17050201SW006_02	Sedimentation/ siltation, total phosphorus	2003
Scott Creek—3rd order	ID17050201SW006_03	Sedimentation/ siltation, total phosphorus	2003
Warm Springs Creek—1st and 2nd order	ID17050201SW007_02	Sedimentation/ siltation, total phosphorus	2003
Warm Springs Creek—3rd order	ID17050201SW007_03	Sedimentation/ siltation, total phosphorus	2003
Hog Creek—1st and 2nd order	ID17050201SW008_02	Total phosphorus	2003
Hog Creek—3rd order	ID17050201SW008_03	Total phosphorus	2003
Dennett Creek—1st and 2nd order	ID17050201SW012_02	Sedimentation/ siltation	2003

2.1 Pollutant Targets

To restore full support of designated beneficial uses (Idaho Code §39.3611and 3604), targets were determined for sediment and nutrients based on criteria from the *Snake River – Hells Canyon Total Maximum Daily Load (TMDL)* (SR-HC TMDL) (DEQ/ODEQ 2004). An in-depth discussion of how these targets were derived is included in sections 3.1.1 and 3.1.2 of this document and in sections 3.2 and 3.5 of DEQ/ODEQ (2004).

As summarized in Table 2, the targets are set in the TMDLs for each AU/pollutant combination. The Brownlee Reservoir subbasin TMDL (DEQ 2003) identifies May–September as a critical period for sediment and nutrient targets. Sediment consists of a TSS target, and nutrients consist of a TP target.

Table 2. Water quality targets for Scott, Warm Springs, Hog, and Dennett Creeks.

Pollutant	Selected Target
Sediment	No greater than 50 milligrams per liter (mg/L) total suspended solids as a monthly average and no greater than 80 mg/L total suspended solids for events lasting less than 14 days[a]
Nutrients	No greater than 0.07 mg/L total phosphorus from May through September[b]

a. Narrative target from IDAPA 58.01.02.200.08 and numeric target from DEQ/ODEQ 2004.

b. Narrative target from IDAPA 58.01.02.200.06 and numeric target from DEQ/ODEQ 2004.

TP was used as a target instead of the more biologically available orthophosphorus for the following reasons:

1. TP is a more stable form of phosphorus: orthophosphorus rapidly converts between forms in the water column.
2. TP represents the phosphorus that is currently available for growth as well as that which has the potential to become available over time.

2.2 Control and Monitoring Points

2.2.1 Monitoring Points

Monitoring locations have been jointly used by Idaho State Department of Agriculture and DEQ since the original TMDL. Two monitoring sites were located on each creek; one site is located where the creek enters the Weiser Flat portion of the Brownlee Reservoir subbasin and one site is located at the lowest portion of the creek before the confluence with the Snake River. The downstream monitoring site in each subwatershed was used to determine total loads into the Snake River. At each downstream site, the load allocation was calculated monthly. The upstream site was used to determine the load contribution from background and domestic livestock grazing and dirt roads. Seasonal loads were used to more accurately characterize the load variations and allocate reductions accordingly. The lower watershed's hydrology is largely governed by irrigation activity in summer. The reverse situation also holds true at certain times of the year due to natural conditions.

In 2014, TSS and TP were sampled weekly or biweekly between May and September during spring runoff and the primary irrigation season. Target and existing concentrations were compared to determine the amount of sediment or nutrient reduction needed to bring water bodies into compliance with Idaho's water quality standards (IDAPA 58.01.02). Daily loads for TSS and TP were calculated using streamflow measurements collected during each sampling event at each water body. Sediment, temperature, bacteria, nutrients, dissolved oxygen, pH, and flow data were also collected.

2.2.2 Load Capacity

Load capacity is the maximum load each water body can accommodate and still meet the water quality standards "with season variations and a margin of safety which takes into account any lack of knowledge..." (CWA §303(d)(C)). Likely sources of uncertainty include lack of knowledge of assimilative capacity, uncertain relation of selected target(s) to beneficial use(s) and variability in target measurement. Load capacity for these stream segments was determined by using the target criteria to identify loads per day.

In determining loads, DEQ accounts for natural load and includes a margin of safety (MOS) to address uncertainty that may result from a variety of sources. These loads are iterative, meaning that if further monitoring shows that targets need to be adjusted, those adjustments will be made. Background load will be evaluated on an ongoing basis to ensure adequate characterization.

TP targets apply from May through September only. Monitoring data show that this is the critical period of algae growth and pollutant load and should be the main focus of pollutant reductions. This seasonal target application should result in reducing the majority of anthropogenic load. Sediment targets apply year-round. Load capacities for TSS and TP are identified in section 3.4, Table 15.

2.2.3 Load Allocation

Using the existing data in concert with target concentrations, load allocations were determined for each watershed. Stream segment-specific load allocations were developed by calculating the

load delivered within a specific stream segment as compared to the natural and background loads. The cumulative value of the stream segment-specific TP load allocations is equal to the calculated load capacity as shown in section 3.4, Table 15. The cumulative value of the stream segment-specific TSS load allocations is equal to the calculated load capacity as shown in section 3.4, Table 15 minus a 10% MOS.

2.2.4 Margin of Safety

Although the best available techniques and information are applied, uncertainty arises in the selection of water quality targets, load capacity, and estimates of existing loads, which can be attributed to incomplete knowledge or understanding of the system and incomplete or variable data. MOS is essentially a reduction in load capacity that is identified before allocation to any sources.

Several areas of uncertainty exist that are addressed by applying a MOS. In this 5-year review, storm events may not be captured in the existing data set since it consists of biweekly and monthly measurements. Pollutant loads vary with cropping patterns as well as climactic conditions, and this variability may not be adequately assessed with only 1 year of monitoring data.

The US Geological Survey determined that discrete flow measurements present 10% to 25%degree of error depending on whether depth/width integrated sampling or grab sampling methodologies were used. Analytical error accounts for another 3% to 5% of uncertainty. Using best professional judgement and the above ranges, 10% has been applied as an MOS for this determination. This MOS has been incorporated into identifying the TP targets for this 5-year review; therefore, it is not necessary to include any further MOS in the TP load allocations.

An implicit MOS is incorporated into the SR-HC TMDL (DEQ/ODEQ 2004) sediment targets, as all parameters used to identify these targets were conservative in nature. An additional explicit MOS of 10% has been used to calculate the sediment load allocations.

2.2.5 Seasonal Variation

Seasonal variation within these streams and their respective drainage basins is primarily driven by flow. Snowmelt and spring runoff flows represent the highest flow regimes; late fall and winter flows represent the lowest flow regimes. Pollutant delivery is associated primarily with snowmelt and spring runoff flows (sediment) and irrigation season flows (sediment and nutrients). Irrigation flows generally start in April or early May and continue through October. Therefore, seasonal variation and critical conditions were considered in TMDL development.

2.2.6 Reserve

Identified sources and land uses are predominantly agricultural, with some minor influence from roadways. With the identified trend of conversion from agricultural land uses to urban/suburban or rural development land uses, agricultural sources of pollutants are likely to remain stable or decrease within the implementation lifetime of this TMDL. For this reason, no future pollutant source load allocations (reserve capacity) were calculated.

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 Idaho water bodies, including the Brownlee Reservoir Subbasin (IDAPA 58.01.02140.19), in the water quality standards (IDAPA 58.01.02.110 – 58.01.02.160).

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

3.1 Beneficial Uses

Water quality standards under the CWA consist of three main components: designated beneficial uses, water quality criteria that are established to protect designated beneficial uses, and antidegradation policies and procedures. Water quality criteria can be either numeric limits for individual pollutants and conditions, or narrative descriptions of desired conditions.

Surface water beneficial use classifications are intended to protect surface water uses. DEQ designates beneficial uses for selected water bodies as outlined in IDAPA 58.01.02.140. All surface waters within the state are designated for agricultural and industrial water supply, wildlife habitat, and aesthetics. Waters without specific beneficial use designations are defined as undesignated waters.

IDAPA 58.01.02.101.01 states: "...undesignated waters shall be protected for beneficial uses, which include all recreational use in and on the water and the protection and propagation of fish, shellfish and wildlife wherever attainable." Therefore, in the case where waters are undesignated, DEQ presumes that most waters in Idaho will support cold water aquatic life and, depending on the characteristics of the water body, primary or secondary contact recreation (IDAPA 58.01.02.101.01a). Cold water aquatic life use support determination procedures apply to undesignated, perennial waters to protect these presumptive uses. If an undesignated surface water body is intermittent, numeric criteria still apply during periods of optimal flow (IDAPA 58.01.02.070.06).

Additionally, under the CWA, any uses that existed or were presumed to exist in a water body in November 1975 are required to be protected as existing uses. The designation of existing uses for protection generally applies to segments where beneficial uses are not formally designated.

While the statewide designations of agricultural and industrial water supply, wildlife habitat, and aesthetics apply, no specific use designations have been made for Scott, Warm Springs, Hog, and

Dennett Creeks. These streams are all undesignated waters and are therefore presumed to support cold water aquatic life, propagation of fish, shellfish and wildlife, and primary or secondary contact recreation. Jenkins Creek is designated for cold water aquatic life and primary contact recreation.

Table 3 gives a complete listing of the designated, presumed, and statewide beneficial uses for each listed water body.

Table 3. Beneficial uses of TMDL water bodies

Water Body	Assessment Unit Number	Beneficial Uses	Type of Use
Jenkins Creek—headwaters to the Snake River	ID17050201SW012_02	Cold water aquatic life, primary contact recreation	Designated
Scott Creek—headwaters to the Snake River	ID17050201SW006_02 ID17050201SW006_03	Cold water aquatic life, secondary contact recreation	Presumed
Warm Springs Creek—headwaters to the Snake River	ID17050201SW007_02 ID17050201SW007_03	Cold water aquatic life, secondary contact recreation	Presumed
Hog Creek—headwaters to the Snake River	ID17050201SW008_02 ID17050201SW008_03	Cold water aquatic life, secondary contact recreation	Presumed
Dennett Creek—headwaters to the Snake River	ID17050201SW012_02	Cold water aquatic life, secondary contact recreation	Presumed

Note: All surface waters within the state are designated for agricultural and industrial water supply, wildlife habitat, and aesthetics (IDAPA 58.01.02.100.03–58.01.02.100.05).

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 4 includes the most common numeric criteria used in TMDLs; Figure 2 provides an outline of the stream assessment process for determining support status of the beneficial uses of cold water aquatic life, salmonid spawning, and contact recreation.

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

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

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

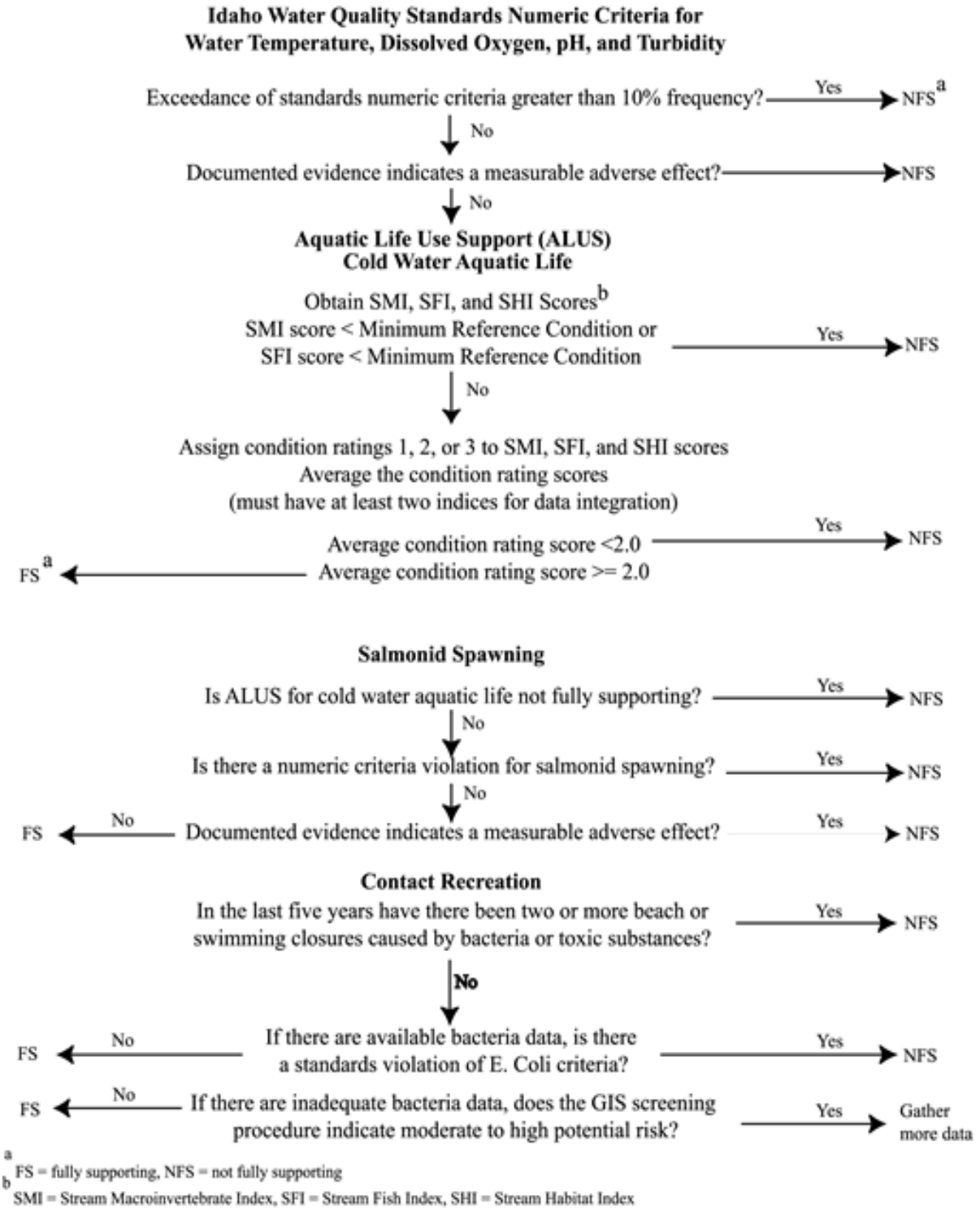


Figure 2. Determination steps and criteria for determining support status of beneficial uses in wadeable streams (Grafe et al. 2002).

3.1.1 Sediment

Scott, Warm Springs, and Hog Creeks are listed for sediment on the 1998 §303(d) list. The water quality standards and guidance values identified for sediment and nutrients are narrative criteria that require a numeric interpretation based on local conditions. The sediment criteria are linked to turbidity, and guidance states that turbidity should be less than 50 nephelometric turbidity units (NTU) above background for any given sample and less than 25 NTU for any 10 consecutive days. This latter criterion was originally developed to address point sources and incorporates mixing zones in the evaluation of violations.

A narrative standard for sediment is appropriate given that wide ranges of sediment and nutrient concentration and duration occur in surface waters. Interpretation of the narrative standard on a site-specific basis is necessary to identify targets that will protect beneficial uses within the listed segment as well as those downstream uses that may be degraded by sediment or nutrient loads carried by inflowing surface waters.

Dennett, Scott, Warm Springs, and Hog Creeks discharge into the Lower Brownlee Reservoir reach of the SR-HC TMDL (ID17050201SW003_08). Jenkins Creek discharges into the Upper Brownlee Reservoir reach of the SR-HC TMDL (ID17050201SW004_08).The designated beneficial uses within these Brownlee Reservoir AUs determined to be most at risk from excess sediment were those associated with aquatic life. Because sediment includes both organic and inorganic materials, direct and indirect impacts to aquatic life are possible.

The sediment numeric targets that are applied in the TMDL were identified to protect and support designated beneficial uses in the SR-HC TMDL Brownlee Reservoir assessment units. The targets were calculated to protect cold water aquatic life, secondary contact recreation, agricultural and industrial water supply, wildlife habitat, and aesthetics. Detailed information on how the sediment targets were identified is provided in the SR-HC TMDL, sections 3.2 and 3.5 (DEQ/ODEQ 2004).

3.1.2 Nutrients

Scott, Warm Springs, and Hog Creeks are listed for nutrients on the 1998 §303(d) list. The water quality standards and guidance values identified for sediment and nutrients are narrative criteria that require a numeric interpretation based on local conditions.

A narrative standard for nutrients is appropriate given that the associated problems (excessive growth, low dissolved oxygen, etc.) can occur under a range of concentrations and are related to system characteristics such as flow, temperature, water-column mixing, light penetration, and water depth. Interpretation of the narrative standard on a site-specific basis is necessary to identify targets that will protect beneficial uses within the listed segment as well as those downstream uses that may be degraded by sediment or nutrient loads carried by inflowing surface waters.

The beneficial uses determined to be most at risk from excess nutrients were those associated with recreation and aquatic life. Dennett, Scott, Warm Springs, and Hog Creeks discharge into the Brownlee Reservoir reach of the SR-HC TMDL (ID17050201SW003_08). Jenkins Creek discharges into the upstream segment of the Brownlee Reservoir reach of the SR-HC TMDL (ID17050201SW004_08).

The nutrients (TP) numeric target that is applied in the TMDL was identified to protect and support designated beneficial uses in the SR-HC TMDL Brownlee Reservoir AUs. The target has been calculated to protect cold water aquatic life, secondary contact recreation, agricultural and industrial water supply, wildlife habitat, and aesthetics.

An instream nutrient target of 0.07 milligrams per liter (mg/L) TP was identified through correlations of TP and algae concentrations, using chlorophyll *a* as a surrogate measure of algae biomass (DEQ/ODEQ 2004). This information was further linked to the public's assessment of water quality specific to recreational and aesthetic use as interpreted from algae concentrations in surface waters. Using literature values for the nutrient concentrations at which discoloration occurred (10 micrograms per liter [µg/L] to 30 µg/L chlorophyll *a*) and alga slimes, which were observed to occur (greater than 30 µg/L chlorophyll *a*), along with data provided from similar determinations completed in other states (chlorophyll *a* threshold concentrations identified in Colorado, New Hampshire, Minnesota, South Carolina, North Dakota, and New Mexico range from less than 50 µg/L to less than 15 µg/L), an estimate was made of the highest level of algae concentration that was acceptable to the general public without curtailing recreational and aesthetic water quality perceptions. This limit was then correlated to TP concentrations that would result in algal concentrations below this level. This information and the methodology used are discussed in the SR-HC TMDL (DEQ/ODEQ 2004).

The critical period for application of this target is from May through September. It is projected that attainment of this and other applicable water quality targets will result in support of beneficial uses within the listed stream segments and will contribute to attainment of beneficial use support in the SR-HC TMDL Brownlee Reservoir AUs.

Due to the findings from the SR-HC TMDL (DEQ/ODEQ 2004), TP has been defined as the nutrient of concern for these creeks. However, as further data are collected, the effects of existing nitrogen concentrations on these streams will be assessed. If nitrogen management is warranted, appropriate load allocations will be identified at that time and incorporated into the implementation planning for management of these tributary streams.

Detailed information on how the nutrient targets were identified is provided in the SR-HC TMDL, sections 3.2 and 3.5 (DEQ/ODEQ 2004).

3.2 Changes to Subbasin Characteristics

Jenkins, Scott, Warm Springs, Hog, and Dennett Creeks are located along the Snake River in Washington County, Idaho. The county, located in southwestern Idaho, is home to approximately 10,021 residents (US Census Bureau 2015). The city of Weiser, with approximately 5,333 residents, is the largest population center in the subbasin (US Census Bureau 2015). Population estimates have remained stable since the initial TMDL was written in 2003.

Land use within the Brownlee Reservoir subbasin, which includes Weiser Flat, is predominantly agricultural with a small amount of forested and urban/suburban acreage (Figure 3). Due to the arid climate, agriculture in this area is heavily dependent on irrigation. Sources of irrigation water include surface water and ground water. Agricultural water use is seasonal, correlating strongly with the summer growing season and reflecting local temperature and precipitation variations. Very little change in land use has occurred since the original TMDL—the majority of

which revolves around herbaceous grassland returning to shrub ecosystems and a smaller amount of herbaceous grassland converted into cropland (Figure 4).

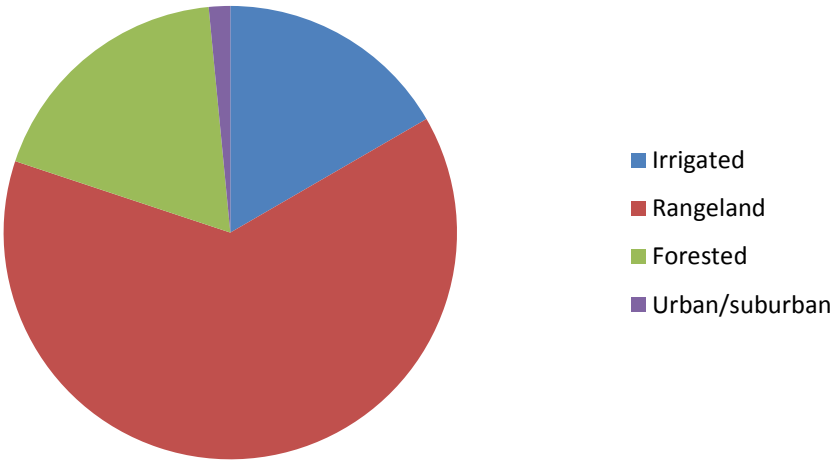


Figure 3. Land use attributes for impaired subwatersheds in the Brownlee Reservoir subbasin.

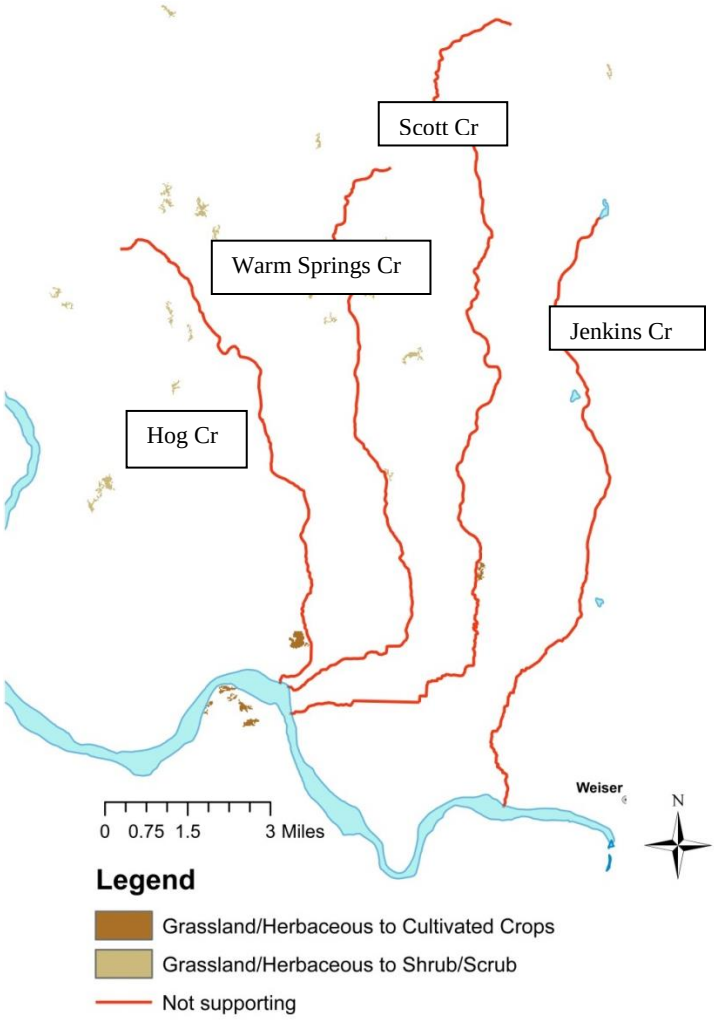


Figure 4. Land use changes between 2001 and 2010 in the Brownlee Reservoir subbasin.

Water quality data collection in the Weiser Flat tributaries of the Brownlee Reservoir subbasin has been sparse since the approval of the TMDL. While it is difficult to ascertain water quality improvement trends given only two datasets, the data can, however, be used to determine if the target is being achieved at any given time. In addition to monitoring compliance with TMDL targets, future data collection should also identify long-term trends in water quality. Future data collection should include 30-day geometric mean data for TMDL target evaluation in addition to monthly samples from approximately April to September. These monthly samples will allow a comparison to pre-TMDL data and identify long-term trends and overall best management practice (BMP) effectiveness. DEQ should also perform occasional synoptic monitoring during the irrigation season to ensure the target is being met during this period.

3.2.1 Jenkins Creek

The Jenkins Creek subwatershed is divided up into rangeland (39.8%) and irrigated land (53.5%). Irrigation occurs primarily in the southern portion of the subwatershed. Crop rotations include sugar beets, onions, alfalfa, and grain crops. Urban/suburban land use in the southeastern portion of the subwatershed represents 6.7% of the total acreage.

3.2.2 Scott Creek

The Scott Creek subwatershed is predominantly rangeland (78.4%) with some irrigated land (21.6%) in the southern portion of the subwatershed. Scott Creek is affected by various activities including agriculture and domestic livestock grazing. Utilization pattern mapping on the US Bureau of Land Management (BLM) allotment showed that most of the land received light to moderate use along Scott Creek (BLM 2001a; BLM 2001b).

3.2.3 Warm Springs Creek

The Warm Springs Creek subwatershed is mostly private land. There is a small section of BLM land in the upper watershed. The subwatershed is predominantly rangeland (91.1%) with a small amount of irrigated land (9.6%) in the southern portion of the subwatershed.

3.2.4 Hog Creek

Hog Creek subwatershed is predominantly rangeland (97.9%) with only a very small portion (2.1%) of irrigated land in the southern portion of the subwatershed. Hog Creek is affected by dirt roads and domestic livestock and wildlife grazing in the upper reach and intensive agricultural activity in the lower reach. Henley Basin Road contributes sediment loads to Hog Creek during rainfall events and spring runoff (BLM 2001a; BLM 2001b).

Beef cattle wintering area of about 150 head exists in the area, but it is fenced off from the creek. There is also a feedlot with a 300 head of cattle capacity, but the potential runoff to the creek is small due to the installation of waste lagoons.

3.2.5 Dennett Creek

Dennett Creek is located in a more remote area than the Weiser Flat streams and has a history of mining activity; domestic livestock grazing is currently the primary anthropogenic activity in the subwatershed. The Dennett Creek subwatershed is split between forested land (51.4%) and rangeland (48.2%) with only a very small portion (0.4%) of irrigated land in the northern portion of the subwatershed. Historically, Dennett Creek was an active mining area but now is mainly used as rangeland. Logging has occurred in the highest elevations of the subwatershed. A dirt road runs along almost the entire length of the main fork of Dennett Creek.

3.3 Summary and Analysis of Current Water Quality Data

3.3.1 Total Suspended Solids

Throughout the sampling period, Dennett Creek showed no exceedance of TSS concentrations in either the upper or lower sites (range of means: 15.0 mg/L to below the detectable limit of 5.0 mg/L (Table 5). All monthly mean and median concentrations are accompanied by standard error (±SE), which is the range of variation of the sampled concentrations per month.

Table 5. Total suspended solids concentrations for Dennett Creek near Brownlee Reservoir, Idaho.

Stream Name	Month	At Confluence with Snake River				Above Primary Grazing (Baseline)			
		Median (mg/L)	± SE	n	Target	Median (mg/L)	± SE	n	Target
Dennett Creek	May	15.0	NA	1	-	5.5	NA	1	-
	June	10.1	1.0	4	-	2.5	0.0	3	-
	July	2.5	0.0	2	-	2.5	0.0	2	-
	August	2.5	0.0	2	-	2.5	0.0	2	-
	September	2.5	0.0	3	-	2.5	0.0	3	-

Notes: milligrams per liter (mg/L); standard error (SE); number of samples (n); not applicable due to too few samples (NA); below target (-); exceeds target (+)

On Weiser Flat, TSS concentrations exceeded the target at the lower sites apart from Hog Creek, but all baseline samples taken above Weiser Flat were below the target (Table 6). Hog Creek contained the lowest concentrations of TSS in comparison with other the creeks (Table 6).

Table 6. Total suspended solid concentrations (mg/L) for creeks on Weiser Flat near Weiser, Idaho.

Stream Name	At Confluence with Snake River				Above Weiser Flat (Baseline)			
	Mean (mg/L)	± SE	n	Target	Mean (mg/L)	± SE	n	Target
Jenkins Creek	35.0	2.0	2	-	15.0	5.0	2	-
	72.5	19.2	4	+	32.8	7.5	4	-
	86.5	23.5	2	+	36.0	8.0	2	-
	68.0	10.7	3	+	29.0	4.6	3	-
	43.0	1.5	3	-	14.3	5.0	3	-
Scott Creek	83.0	9.0	2	+	2.5	0.0	2	-
	52.5	7.9	4	+	2.5	0.0	2	-
	33.0	5.0	2	-	Dry	—	—	—
	68.3	9.9	3	+	Dry	—	—	—
	27.7	0.3	3	-	Dry	—	—	—
Warm Springs Creek	18.5	2.5	2	-	2.5	0.0	2	-
	39.0	9.8	4	-	2.5	0.0	4	-
	53.5	23.5	2	+	2.5	0.0	2	-
	66.3	14.2	3	+	2.5	0.0	3	-
	24.7	2.4	3	-	2.5	0.0	3	-
Hog Creek	16.0	5.0	2	-	Dry	—	—	—
	8.1	1.9	4	-	Dry	—	—	—
	23.5	15.5	2	-	Dry	—	—	—
	12.3	0.3	3	-	Dry	—	—	—
	12.3	1.9	3	-	Dry	—	—	—

Notes: milligrams per liter (mg/L); standard error (SE); number of samples (n); not applicable due to too few samples (NA); below target (-); exceeds target (+).

Weiser Flat contributed the majority of the TSS load delivered by each creek to the Snake River (Table 7). TSS load to the Snake River varied by month and creek. TSS loads generally increased from May until July or August (except Scott Creek, Table 7), with the most TSS delivered to the Snake River in July and August and then decreasing in September (Figure 5). While variable, Jenkins, Scott, and Warm Springs Creeks delivered the largest loads to the Snake River with a minimum of 755 ± 276 pounds per day (lb/day) (Scott Creek in July) and maximum of 9,316 lb/day (Scott Creek in May, Table 7). Hog Creek delivered the least TSS loads, ranging between 75 ±37 lb/day in June to 430 ±155 lb/day in August.

Table 7. Monthly mean total suspended sediment (lb/day) for creeks on Weiser Flat near Weiser, Idaho.

Stream Name	Month	At Confluence with Snake River		Above Weiser Flat (Baseline)	
		Load (lb/day)	± SE	Load (lb/day)	± SE
Jenkins Creek	May	1,280	—	15.8	—
	June	3,598	1,144	143.5	41.7
	July	3,909	1,307	16.0	9.7
	August	2,313	742	5.5	—
	September	1,495	142	7.5	3.5
Scott Creek	May	9,316	—	3.3	—
	June	2,612	739	0.0	—
	July	755	276	Dry	—
	August	5,230	807	Dry	—
	September	1,470	115	Dry	—
Warm Springs Creek	May	1,446	—	1.2	0.1
	June	1,796	639	0.9	0.1
	July	3,552	2,823	0.7	0.0
	August	5,901	1,965	0.5	0.0
	September	2,142	421	0.5	0.0
Hog Creek	May	—	—	—	—
	June	75	37	Dry	—
	July	82	16	Dry	—
	August	430	155	Dry	—
	September	310	15	Dry	—

a. The percentage difference between the baseline and lower sites.
Notes: pounds per day (lb/day); standard error (SE)

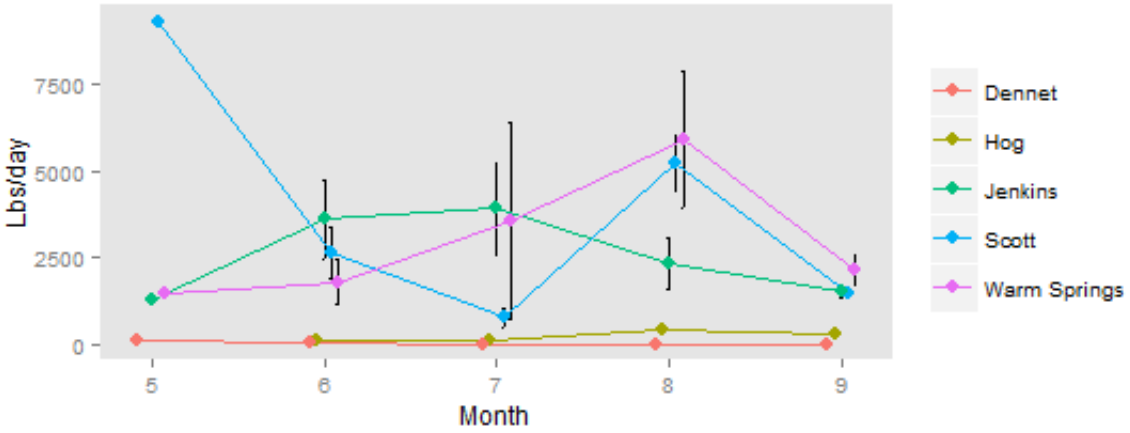


Figure 5. Monthly mean total suspended solid loads (±SE) in pounds per day (lb/day) for creeks on Weiser Flat near Weiser, Idaho.

Hog Creek was naturally dry during the sampling period and almost entirely sourced from Galloway Canal. Galloway Canal contained TSS monthly mean concentrations that ranged from 13.7 ±1.2 mg/L to 67.0 ±33.0 mg/L and were marginally higher than the corresponding monthly TSS concentrations of Hog Creek at the confluence with the Snake River (Table 8). Interestingly, the TSS concentrations at the Galloway Canal/Hog Creek confluence throughout the sampling period were below target and, although a large deviance, only once did TSS concentrations show an exceedance above target (i.e., 100 mg/L on July 9, 2014).

Given these concentrations in combination with flow (cubic feet per second), Galloway Canal delivered between 330 ±103 lb/day to 2,213 ±1,169 lb/day each month of TSS to Hog Creek (Table 8) yet only 75 ± 37 lb/day to 430 ±155 lb/day each month of that amount was delivered to the Snake River (Table 7). This trend is inverse of the other creeks where greater TSS concentrations occurred near the Snake River rather than at the upper site. This opposite trend is likely attributable to the Hog Creek wetland BMP project created at the terminal end of Galloway Canal, which effectively captures sediment and nutrients (section 4.2.4 provides for details on this project).

Table 8. Mean concentration (mg/L) and mean loads (lb/day) of total suspended sediment loads per month at the terminal end of Galloway Canal at Hog Creek on Weiser Flat near Weiser, Idaho.

Stream Name	Month	Mean Concentration (mg/L)	± SE	n	Target	Load (lb/day)	± SE
Galloway Canal (Hog Creek)	May	37.5	6.5	2	-	—	—
	June	15.5	2.2	4	-	330	103
	July	67.0	33.0	2	+	2,213	1,169
	August	30.3	0.9	3	-	1,639	215
	September	13.7	1.2	3	-	566	50

Notes: milligrams per day (mg/L); standard error (SE); number of samples (n); pounds per day (lb/day)

Dennett Creek contributed small TSS loads to the Snake River at Brownlee Reservoir with a minimum 0.01± 0.001 lb/day in August and a maximum of 0.26 lb/day in May (Table 9). In

contrast to the Weiser Flat creeks, TSS loads decreased throughout the season, with the largest loads observed in May and the smallest loads in July, August and September.

Table 9. Total suspended sediment loads (lb/day) for Dennett Creek near Brownlee Reservoir, Idaho.

Stream Name	Month	At Confluence with Snake River		Above Primary Grazing (Baseline)		Difference (%)
		Load (lb/day)	± SE	Load (lb/day)	± SE	
Dennett Creek	May	0.26	—	0.08	—	69.2
	June	0.13	0.03	0.05	0.01	61.5
	July	0.02	0.001	0.001	0.001	100.0
	August	0.01	0.001	0.01	—	0.0
	September	0.01	0.01	0.01	0.001	0.0

Notes: pounds per day (lb/day); standard error (SE)

3.3.2 Total Phosphorus

For each creek, DEQ sampled at the upper portion of the creek before it flowed onto the main agricultural-influenced area of Weiser Flat and then at a lower point at its confluence with the Snake River. Above Weiser Flat, TP concentrations exceeded the 0.07 mg/L monthly median target in all creeks except for upper Scott Creek (Table 10) and Dennett Creek (Table 11). All monthly mean and median concentrations are accompanied by ± standard error (±SE), which is the range of variation of the sampled concentrations per month. Dennett Creek drains into Brownlee Reservoir downstream of all other sampled creeks and is the only sampled creek not located on Weiser Flat. Throughout the sampling period, Dennett Creek showed no exceedance of monthly median TP concentrations in either the upper portion (0.01–0.02 ± 0.00-0.00 mg/L) or the lower portion (0.01–0.03 ± 0.00-0.00 mg/L) of the site (Table 11).

Table 10. Total phosphorus concentrations (mg/L) for creeks on Weiser Flat near Weiser, Idaho.

Stream Name	Month	At Confluence with Snake River				Above Weiser Flat (Baseline)			
		Median (mg/L)	± SE	n	Target	Median (mg/L)	± SE	n	Target
Jenkins Creek	May	0.20	0.00	2	+	0.20	0.05	2	+
	June	0.17	0.06	4	+	0.24	0.01	4	+
	July	0.45	0.02	2	+	0.16	0.02	2	+
	August	0.39	0.08	3	+	0.14	0.01	3	+
	September	0.24	0.04	3	+	0.09	0.00	3	+
Scott Creek	May	0.22	0.02	2	+	0.07	0.01	2	-
	June	0.21	0.04	4	+	0.07	0.01	2	-
	July	0.42	0.02	2	+	Dry	NA	NA	NA
	August	0.39	0.03	3	+	Dry	NA	NA	NA
	September	0.23	0.02	3	+	Dry	NA	NA	NA
Warm Springs Creek	May	0.14	0.02	2	+	0.30	0.05	2	+
	June	0.30	0.04	4	+	0.28	0.01	4	+
	July	0.45	0.02	2	+	0.28	0.02	2	+
	August	0.35	0.02	3	+	0.26	0.01	3	+
	September	0.22	0.01	3	+	0.19	0.02	3	+
Hog Creek	May	0.12	0.00	2	+	Dry	NA	NA	NA
	June	0.22	0.03	4	+	Dry	NA	NA	NA
	July	0.34	0.12	2	+	Dry	NA	NA	NA
	August	0.24	0.01	3	+	Dry	NA	NA	NA
	September	0.21	0.01	3	+	Dry	NA	NA	NA

Notes: milligrams per liter (mg/L); standard error (SE); number of samples (n); exceeds target concentration (+), below target concentration (-).

Table 11. Total phosphorus concentrations (mg/L) for Dennett Creek near Brownlee Reservoir, Idaho.

Stream Name	Month	At Confluence with Snake River				Above Primary Grazing (Baseline)			
		Median (mg/L)	± SE	n	Target	Median (mg/L)	± SE	n	Target
Dennett Creek	May	0.03	—	1	-	0.02	—	1	-
	June	0.03	0.00	4	-	0.02	0.00	3	-
	July	0.02	0.00	2	-	0.02	0.00	2	-
	August	0.01	0.00	2	-	0.01	0.00	2	-
	September	0.01	0.00	3	-	0.01	0.00	3	-

Notes: milligrams per liter (mg/L); standard error (SE); number of samples (n), exceeds target concentration (+), below target concentration (-)

Weiser Flat contributed the majority of the TP load delivered to the Snake River by these creeks (Table 13). Phosphorus loads to the Snake River varied by month and creek. TP loads generally increased from May until August, with the most TP delivered to the Snake River in July and August and then decreasing in September (Figure 6). Hog and Warm Springs Creeks delivered

the least and greatest TP loads, respectively. Hog Creek delivered relatively small loads ranging between 1.7 ± 0.8 lb/day in June to 8.5 ± 3.1 lb/day in August, while Warm Springs Creek delivered the largest loads to the Snake River with a minimum of 10.3 lb/day in May and maximum of 28.8 ± 5.1 lb/day in August (Table 13).

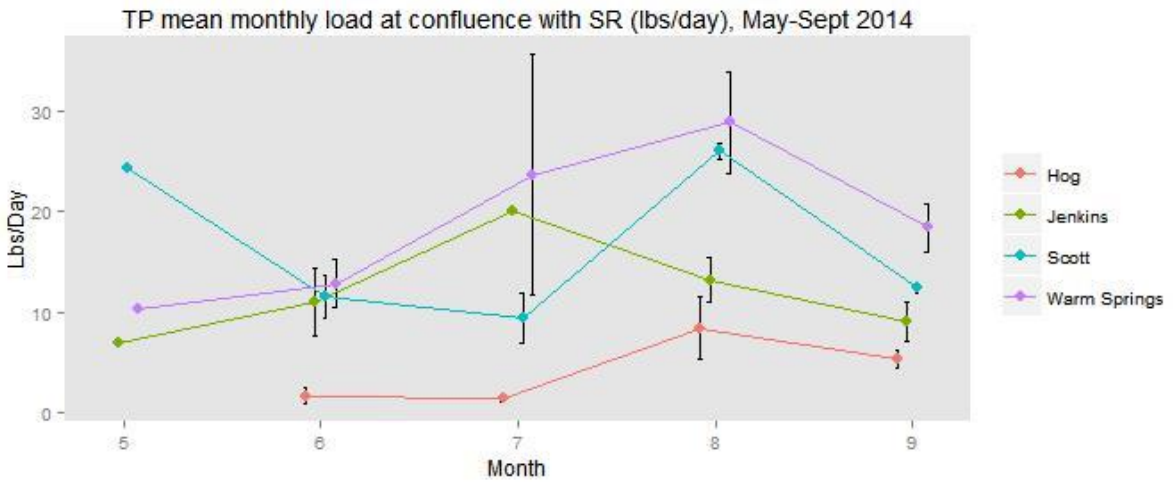


Figure 6. Monthly mean total phosphorus (±SE) in pounds per day (lb/day) for creeks on Weiser Flat near Weiser, Idaho

The upper portion of Hog Creek was dry on the first sampling date (May 19, 2014) leaving Galloway Canal as the primary source of flow to Hog Creek for almost the entire sampling period. DEQ sampled Hog Creek at the confluence of Galloway Canal as it entered Weiser Flat and at the confluence with the Snake River. Galloway Canal contained TP concentrations that ranged from 0.11 ± 0.01 mg/L to 0.36 ±0.03 mg/L and were marginally higher than the corresponding monthly TP concentrations of Hog Creek at the confluence with the Snake River. Given these concentrations in combination with flow (cubic feet per second), Galloway Canal delivered between 2.1 ± 0.3 lb/day to 13.6 ± 1.8lb/day each month of TP to Hog Creek yet only 1.5 ± 0.3 lb/day to 8.5 ± 3.1 lb/day each month of that amount was delivered to the Snake River (Table 12 and Table 13, respectively). This trend is opposite of the other creeks where greater TP concentrations occurred near the Snake River rather than at the site above Weiser Flat. This opposite trend is likely attributable to the Hog Creek wetland BMP project created at the terminal end of Galloway Canal, which effectively captures sediment and nutrients (section 4.2.4 provides details on this project).

Table 12. Mean concentration (mg/L) and mean loads (lb/day) of total phosphorus per month at the terminal end of Galloway Canal at Hog Creek on Weiser Flat near Weiser, Idaho.

Stream Name	Month	Mean Concentration (mg/L)	± SE	n	Target	Load (lb/day)	± SE
Galloway Canal (Hog Creek)	May	0.14	0.04	2	+	—	—
	June	0.11	0.01	4	+	2.12	0.25
	July	0.36	0.03	2	+	11.66	1.53
	August	0.25	0.01	3	+	13.62	1.83
	September	0.19	0.01	3	+	7.77	0.70

Notes: milligrams per day (mg/L); standard error (SE); number of samples (n); pounds per day (lb/day)

Table 13. Monthly mean total phosphorus loads (lb/day) for creeks on Weiser Flat near Weiser, Idaho.

Stream Name	Month	At Confluence with Snake River		Above Weiser Flat (Baseline)	
		Load (lb/day)	± SE	Load (lb/day)	± SE
Jenkins Creek	May	6.92		0.22	—
	June	11.05	3.37	1.06	0.19
	July	20.11	0.28	0.07	0.04
	August	13.25	2.20	0.03	—
	September	9.07	2.00	0.04	0.00
Scott Creek	May	24.30	—	0.10	—
	June	11.50	2.13	0.00	—
	July	9.47	2.46	0.00	—
	August	26.01	0.74	0.00	—
	September	12.45	0.52	0.00	—
Warm Springs Creek	May	10.33	—	0.14	0.01
	June	12.88	2.34	0.10	0.01
	July	23.63	11.97	0.07	0.01
	August	28.82	5.06	0.05	0.00
	September	18.42	2.37	0.04	0.00
Hog Creek	May	—	—	—	—
	June	1.72	0.83	Dry	—
	July	1.48	0.34	Dry	—
	August	8.47	3.09	Dry	—
	September	5.33	0.87	Dry	—

a. The percentage difference between the upper and lower sites, and therefore, attributable to Weiser Flat.
Notes: pounds per day (lb/day); standard error (SE)

Dennett Creek contributed small TP loads to the Snake River at Brownlee Reservoir with a minimum 0.01± 0.001 lb/day in August and a maximum of 0.26 lb/day in May (Table 14). In contrast to the Weiser Flat creeks, TP loads decreased throughout the season, with the largest loads observed in May and the smallest loads in July, August, and September.

Table 14. Monthly mean total phosphorus loads for Dennett Creek near Brownlee Reservoir, Idaho.

Stream Name	Month	At Confluence with Snake River		Above Primary Grazing (Baseline)	
		Load (lb/day)	± SE	Load (lb/day)	± SE
Dennett Creek	May	0.26	—	0.08	—
	June	0.13	0.03	0.05	0.01
	July	0.02	0.00	0.00	0.00
	August	0.01	0.001	0.01	—
	September	0.01	0.01	0.01	0.00

a. The percentage difference between the upper and lower sites.
Notes: pounds per day (lb/day); standard error (SE)

3.4 Overall Pollutant Load Allocation and Capacity

TP loads exceed load capacity in all impaired creeks and need to be reduced by 54%–90% (Table 15). TSS load in Dennett Creek is below criteria and no reduction (0%) is needed (Table 15). However, TSS loads in Jenkins, Scott, and Warm Springs Creeks exceed load capacity and need to be reduced by 43%–67% (Table 15).

Table 15. Sediment and total phosphorus load allocations and capacities for impaired creeks in Weiser Flat.

Assessment Unit Name	Assessment Unit Number	Pollutant	Load Allocation (lb/day)[a]	±SE	Load Capacity (lb/day)[b]	±SE	Reduction Required (lb/day)	Percent Reduction (%)
Jenkins Creek—headwaters to mouth	ID17050201SW005_02	TSS	2,613	320	867	285	1,746	67
		TP	12.2	1.4	1.2	0.4	11.0	90
Scott Creek—headwaters to mouth	ID17050201SW006_02 ID17050201SW006_03	TSS	3,877	1,039	1,493	585	2,383	61
		TP	16.8	2.3	2.1	0.8	14.7	88
Warm Springs Creek—headwaters to mouth	ID17050201SW007_02 ID17050201SW007_03	TSS	2,967	544	1,687	587	1,280	43
		TP	18.8	2.3	2.4	0.8	16.5	87
Hog Creek—headwaters to mouth	ID17050201SW008_02 ID17050201SW008_03	TP	4.3	1.1	2.0	0.4	2.3	54
Dennett Creek—headwaters to mouth	ID17050201SW012_02	TSS	34	15	112	38	0	0

a. Load capacity is the target concentration (milligrams per liter) incorporating the margin of safety, multiplied by mean flow and a conversion constant of 5.39 during the critical period (May–September).
b. Load allocation is sampled concentration (milligrams per liter) incorporating the margin of safety, multiplied by mean flow and a conversion constant of 5.39 during the critical period (May–September).
Notes: total suspended solids (TSS); total phosphorus (TP); pounds per day (lb/day)

3.5 Beneficial Use Recommendations

TSS concentrations in the downstream segments of Jenkins, Scott, and Warm Springs Creeks exceed sediment targets, and sediment reductions will be necessary for these streams. DEQ's data show that TSS in Dennett Creek is substantially below target (Table 5 and Table 15), and DEQ recommends §303(d) delisting.

TP concentrations in Jenkins, Scott, Warm Springs, and Hog Creeks are substantially greater than the target value for the SR-HC TMDL (DEQ/ODEQ 2004); TP reductions continue to be necessary for these streams to protect water quality downstream (Table 15).

Past and current *E.coli* data indicate that the beneficial uses of primary and secondary contact are not supported in Jenkins, Scott, Warm Springs, and Hog Creeks. *E. coli* data are not discussed in this 5-year review but will be assessed in a separate TMDL.

Continued monitoring is necessary to ensure that the characterization of these watersheds is complete. Available information for cold water aquatic life use is limited and largely unknown. As such, support of cold water aquatic life uses cannot be determined specific to sediment and nutrient concentrations. Interpretation of data available for sediment and nutrients is therefore tied to the attainment of full support of downstream waters (SR-HC TMDL) shown to be impaired due to excessive sediment and nutrient loads. To reduce degradation to downstream waters, the targets for TSS and TP for the SR-HC TMDL (DEQ/ODEQ 2004) must be met in discharging waters (Table 2).

Elevated concentrations of sediment (Jenkins, Scott, and Warm Springs Creeks) and TP (Jenkins, Scott, Warm Springs, and Hog Creeks) contribute to impairment of downstream waters in the Snake River. Continuing to reduce TSS and TP loads by managing agricultural practices and livestock will have the greatest impact towards attaining beneficial uses.

4 Review of Implementation Plan and Activities

The *Weiser Flat TMDL Implementation Plan for Agriculture* (ISWCC 2004) was developed for DEQ by IASCD in cooperation with ISWCC, Weiser River Soil Conservation District, and Weiser River WAG. The implementation plan provides guidance for the Weiser River Soil Conservation District.

The implementation plan divides the watershed into seven sections for implementation.

1. Hog Creek subwatershed
2. Warm Springs Creek subwatershed
3. Scott Creek subwatershed
4. Jenkins Creek subwatershed
5. Snake River Tributaries subwatershed
6. Galloway Canal subwatershed
7. Storage Ponds subwatershed

The plan prioritizes critical areas within each section for BMP implementation. Prioritization is based on tiering. Tier 1 lands are of immediate concern and have the highest impact on water quality due to their proximity to surface water. Tier 2 lands are not directly adjacent to surface water, while Tier 3 lands are generally upland with no surface water connection and are low priority. The implementation plan loosely sets goals for these tiered lands in each watershed section. DEQ recommends that the implementation plan be updated to include AUs.

In general, the implementation plan suggests the implementing BMPs that address four main topics:

- Irrigation-induced erosion
- Irrigation tailwater delivery to receiving water bodies
- Lack of adequate vegetation adjacent to waterways necessary for reducing sediment, nutrients, and pathogens from runoff
- Animal feedlots in and adjacent to waterways delivering excess sediment, bacteria, and nutrients

The implementation plan provides three sets of BMPs that were determined the most useful for improving water quality in the Weiser Flat creeks. The BMP sets cover a broad range of possible activities such as filter strips, sprinkler irrigation systems, and fencing (list available in ISWCC 2004).

Hog Creek Subwatershed

The majority of the watershed includes agricultural acreage in Tier 1 critical areas (proximity to the mouth of Hog Creek near the Snake River or adjacent to the creek itself). The implementation plan did not identify any specific goals or targets for Hog Creek but suggested ongoing monitoring of the then proposed wetland construction at the confluence of Galloway Canal with Hog Creek.

Warm Springs Creek Subwatershed

The majority of the watershed includes agricultural acreage in Tier 1 and Tier 2 critical areas. The implementation plan did not identify any specific goals or targets for Warm Springs Creek. BMPs will be site-specific and initial efforts focused on identifying willing landowners.

Scott Creek Subwatershed

The majority of the watershed includes agricultural acreage in Tier 1 and Tier 2 critical areas. The implementation plan did not identify any specific goals or targets for Scott Creek. BMPs will be site-specific and initial efforts focused on identifying willing landowners.

Jenkins Creek Subwatershed

The majority of the watershed includes agricultural acreage in Tier 1 and Tier 2 critical areas. The implementation plan did not identify any specific goals or targets for Jenkins Creek. BMPs will be site-specific and initial efforts focused on identifying willing landowners.

Snake River Tributaries Subwatershed

The majority of the watershed includes agricultural acreage in Tier 3 and Tier 2 critical areas. The implementation plan did not identify any specific goals or targets for the Snake River tributaries. BMPs will be site-specific and initial efforts focused on identifying willing landowners.

Galloway Canal Subwatershed

Since all wastewater from acreage within the Galloway Canal subwatershed is reused once it reaches the canal, all surface-irrigated land within the subwatershed is categorized as Tier 3. The implementation plan did not identify any specific goals or targets for Galloway Canal. BMPs will be site-specific and initial efforts focused on identifying willing landowners.

Storage Ponds Subwatershed

Since all wastewater from acreage within the Storage Ponds subwatershed drains into the two irrigation storage ponds on Jenkins Creek Road north of Olds Ferry Road, all surface-irrigated land within the subwatershed is categorized as Tier 3. BMPs will be site-specific and initial efforts focused on identifying willing landowners.

4.1 Planned Activities

The Weiser River Soil Conservation District applied for land treatments to four programs that provide sources of funding for cost-share assistance within the Weiser Flat watershed. BMPs included improved irrigation systems, sediment and nutrient control systems, and management practices. The current sources of funding include the Environmental Quality Incentives Program administered by Natural Resources Conservation Service (NRCS), a §319 grant administered by DEQ, a Water Quality Program for Agriculture cost-share project administered by ISWCC, and a PL-566 Small Watershed project administered by NRCS. At the time the implementation plan was written, all sources of funding were applied for and secured by the Weiser River Soil Conservation District to address identified surface water and ground water concerns near the Weiser River. The implementation plan states that individual participants will be responsible for installing the BMPs scheduled within their contract as planned in their conservation plan.

At the time of the implementation plan, the Weiser Irrigation District currently had a number of wetlands systems under development along the Snake River within Weiser Flat. The irrigation district has formed an agreement with the Weiser River Soil Conservation District, Idaho Department of Fish and Game, City of Weiser, NRCS, Idaho Power, Ducks Unlimited, and local landowners to construct and maintain pond/wetland systems in at least five different locations in the Weiser Flat. Ongoing and planned locations for the constructed wetland systems include Galloway Canal at Hog Creek, Scott Creek near the Snake River, and Jenkins Creek near the Snake River.

4.2 Accomplished Activities

Multiple land treatments to benefit water quality have occurred since the origin of the TMDL and associated implementation plan; both are from DEQ §319-funded projects and other NRCS-approved projects. Weiser Irrigation District and individual irrigators have made improvements in irrigation infrastructure and installed several BMPs. DEQ has provided §319 funding for a number of projects resulting in water quality improvements. DEQ has also provided funding for ground water improvement projects with ancillary surface water benefits that have reduced sediment and nutrients. These projects have realized a net reduction on the pollutants reaching surface water.

4.2.1 Weiser Irrigation Automated Head Gate Project (2014)

Automatic headgates were installed on the Galloway Canal at the Weiser River diversion dam and at the entrance of Galloway Canal to Jenkins, Monroe, and Warm Springs Creeks. Prior to automation, diversions were created by flashboards. Automating headgates allows for more accurate accounting of water consumption from the Weiser River and nearly eliminate excess water in the irrigation delivery and return drains systems. The headgates reduce the amount of pollutants loads going into the Snake River. Load reduction estimates for sediment are 531 tons/year (Jenkins Creek), 69 tons/year (Monroe Creek), 937 tons/year (Galloway Canal), and 520 tons/year (Warm Springs Creek). Load reduction estimates for TP are 3,200 lb/year (Jenkins Creek), 765 lb/year (Monroe Creek), 9,630 lb/year (Galloway Canal), and 2,568 lb/year (Warm Springs Creek).

4.2.2 Weiser Water Quality Protection Project: Phases II-III (2003–2010)

The primary focus of this project was to reduce nitrates in ground water but with ancillary impacts of phosphorus load reduction in surface water. Landowners volunteered to include fertilizer demonstration plots on their land. Demonstration plots were fertilized according to state standards (180 lb/acre) and current average application (300–400 lb/acre). Working with local landowners and producers in the Weiser area was of primary interest.

4.2.3 Phase III Weiser Flat Wetland Project (2014–current)

The Weiser Flat Wetland Project is a multiphase project that includes constructing the Galloway-Warm Springs and Smith-Hemenway wetlands (current) complimented by landowners sprinkling with water stored in the wetland. Pollutant load reductions of 60%–70% are projected.

4.2.4 Weiser Flat Hog Creek Wetland (2004)

This project involves completing the third of a series of wetlands and settling basins. Weiser Irrigation District created these wetlands to aid in implementing the Weiser Flat TMDL, reduce pollutant loads from the Galloway Canal, and create wetland wildlife habitat. The final phase of the project created a 10-acre artificial wetland along a 3,300-foot reach of Hog Creek, just before its confluence the Snake River. Phosphorus load reduction estimates are 10,250 lb/year. Sediment load reduction estimates are 7,687 tons/year. This wetland in particular has improved sediment and phosphorus loads in Hog Creek (Table 8).

4.2.5 Scott and Mann Creeks Implementation (2001–2006)

The Weiser River Soil Conservation District was awarded a §319 grant to implement BMPs to reduce nitrogen loads to the ground water. The project area has been degraded by nutrients, potentially coliform bacteria, surface and stormwater runoff, and nitrogen leachate from septic systems. The goal of this project was to reduce levels of nitrate in the ground water; however, the activities also likely improved local surface water quality.

New septic systems in the nitrate priority area are permitted only in the top 2 feet of soil for maximum nitrate uptake (where applicable, replacement septic systems are also permitted so drainfields are kept in the top 2 feet of soil).

4.2.6 Additional Best Management Practices

In addition to the §319 projects, the ISWCC and local landowners have been installing NRCS BMPs. The ISWCC provided detailed data on BMPs that were installed in the subbasin from 2003–2014. (Table 16–Table 19).

Table 16. Best management practices for Jenkins Creek subwatershed (2003–2014[a]).

Best Management Practice	2006	2007	2008	2009	2011	2012	2013	2014	Total
	Acres								
Aboveground, multioutlet pipeline	—	—	—	—	73	—	—	—	73
Conservation completion incentive first year	—	49	—	—	—	—	—	—	49
Forage and biomass planting	—	—	49	—	—	—	—	—	49
Forage harvest management	—	—	49	—	—	—	—	—	49
Herbaceous weed control	—	—	—	—	—	15,619	7,809	7,809	31,238
Integrated pest management	—	—	49	—	—	12,167	6,084	—	18,300
Irrigation land leveling	—	—	—	—	24	—	—	—	24
Microirrigation system	—	—	25	—	—	—	—	—	25
Surface and subsurface irrigation System	—	—	—	—	49	—	—	—	49
Irrigation water conveyance, pipeline, high-pressure, underground, plastic	27	—	—	—	—	—	—	—	27
Irrigation water conveyance, pipeline, low-pressure, underground, plastic	—	—	—	—	96	—	—	—	96
Irrigation water conveyance, pipeline, steel	8	—	—	—	24	—	—	—	31
Irrigation water management	49	—	—	53	—	—	—	—	102
Livestock pipeline	—	—	—	—	—	—	—	2,705	2,705
Nutrient management	—		49	53	—	—	—	—	102
Prescribed grazing	—	3,275	—	—	—	—	—	—	3,275
Range planting	—	—	—	—	—	1,859	—	1,158	3,017
Spring development	—	—	—	—	—	—	—	1,353	1,353
Sprinkler system	49	—	—	—	—	—	—	—	49
Structure for water control	10	—	—	—	24	—	—	—	34
Upland wildlife habitat management	—	—	10	—	—	16,643	14,405	—	31,058
Watering facility	—	—	—	—	—	—	—	1,353	1,353
Windbreak/shelterbelt establishment	—	—	10	—	—	—	—	—	10
Total	143	3,324	242	105	289	46,288	28,298	14,378	93,068

a. This table shows only the years in which best management practices were implemented between 2003 and 2014.

Table 17. Best management practices for Scott Creek subwatershed (2003–2014[a]).

Best Management Practice	2003	2004	2005	2009	2010	2011	2012	2013	2014	Total
	Acres									
Conservation crop rotation	—	38	—	—	—	—	—	—	—	38
Forage and biomass planting	23	—	—	—	—	—	—	—	—	23
Forage harvest management	36	—	38	—	—	—	—	—	—	74
Integrated pest management	—	36	38	—	—	—	—	—	—	74
Irrigation pipeline	—	—	—	—	—	—	100	—	—	100
Microirrigation system	—	—	—	—	32	—	15	—	—	47
Irrigation water conveyance	—	—	—	—	—	—	14	—	—	14
Irrigation water conveyance, corrugated metal pipeline	—	—	—	19	—	—	14	—	—	32
Irrigation water conveyance, pipeline, high-pressure, underground, plastic	23	—	—	37	—	—	—	—	—	60
Irrigation water management	—	36	38	—	—	19	—	90	59	257
Nutrient management	—	—	—	—	—	19	—	61	59	138
Pumping plant	23	—	—	—	—	—	76	—	—	99
Residue management, mulch till	—	23	—	—	—	—	—	—	—	23
Sprinkler system	36	—	38	19	—	—	218	—	—	311
Water control structure	23	—	—	19	—	—	14	—	—	55
Total	164	134	152	94	32	37	450	150	118	1,346

a. This table shows only the years in which best management practices were implemented between 2003 and 2014.

Table 18. Best management practices for Warm Springs Creek subwatershed (2003–2014[a]).

Best Management Practice	2005	2007	2012	2013	2015	Total
	Acres					
Conservation completion incentive first year	—	107	—	—	—	107
Conservation cover	—	—	399	—	—	399
Conservation crop rotation	46	—	—	—	—	46
Forage harvest management	46	—	—	—	—	46
Integrated pest management	46	107	—	—	—	153
Microirrigation system	—	—	31	—	—	31
Surface and subsurface irrigation system	46	—	—	—	—	46
Irrigation water conveyance, pipeline, high-pressure, underground, plastic	10	—	—	—	—	10
Irrigation water conveyance, pipeline, low-pressure, underground, plastic	6	49	—	—	—	54
Irrigation water conveyance, pipeline, rigid gated pipeline	—	156	—	—	—	156
Irrigation water conveyance, pipeline, steel	—	103	—	—	—	103
Irrigation water management	46	—	—	62	31	139
Prescribed grazing	—	4,808	—	—	—	4,808
Structure for water control	—	151	—	—	—	151
Total	245	5,482	430	62	31	6,250

a. This table shows only the years in which best management practices were implemented between 2003 and 2014.

Table 19. Best management practices for Hog Creek subwatershed (2003–2014[a]).

Best Management Practice	2007	2011	2013	Total
	Acres			
Integrated pest management	—	—	12,358	12,358
Livestock pipeline	—	37,073	—	37,073
Prescribed grazing	1,264	—	—	1,264
Spring development	—	24,715	—	24,715
Watering facility	—	49,430	—	49,430
Total	1,264	111,218	12,358	124,839

a. This table shows only the years in which best management practices were implemented between 2003 and 2014.

4.3 Future Strategy

The current water quality monitoring has provided insight into the status of water quality in relation to the TMDL targets. Future TSS and TP monitoring should occur annually during the critical time period at the locations described in this 5-year review. Perhaps the biggest gap lies in private land access required to conduct beneficial use monitoring. Beneficial use monitoring is critical if DEQ is to evaluate the successes and shortcomings of the current TMDL. Without beneficial use monitoring, DEQ will not be able show if water quality has improved sufficiently to support beneficial uses and meet water quality standards. DEQ should work with the WAG to find landowners who are willing to allow access for this monitoring over the next few years.

4.4 Planned Time Frame

Aside from Dennett Creek, water quality data suggest that water quality conditions are not yet showing measurable improvements in these AUs. The impacts of recent projects are likely to start having a detectable reduction in pollutant delivery to the Snake River over the next several years. It is expected that the creeks in the Brownlee Reservoir subbasin should be meeting the TMDL within 10 years and supporting beneficial within a reasonable period after the TMDL is met. If this is not the case, the TMDL targets may have to be revised.

5 Summary of Five-Year Review

5.1 Review Process

The NRCS and Weiser River Soil Conservation District have been extremely proactive in improving water quality within the Brownlee Reservoir subbasin. The Weiser River Soil Conservation District consults with the Weiser River WAG, and through this process, on April 30, 2015, the Weiser River WAG was invited to review this 5-year review within a 1-month period and provide input and additional information. For this 5-year review, the primary data sources were NRCS, Weiser River Soil Conservation District, and DEQ. ISWCC provided data on load reductions related to implementation projects, and NRCS and ISWCC provided information on installed BMPs. The Weiser River WAG also provided valuable insight into the status of the TMDL, ongoing water quality issues, and areas of improvement.

5.2 Changes in Subbasin

No major changes in land use, land conversion, or new industry, point sources, or nonpoint sources have occurred in the subbasin, and according to the local landowners, land use in regards to these activities remains relatively stable.

5.3 TMDL Analysis

The original sediment TMDL target may need to be revised if future data analysis suggests beneficial uses are not being supported. Before this occurs, targeted effort must occur to assess the status of beneficial uses in all of the listed AUs to which the TMDL applies. At this point, the

data are too sparse when assessing cold water aquatic life. Significant data must be collected to define the status of fish populations on Weiser Flat portion of the Brownlee Reservoir subbasin. Ideally, Beneficial Use Reconnaissance Program sites could be established within each AU; however, at a minimum, both fish and macroinvertebrate data should be collected at multiple locations in each AU.

DEQ recommends assessing the potential to move Dennett Creek (ID17050201SW012_02) into Category 2 (Table 20).

Table 20. Summary of recommended changes for AUs reviewed.

Assessment Unit Name	Assessment Unit Number	Pollutant	TMDL Approval Year	Recommended Changes to Next Integrated Report	Justification
Jenkins Creek	ID17050201SW005_02	Total phosphorus, sedimentation/ siltation	2003	Remain in Category 4a	Excess total phosphorus concentration
Scott Creek—2nd order	ID17050201SW006_02	Total phosphorus, sedimentation/ siltation	2003	Remain in Category 4a	Excess total phosphorus concentration
Scott Creek—3rd order	ID17050201SW006_03	Total phosphorus, sedimentation/ siltation	2003	Remain in Category 4a	Excess total phosphorus concentration
Warm Springs Creek—1st and 2nd order	ID17050201SW007_02	Total phosphorus, sedimentation/ siltation	2003	Remain in Category 4a	Excess total phosphorus concentration
Warm Springs Creek—3rd order	ID17050201SW007_03	Total phosphorus, sedimentation/ siltation	2003	Remain in Category 4a	Excess total phosphorus and sediment concentration
Hog Creek—1st and 2nd order	ID17050201SW008_02	Total phosphorus	2003	Remain in Category 4a	Excess total phosphorus concentration
Hog Creek—3rd order	ID17050201SW008_03	Total phosphorus	2003	Remain in Category 4a	Excess total phosphorus concentration
Dennett Creek—1st and 2nd order	ID17050201SW012_02	Sedimentation/ siltation	2003	Assess potential to move to Category 2	Meets sediment concentration target

5.4 Review of Beneficial Uses

A thorough review of beneficial use support is difficult because the data are lacking to support such an analysis; future data collection should be targeted to assess beneficial uses in conjunction with the TMDL.

5.5 Water Quality Criteria

Water quality criteria related to the TSS and TP TMDLs have remained unchanged. While the TMDL has been implemented, little improvement in water quality has occurred. Aside from Dennett Creek, sediment and nutrients criteria are not currently being met in these AUs (Table

20). Improvements are expected as BMPs continue to be implemented, and large-scale water quality improvement projects are planned, but this is contingent upon receiving §319 funding.

5.6 Watershed Advisory Group Consultation

The Weiser River WAG reviewed this 5-year review for a 1-month period starting April 30, 2015 to provide input and additional information. The WAG provided clarity on appropriate acronyms and titles for entities involved in this document. These recommendations were incorporated into the final document.

The WAG has been proactive in working to improve water quality within the Brownlee Reservoir subbasin. After reviewing the 5-year review, the WAG provided information on additional BMPs yet to be implemented that would likely have the most impact on improving beneficial uses in these impaired waters, including sediment pond and wetland construction on and near Galloway Canal. Lastly, the Weiser Flat TMDL Implementation Plan for Agriculture was recently revised in 2014.

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