Hatwai Creek Subbasin

TMDL Five-Year Review

Hydrologic Unit Code 17060306

State of Idaho
Department of Environmental Quality
March 2019

Acknowledgments

DEQ thanks the Hatwai Creek Watershed Advisory group for their input. DEQ also thanks Roy and Mary Busch and Robert Schwenne for granting property access, and the Nez Perce Soil and Water Conservation District for providing the METER sensor and data logger installed in Hatwai Creek.

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Printed on recycled paper, DEQ, January 2019, PID 5YST, CA code 22066. Costs associated with this publication are available from the State of Idaho Department of Environmental Quality in accordance with Section 60-202, Idaho Code.

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Abbreviations, Acronyms, and Symbols

067_02	assessment unit ID17060306CL067_02 (tributaries)
067_03	assessment unit ID17060306CL067_03 (third order main stem)
§303(d)	refers to section 303 subsection (d) of the Clean Water Act, or a list of impaired water bodies required by this section
§	section (usually a section of federal or state rules or statutes)
AU	assessment unit
BMP	best management practice
BURP	Beneficial Use Reconnaissance Program
CFR	Code of Federal Regulations (refers to citations in the federal administrative rules)
cfs	cubic feet per second
cfu	colony forming unit
CWA	Clean Water Act
DEQ	Idaho Department of Environmental Quality
DO	dissolved oxygen
E. coli	*Escherichia coli*
EPA	United States Environmental Protection Agency
GIS	geographic information system
HUC	hydrologic unit code
lb	pound
IDAPA	Refers to citations of Idaho administrative rules
IDFG	Idaho Department of Fish and Game
L	liter
mg	milligram
mL	milliliter
MOS	margin of safety
mpn	most probable number
MSL	mean sea level
NO_3+NO_2-N	nitrate plus nitrite nitrogen
NPSWCD	Nez Perce Soil and Water Conservation District
NRCS	Natural Resources Conservation Service
TMDL	total maximum daily load

TP	total phosphorus
TN	total nitrogen
USDA	US Department of Agriculture
WAG	watershed advisory group

Executive Summary

This document presents a 5-year review of the Hatwai Creek subbasin assessment and total maximum daily loads (TMDLs) (DEQ 2010). It addresses water bodies in the subbasin that are in Category 4a of *Idaho's 2014 Integrated Report* (DEQ 2017). This review complies with Idaho Code §39-3611(7) and describes current water quality status, pollutant sources, and recent pollution control efforts in the subbasin.

Subbasin at a Glance

The Hatwai Creek subbasin is a 32-square mile watershed located in Nez Perce County, Idaho. Hatwai Creek is a tributary of the Clearwater River (Figure A). Its headwaters begin in the rolling cropland of the Palouse at an elevation of approximately 2,900 feet above mean sea level (MSL). Hatwai Creek tributaries flow through a steep canyon and ranchland where they converge and become a 3rd-order stream. At its mouth, Hatwai Creek flows through a culvert under US Highway 95 and converges with the Clearwater River at an elevation of 788 feet above MSL.

Land uses in the watershed include dryland agriculture, ranching, and rural residences. The watershed area is 66% agricultural land and less than 1% is covered by an impervious surface (USGS 2017). Anadromous Rainbow Trout (steelhead) spawn in Hatwai Creek (NPSWCD 2014; Joe DuPont, Idaho Department of Fish and Game, personal communication, August 28, 2018). The creek is also an important historical fishery for the Nez Perce Tribe. The eastern portion of the watershed lies within the Nez Perce Reservation boundary (Figure A). The *Hatwai Creek Subbasin Assessment and TMDLs (Lower Clearwater HUC 17060306)* (DEQ 2010) provides a detailed watershed description.

In 1989, the Idaho Department of Health and Welfare, Division of Environmental Quality, identified Hatwai Creek as impaired by nutrients, bacteria, temperature, and habitat modifications (IDHW 1989). In 1994, the United States Environmental Protection Agency (EPA) placed Hatwai Creek on Idaho's §303(d) list, a biannual list of impaired state waters required by Clean Water Act (CWA) section 303(d). Idaho's 1994 §303(d) list was created by EPA under a court order (EPA 1994) (Appendix A provides Hatwai Creek's §303(d) listing history). For waters identified Idaho's §303(d) list, states must develop pollution load limits, or TMDLs for each pollutant, and submit TMDLs to EPA for approval. In 2010, the Idaho Department of Environmental Quality (DEQ) developed TMDLs for four pollutants in Hatwai Creek: nitrate plus nitrite nitrogen (NO_3+NO_2-N), total phosphorus (TP), bacteria (*Escherichia coli [E. coli]*), and stream temperature (DEQ 2010) (Table A). EPA approved the Hatwai Creek TMDLs in 2010 (EPA 2010). The TMDLs were developed to restore and protect cold water aquatic life, salmonid spawning, and secondary contact recreation beneficial uses. The TMDLs attributed all pollutant loading to nonpoint sources; no known point sources exist in the watershed. This 5-year review addresses only NO_3+NO_2-N, TP, and *E. coli* TMDLs in the Hatwai Creek subbasin. The temperature TMDL needs revision and will be addressed in a separate document. Use of 'TMDL' in this 5 year review refers to the Hatwai Creek Subbasin

Assessment and TMDLs (Lower Clearwater HUC 17060306) and is not to read as a general statement for all Idaho DEQ TMDLs.

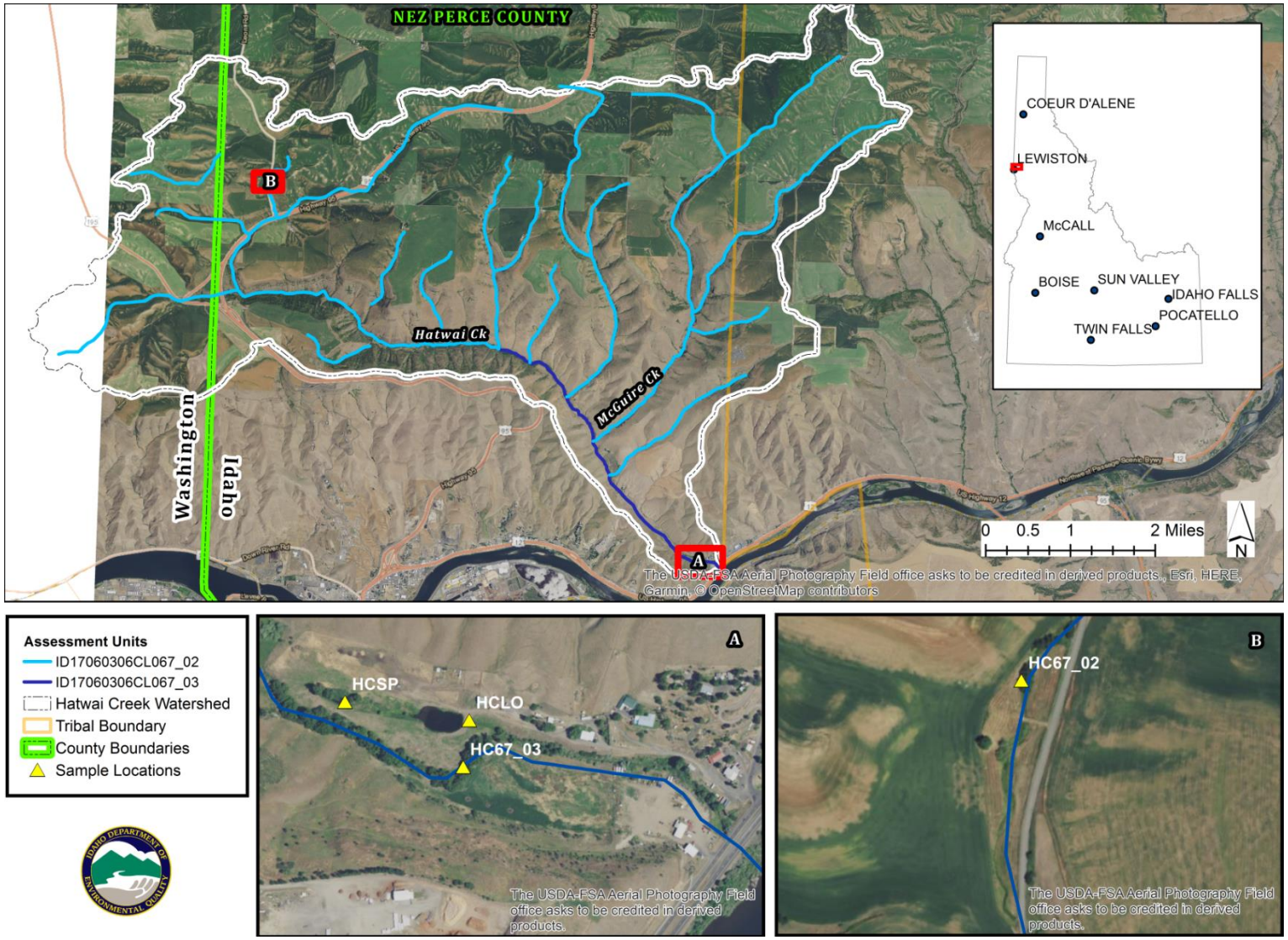

Figure A. Hatwai Creek subbasin and 2018 sample locations.

Table A. Existing TMDLs and general status.

Assessment Unit Name	Assessment Unit Number	Pollutants	TMDL Approval Year	Water Quality Trend
Hatwai Creek—1st and 2nd order	ID17060306CL067_02	NO_3+NO_2-N	2010	Sampled for first time; target not met
		TP	2010	Sampled for first time; target not met
		E. coli	2010	Sampled for first time; criteria not met
Hatwai Creek—3rd order	ID17060306CL067_03	NO_3+NO_2-N	2010	Degrading
		TP	2010	Static
		E. coli	2010	Static

Note: Both AUs have an approved temperature TMDL; the temperature TMDL requires revision and will be addressed in a separate document.

Key Findings

This document addresses NO_3+NO_2-N, TP, and *E. coli* TMDLs previously developed for Hatwai Creek (Table A). In 2018, DEQ collected water quality data in the Hatwai Creek subbasin to evaluate progress towards meeting water quality goals defined in the Hatwai Creek TMDL (DEQ 2010). The 2018 monitoring methods and results are summarized in this 5-year review and are described in detail in the *Hatwai Creek Water Quality Monitoring Report: 2018* (DEQ 2018). In 2018, NO_3+NO_2-N, TP, and *E. coli* concentrations exceeded TMDL targets in both assessment units (AUs). NO_3+NO_2-N concentrations were higher in 2018 than in 2006–2007, when data were last collected. Greater precipitation, stream flow, and ground water nutrient inputs in 2018 are one potential reason for the observed NO_3+NO_2-N increase. Extensive filamentous green algal growths were observed near the mouth and dissolved oxygen percent saturation was briefly less than the 90% value required by Idaho's Water Quality Standards (IDAPA 58.01.02) for protection of salmonid spawning. These patterns may be a symptom of elevated nutrient concentrations and water temperatures. *E. coli* concentrations also exceeded IDAPA 58.01.02 in both AUs. Water quality goals established in the Hatwai Creek TMDL have not been met.

Due to private property access constraints, NO_3+NO_2-N, TP, and *E. coli* water quality data were not available in the tributaries assessment unit (ID17060306CL067_02, [067_02]) when the TMDL was developed. All components of the TMDL, including load capacities and allocations, were developed based on data collected in the third order main stem assessment unit (ID17060306CL067_03, [067_03]), but were assumed to also apply to the tributaries (067_02). EPA approved TMDLs for both AUs based on data collected only in the third order main stem (67_03) (EPA 2010), and DEQ subsequently placed both AUs in Category 4a of the Integrated Report. In 2018, DEQ collected data in the tributaries assessment unit (067_02) for the first time within a headwaters stream segment. NO_3+NO_2-N, TP, and *E. coli* concentrations in 067_02 greatly exceeded TMDL targets. NO_3+NO_2-N concentrations were very high (7.5–9.5 milligrams per liter [mg/L]) in this 1st-order headwaters stream segment, which is fed primarily by ground water and runoff from upstream Palouse cropland.

Changes in Subbasin

No significant changes have occurred in the subbasin characteristics since the TMDL was developed (DEQ 2010). There are no point sources permitted under the National Pollution Discharge Elimination System or Idaho Pollutant Discharge System and no major land use changes or significant new developments within the watershed.

TMDL Analysis

Table B provides a summary of the analysis conducted for this 5-year review. Details are provided below.

Table B. TMDL analysis summary.

Analysis	NO_3+NO_2-N	TP	*E. coli*
Are the TMDL targets appropriate?	Unclear	Unclear	Yes
Are the pollutant allocations appropriate?	No	No	Yes
Are the assumptions and analysis appropriate?	No	No	Yes
Are the water quality criteria used in the TMDL consistent with current Idaho's water quality standards	Yes	Yes	Yes
Are the beneficial uses the TMDL was developed to protect appropriate and attainable?	Yes	Yes	Yes
Is the subbasin implementation plan appropriate?	No	No	No

Nutrient TMDLs (NO_3+NO_2-N and TP)

- It is not clear if NO_3+NO_2-N and TP targets, which were defined using EPA's ambient water quality criteria recommendations for the Columbia Plateau ecoregion concentrations (NO_3+NO_2-N = 0.072 mg/L, TP = 0.03 mg/L) (EPA 2000), represent threshold concentrations that impair beneficial uses in Hatwai Creek.
- NO_3+NO_2-N and TP load allocations in the TMDL likely are not appropriate for the tributaries assessment unit (067_02). Load allocations for 067_02 were developed based on stream flow and nutrient concentration data collected in the third order main stem assessment unit (067_03). Stream flows, nutrient concentrations, and thus load capacities and allocations differ between the two AUs. Ideally, separate load capacities and allocations would be developed for each AU. However, because of limited data and property access constraints, it is not currently possible to calculate load capacities and allocations representative of 067_02.
- The nutrient TMDLs assumed stream flows and nutrient concentrations observed in the main stem assessment unit (067_03) near the mouth represent those in the tributaries assessment unit (067_02). This assumption is not reasonable. Data collected in a headwaters stream segment within 067_02 had much higher nutrient concentrations and much lower flows. However, this headwater site likely is not representative of other larger segments of 067_02.
- The current implementation plan for agriculture should be revisited. In 2018, NO_3+NO_2-N concentrations were greater than in previous years, and extensive algal growths were observed near the mouth. These observations suggest implementation activities undertaken since the TMDL were not sufficient to yield pollutant reductions or have not had sufficient time to yield results.

E. coli TMDL

- Targets, load allocations, and assumptions used in the *E. coli* TMDL are reasonable. DEQ used the *E. coli* water quality criterion (IDAPA 58.01.02) to define targets and calculate load allocations. The *E. coli* water quality criterion protects secondary contact recreation use and has not changed since the TMDL was developed.
- The implementation plan for agriculture should be revisited. *E. coli* concentrations still exceed the *E. coli* water quality criterion.

Review of Beneficial Uses

A review of beneficial uses and their support status was conducted and is summarized below.

- Beneficial uses applied to Hatwai Creek (cold water aquatic life, salmonid spawning, secondary contact recreation) are appropriate.
- No changes in beneficial use support status are recommended for the next Integrated Report (Table C).
- In the tributaries assessment unit (067_02), secondary contact recreation remains impaired and in Category 4a of the Integrated Report for *E. coli* because concentrations exceed the *E. coli* water quality criterion (IDAPA 58.01.02) in the AU and at the mouth (067_03). The headwaters stream reach sampled in 067_02 may be intermittent and likely does not represent other reaches within the AU, where flows are greater and perennial. Based on elevated 2018 *E. coli* concentrations observed at both the headwaters and mouth, DEQ assumes upstream *E. coli* load reductions are still needed to protect recreational use in 067_02 until DEQ gains property access to collect data from a more representative location in the AU.
- In 067_02, cold water aquatic life use remains impaired and in Category 4a of the Integrated Report because the 2018 NO_3+NO_2-N and TP concentrations exceeded TMDL targets. The 067_02 sample location has several limitations (see the previous bullet point) and Beneficial Use Reconnaissance Program (BURP) data are not available for this AU. Based on elevated nutrient concentrations, algal growth, and dissolved oxygen patterns observed at the mouth, DEQ assumes nutrient load reductions are still needed to restore cold water aquatic life use in 067_02 until DEQ gains property access to collected data from a more representative location within the AU.
- In the main stem assessment unit (067_03), secondary contact recreation use remains impaired by *E. coli* because the 2018 concentrations exceed the *E. coli* water quality criterion. Cold water aquatic life use remains impaired because NO_3+NO_2-N and TP concentrations exceed TMDL targets and ecological effects of elevated nutrients and temperatures (algal growth and a brief period of reduced dissolved oxygen) were observed. BURP data were collected in this AU in 2017, but results are not yet available.

Table C. Existing TMDLs and recommendations for the next Integrated Report.

Assessment Unit Name	Assessment Unit Number	Pollutant	TMDL Target	Recommended Changes to Next Integrated Report	Justification
Hatwai Creek—1st and 2nd order	ID17060306CL067_02	NO_3+NO_2-N	0.072 mg N/L	Retain in Category 4a	Target exceeded; limited data in some segments
		TP	0.03 mg P/L	Retain in Category 4a	Target exceeded; limited data in some segments
		E. coli	126 cfu/100 mL	Retain in Category 4a	Target exceeded
Hatwai Creek—3rd order	ID17060306CL067_03	NO_3+NO_2-N	0.072 mg N/L	Retain in Category 4a	Target exceeded; extensive algal growth
		TP	0.03 mg P/L	Retain in Category 4a	Target exceeded; extensive algal growth
		E. coli	126 cfu/100 mL	Retain in Category 4a	Target exceeded

Water Quality Criteria

Since the TMDL was developed, no changes to Idaho water quality criteria have occurred for pollutants addressed in the TMDL.

Implementation Activities

After the TMDL was finalized, two implementation plans were developed. The Nez Perce Soil and Water Conservation District (NPSWCD) and Hatwai Creek Watershed Advisory Group (WAG) developed the *Hatwai Creek Watershed Total Maximum Daily Load Implementation Plan for Agriculture* (NPSWCD 2012). This plan identified agricultural best management practices (BMPs) for cropland and riparian zones, and recommended priorities for BMP implementation. In addition, the NPSWCD developed the *Hatwai Creek Steelhead Habitat Restoration Plan* (NPSWCD 2014), which identified potential factors limiting steelhead productivity and restoration strategies (NPSWCD 2014).

Since the TMDL was developed, NPSWCD produced documents that used geographic information systems analysis to characterize Hatwai Creek:

- *Hatwai Creek Erosion Assessment Using WEPP* (2014) *http://www.nezperceswcd.org/Portals/2/DynamicDocs/Publications//Hatwai%20Creek%20Erosion%20Assessment%20Using%20WEPP%20-%202014.pdf*
- *Hydrologic Analysis of the Hatwai Creek Watershed, Nez Perce County, Idaho: Level-1 Reconnaissance Report*

http://www.nezperceswcd.org/Portals/2/DynamicDocs/Publications//Hatwai%20Creek%20Hydrologic%20Analysis%20-%202014.pdf

- Lower Canyon Tributaries Stream Inventory and Assessment (2014) *http://www.nezperceswcd.org/Portals/2/DynamicDocs/Publications//Lower%20Canyon%20Tributaries%20Stream%20Inventory%20and%20Assessment%20-%202014.pdf*

NPSWCD also developed documents focused on Hatwai Creek fisheries:

- *Hatwai Creek Fisheries and Fish Habitat Assessment* (2014) *http://www.nezperceswcd.org/Portals/2/DynamicDocs/Publications//Hatwai%20Creek%20Fisheries%20and%20Fish%20Habitat%20Assessment%20-%202014.pdf*
- *Hatwai Creek Steelhead Habitat Restoration Plan* (2014) *http://www.nezperceswcd.org/Portals/2/DynamicDocs/Publications//Hatwai%20Creek%20Steelhead%20Habitat%20Restoration%20Plan%20-%202014.pdf*

From 2010 to 2018 the Nez Perce Soil and Water Conservation District (NPSWCD) began addressing the limiting factors for steelhead within the Hatwai Creek watershed. During this time, the NPSWCD completed an erosion assessment using WEPP, a stream inventory and assessment, a hydrology assessment, and a fisheries assessment (see above).

In 2014, the NPSWCD applied for an EPA 319 grant throught the Idaho Department of Environmental Quality to address phosphorus and nitrogen pollutants identified in the TMDL agricultural implementation plan as well as fish habitat limitations identified in the steelhead recovery plan. The grant proposed the installation of 800 linear feet of streambank protection, 1,000 linear feet of road improvements, 12 acres of grass seeding, 5 erosion control structures and 1,000 acres of upland nutrient treatments. The project was not funded, so implementation work was not completed. However, should funding become available, many pre-planning activites were completed. This proposal identified 3 objectives 1) reduce instream sedimentation and associated nutrients from uplands, 2) enhance riparian areas to reduce nutrients and reduce stream temperatures, and 3) reduce road related sediment and nutrient delivery to the stream.

The US Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) has worked with agricultural producers within the Hatwai Creek watershed using the Conservation Security Program and Environmental Quality Incentive Program. These programs are available to agricultural producers who participate in Farm Bill programs. BMPs installed from 2010 to 2018 include tillage management using both mulch till and no-till; nutrient management ranging from basic soil testing to precision agriculture applications;integrated pest management, and vegetative buffers.

Recommendations for Further Action

DEQ recommends the following actions:

- The Hatwai Creek WAG and designated management agencies should revisit existing implementation plans and revise them if needed. Ideally, priority stream segments or tributaries should be identified so focused BMP implementation activities can be developed for these drainages.

- DEQ should conduct outreach activities targeting watershed property owners to gain stream-sampling access at sites in the tributaries (067_02). DEQ needs access to additional stream segments, to better characterize pollutant loads and biological communities within the AU. DEQ will work with NPSWCD to attempt to gain additional property access.
- The Hatwai Creek WAG and designated management agencies should conduct outreach activities targeting watershed property owners to promote adopting agriculture BMPs as well as other actions recommended by the implementation plans.
- DEQ should revise future nutrient load capacities and allocations for the tributaries assessment unit (067_02) if property access and necessary data become available.
- Considering the 2018 NO_3+NO_2-N concentrations exceeded targets by several orders of magnitude, DEQ believes promoting nitrogen reduction activities is a higher priority than revising the TMDL nutrient targets. DEQ and the WAG could create interim nutrient goals to promote and track nitrogen reductions if needed. In consultation with the Hatwai Creek WAG, DEQ could revise nutrient targets to be more representative of Hatwai Creek *after* substantial nitrogen load reductions have occurred.

1 Introduction

The Hatwai Creek subbasin is a 32-square mile watershed located in Nez Perce County, Idaho (Figure 1). The headwaters of Hatwai Creek begin in the rolling cropland of the Palouse at an elevation of approximately 2,900 feet above mean sea level (MSL). Hatwai Creek tributaries flow through a steep canyon and ranchland where they converge and become a 3rd-order stream. At its mouth, Hatwai Creek flows through a culvert under US Highway 95 and converges with the Clearwater River at an elevation of 788 feet above MSL.

Land uses in the watershed include dryland agriculture, ranching, and rural residences. The watershed area is 66% agricultural land and less than 1% is covered by an impervious surface (USGS 2017). Anadromous Rainbow Trout (steelhead) spawn in Hatwai Creek (NPSWCD 2014; Joe DuPont, Idaho Department of Fish and Game, personal communication, August 28, 2018). The creek is also an important historical fishery for the Nez Perce Tribe. The eastern portion of the watershed lies within the Nez Perce Reservation boundary (Figure 1). The *Hatwai Creek Subbasin Assessment and TMDLs (Lower Clearwater HUC 17060306)* (DEQ 2010) provides a detailed watershed description.

In 1989, the Idaho Department of Health and Welfare, Division of Environmental Quality, identified Hatwai Creek as impaired by nutrients, bacteria, temperature, and habitat modifications (IDHW 1989). In 1994, US Environmental Protection Agency (EPA) placed Hatwai Creek on Idaho's §303(d) list, a biannual list of impaired state waters required by the Clean Water Act (CWA) §303(d). Idaho's 1994 §303(d) list was created by EPA under a court order (EPA 1994). For waters identified in Idaho's §303(d) list, the Idaho Department of Environmental Quality (DEQ) must develop pollutant load limits, or total maximum daily loads (TMDLs), for each pollutant and submit the TMDLs to EPA for approval. In 2010, DEQ developed Hatwai Creek TMDLs for four pollutants: nitrate plus nitrite nitrogen (NO_3+NO_2-N), total phosphorus (TP), bacteria (*Escherichia coli [E. coli]*), and stream temperature (DEQ 2010) (Table 1). EPA approved the Hatwai Creek TMDLs in 2010 (EPA 2010). Appendix A provides a detailed §303(d) listing history for Hatwai Creek.

In 2018, DEQ collected water quality data in the Hatwai Creek watershed to evaluate progress toward meeting water quality goals defined in the Hatwai Creek TMDLs. The 2018 monitoring methods and results are summarized here and described in detail in the *Hatwai Creek Surface Water Quality Monitoring Report: 2018* (DEQ 2018).

This 5-year review addresses the status of water bodies addressed in the Hatwai Creek TMDLs (DEQ 2010) and evaluates current water quality data, appropriateness of the TMDLs to current watershed conditions, and any available implementation plans.

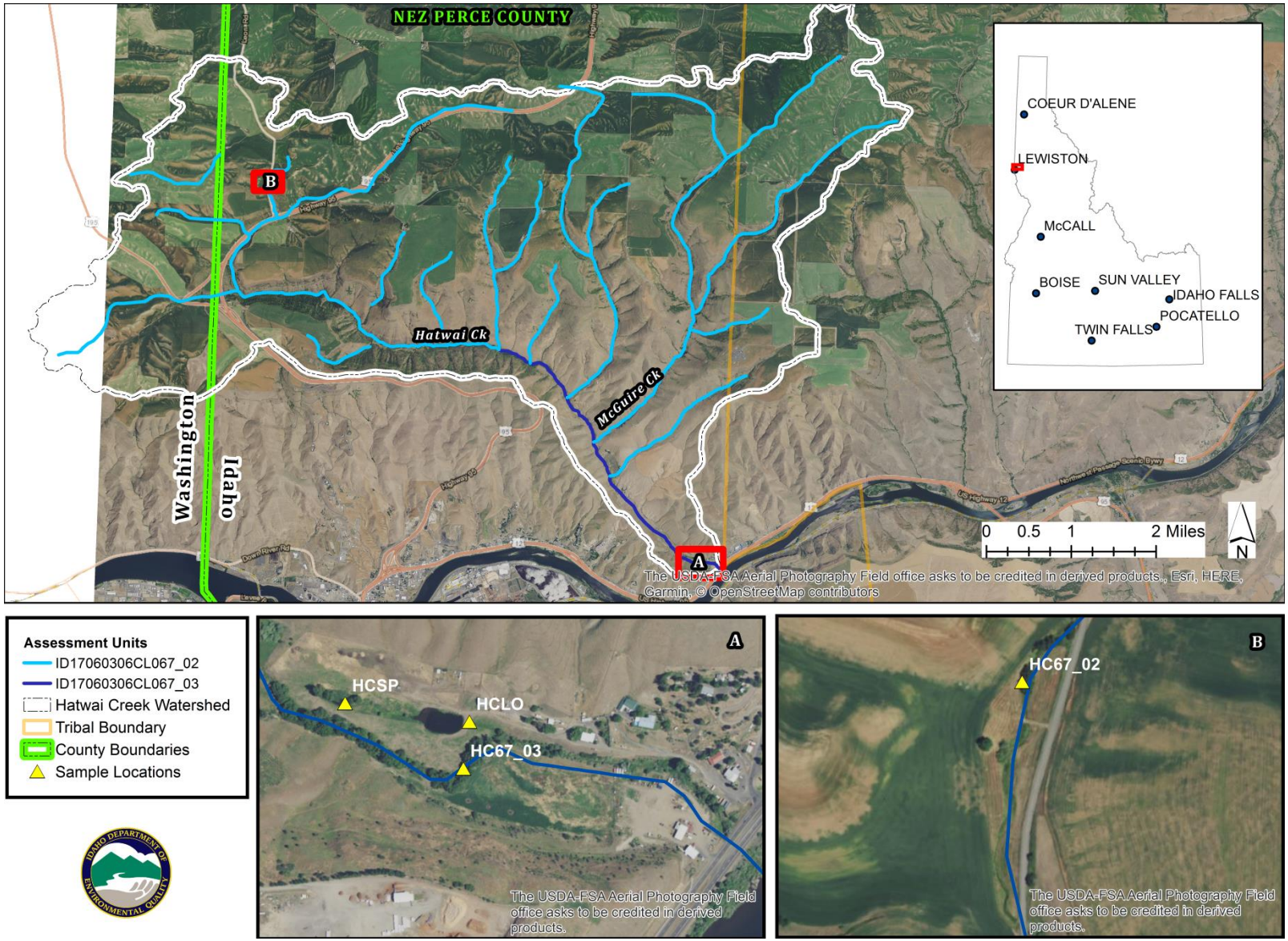

Figure 1. Hatwai Creek watershed and 2018 monitoring locations.

Table 1. Hatwai Creek beneficial uses and associated pollutants with TMDLs.

Assessment Unit Name	Assessment Unit Number	Beneficial Use	Pollutant	Numeric Criteria	Narrative Target
Hatwai Creek—1st and 2nd order	ID17060306CL067_02	Cold water aquatic life	NO_3+NO_2-N	—	0.072 mg N/L
			TP	—	0.03 mg P/L
			Temperature	19ºC daily average, 22ºC daily maximum	—
		Secondary contact recreation	*E. coli*	126 cfu/100 mL	—
Hatwai Creek—3rd order	ID17060306CL067_03	Cold water aquatic life	NO_3+NO_2-N	—	0.072 mg N/L
			TP	—	0.03 mg P/L
			Temperature	19ºC daily average, 22ºC daily maximum	—
		Salmonid spawning	Temperature	9ºC daily average, 13ºC daily maximum	—
		Secondary contact recreation	*E. coli*	126 cfu/100 mL	—

Notes: milligrams (mg); colony forming unit (cfu); milliliter (mL)

1.1 Public Involvement

DEQ developed this 5-year review in consultation with the Hatwai Creek Watershed Advisory Group (WAG) and discussed the TMDL review with the WAG at public meetings on February 2, 2019 and April 5, 2019. The general public had the opportunity to comment on this document during public WAG meetings.

1.2 Regulatory Requirements

The federal 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 The CWA§303 must adopt water quality standards necessary to protect fish, shellfish, and wildlife while providing for recreation in and on the nation's waters whenever possible. The water quality standards must specify beneficial uses to be achieved and protected for waters and water quality criteria that protect beneficial uses (40 CFR 131.6).

Idaho's "Water Quality Standards" (IDAPA 58.01.02) specify beneficial uses to be achieved and protected in Idaho waters as well as water quality criteria. Beneficial uses in IDAPA 58.01.02 include aquatic life uses (i.e., cold water, seasonal cold water, warm water, salmonid spawning, and modified) contact recreation (i.e., swimming and boating), water supply, wildlife habitats, and aesthetics. IDAPA 58.01.02.050.02 requires that surface waters of the state be protected for relevant beneficial uses, wherever attainable. Idaho's water quality criteria are numeric

chemical-specific concentrations, or narrative statements representing water quality that protects a particular beneficial use.

The CWA§303(d) 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 publish a biannual priority list (a "§303(d) list") of impaired waters. For waters identified on this list, states and tribes must develop a TMDL for the pollutants, set at a level to achieve water quality standards. A TMDL specifies maximum inputs of a pollutant from all sources that can occur while still meeting water quality criteria and thus supporting beneficial uses.

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.

This 5-year review, developed with the Hatwai Creek WAG, addresses the Hatwai Creek TMDLs (DEQ 2010). It 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 plans (NPSWCD 2012; NPSWCD 2014), and was developed in consultation with a 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.

1.3 Assessment Units

To assess if water quality criteria are met, beneficial uses are supported, and to fulfill CWA §303(d) and §305(b) reporting requirements, DEQ subdivides surface water bodies into assessment units (AUs). AUs are groups of similar streams with similar land use practices, ownership, or land management. AUs are based on Strahler stream order, although additional factors such as land use, landscape physical characteristics, and local knowledge may be considered. 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 used to specify beneficial uses, which relates them directly to Idaho's water quality standards. A detailed description of how DEQ subdivides state waters into AUs is provided in the Integrated Report (DEQ 2017). The Hatwai Creek watershed includes two AUs (Figure 1). AU ID17060306CL067_02 (067_02) includes the Hatwai Creek tributaries (1st- and 2nd-order streams), and AU ID17060306CL067_03 (067_03) includes the main stem of Hatwai Creek (3rd-order stream).

2 TMDL Review and Status

The Hatwai Creek TMDLs were developed to restore and protect beneficial uses in two AUs (Figure 1;Table 1). DEQ developed NO_3+NO_2-N, TP, and stream temperature TMDLs to restore and protect cold water aquatic life and salmonid spawning uses, and developed an *E. coli* TMDL to restore and protect secondary contact recreation use (Table 1). Waters protected for cold water aquatic life use are expected to maintain a viable aquatic community for cold water species. Waters protected for salmonids spawning are expected to provide a habitat for active, self-propagating populations of salmonid fishes. Waters protected for secondary contact recreation are expected to allow for recreation activities, such as wading and fishing where immersion and ingestion are unlikely. The Hatwai Creek TMDLs are found at *www.deq.idaho.gov/water-quality/surface-water/tmdls/table-of-sbas-tmdls.*

In 2018, DEQ collected water quality data in the Hatwai Creek watershed (DEQ 2018). DEQ used 2018 monitoring results and other relevant information to review the Hatwai Creek NO_3+NO_2-N, TP, and *E. coli* TMDLs as required by Idaho Code §39-3611(7). The Hatwai Creek temperature TMDL requires revision and will be addressed in a separate document.

2.1 Escherichia coli

DEQ developed an *E. coli* TMDL to protect secondary contact recreation use in Hatwai Creek. IDAPA 58.01.02.110–160 do not list secondary contact recreation as a designated use in Hatwai Creek. However, DEQ applies primary or secondary contact recreation criteria to undesignated waters because DEQ presumes most waters of the state will support recreation use (IDAPA 58.01.02.101.01). DEQ applies secondary contact recreation presumed use protection to both Hatwai Creek AUs. Secondary contact recreation activities are those where water immersion and ingestion are unlikely (wading and fishing). Primary contact recreation activities where immersion and ingestion are likely, such as swimming, have not been documented in Hatwai Creek to DEQ's knowledge and are unlikely considering Hatwai Creek is small and shallow. However, the Nez Perce Tribe designated primary contact recreation for all water bodies within the Nez Perce Reservation due to ceremonial and religious uses of water by tribal members. The Idaho *E. coli* water quality criterion (IDAPA 58.01.02) is the same for both primary and secondary recreation.

2.1.1 Pollutant Targets

The *E. coli* water quality criterion is 126 colony forming units (cfu)/100 milliliters (mL) 30-day geometric mean concentration (IDAPA 58.01.02.251.02). This criterion was selected as the *E. coli* TMDL target (DEQ 2010). The target was selected to protect secondary contact recreation use in Hatwai Creek. The *E. coli* water quality criterion has not changed since TMDL development, so DEQ considers this target to be adequate. The Hatwai Creek TMDL assigned a year-round critical period to the *E. coli* target.

2.1.2 Control and Monitoring Points

In the TMDL, stream *E. coli* data collected near the mouth (in 067_03) were used to assess exceedance of Idaho's water quality criterion and calculate existing *E. coli* loads. The geometric mean of five samples collected at the mouth between July 20, 2006, and August 10, 2006,

(347.9 cfu/100 mL) exceeded the *E. coli* criterion. No *E. coli* data were collected in the tributaries AU (067_02) because of property access constraints. DEQ assumed *E. coli* concentrations in 067_02 also exceeded the *E. coli* water quality criterion based on data collected at the mouth. All components of the *E. coli* TMDL, including load capacities and allocations, were developed based on data collected in 067_03 but were assumed to also apply to 067_02. EPA approved *E. coli* TMDLs for both AUs based on data collected only in 067_03 (EPA 2010), and DEQ subsequently placed both AUs in Category 4a of the Integrated Report.

In 2018, DEQ collected *E. coli* data in both AUs (Figure 1), and concentrations exceeded the TMDL target in both AUs. The sample site in 067_03 is located near the mouth (HC67_03, Figure 1), runs through a property with a winter cow feeding operation, and is downstream of livestock and cropland. This site is representative of the AU and is suitable for future TMDL monitoring.

The sample site in 067_02 (HC67_02, Figure 1) is a 1st-order stream draining Palouse wheat fields with very low flows year-round (<1 cubic feet per second [cfs]). Livestock were present on the property in fall 2018 but not present in spring and summer. While *E. coli* exceeded targets at this headwaters site, the site is not representative of other tributary segments in 067_02, which likely have greater stream flows and more upstream livestock. In addition, if this reach naturally has a period of zero flow for at least 1 week during most years, or has a flow < 0.1 cfs over 7 days in 2 years (7Q2 flow), then it would be intermittent according to IDAPA 58.01.02.010.54. If the reach is intermittent, the *E. coli* water quality criterion would only apply when stream flow is ≥ 5 cfs (IDAPA 58.01.02.070.06). The reach likely meets the intermittent definition in Idaho's water quality standards, but flow measurements across multiple years would be needed to confirm intermittent status. The sampled reach in 067_02 had flow year-round in 2018. Flow was < 0.1 cfs in June–September 2018, but only 1 year of flow data are available. In 2018, it was a wetter than average year, so flow in this reach was also likely higher than average. Other reaches in 067_02 that DEQ could not access likely have greater flows and are perennial. DEQ only sampled one stream segment within 067_02 due to private property access constraints.

To evaluate beneficial use support and review TMDLs at the AU scale, DEQ should continue to monitor both AUs and collect additional data in representative perennial segments of 67_02. DEQ sampled only one location within 067_02 in 2018 due to private property access constraints.

2.1.3 Load Capacity

In the TMDL, the *E. coli* load capacity is expressed as a 126 cfu/100 mL 30-day geometric mean concentration consistent with the *E. coli* criterion. The *E. coli* criterion has not changed since TDML development, so the *E. coli* load capacity is still reasonable and can apply to both AUs.

2.1.4 Load Allocations

In the TMDL, DEQ expressed the *E. coli* load allocation as a 113.4 cfu/100 mL geometric mean, calculated by subtracting a 10% margin of safety (MOS) (section 2.1.5) from the 126 cfu/100 mL load capacity. DEQ attributed all the *E. coli* load to nonpoint sources and did not develop load allocations for specific tributaries or source types (e.g., livestock and wildlife). Because the *E. coli* water quality criterion has not changed since TMDL development, the load

allocation is still reasonable, and it is reasonable to apply this load allocation to both AUs. In 2018, DEQ measured geometric mean concentrations in 067_03 in spring and summer, and in 067_02 in summer (DEQ 2018). Geometric means exceeded Idaho's water quality criterion in both AUs (Table 2).

Table 2. Hatwai Creek subbasin *E. coli* load allocations based on 2018 data.

Assessment Unit Name	Assessment Unit Number	Current Load	Load Capacity	Load Allocation[a]	Load Reduction Required[b]
		(mpn/100 mL)			
Hatwai Creek—1st and 2nd order	ID17060306CL067_02	367.8 (July)	126	113.4	254.4 (69%)
Hatwai Creek—3rd order	ID17060306CL067_03	645.1 (March)	126	113.4	531.7 (82%)
		227.8 (July)	126	113.4	114.4 (50%)

a. Load allocation (mpn/100 mL) = load capacity – (load capacity * 10% margin of safety)
b. Load reduction required (mpn/100 mL) = current load – load allocation; load reduction required (%) = 1-(load allocation/current load) * 100
Note: Units of most probable number (mpn)/100 mL are considered equivalent to cfu/100 mL.

2.1.5 Margin of Safety

A MOS accounts for uncertainties that may affect the protectiveness of the TMDL. A MOS reduces the pollutant load available for allocation to nonpoint and point sources. In the TMDL, DEQ defined an explicit 10% MOS. In addition, the *E. coli* water quality criterion is inherently conservative (protective) for Hatwai Creek because it was developed to protect against illness for people participating in primary contact recreation activities, where immersion and ingestion are likely, whereas only secondary contact recreation activities are likely in Hatwai Creek. DEQ considers the MOS used for *E. coli* to still be reasonable.

2.1.6 Seasonal Variation

As previously described, DEQ expressed the load capacity and allocation as a constant geometric mean concentration. DEQ also used a year-round critical period, meaning the target concentration always applies and is not season specific. DEQ believes using a constant load capacity and allocation and a year-round target period is protective and still reasonable.

2.1.7 Reserve

The TMDL did not include a reserve for growth and stated "any new source would need to be assigned a portion of the existing load allocation" (DEQ 2010). Considering conservative assumptions associated with the *E. coli* target, DEQ believes it is still reasonable to not include a reserve for growth in the *E. coli* TMDL.

2.2 Nutrients (NO_3+NO_2-N and TP)

DEQ developed TMDLs for both nitrogen and phosphorus to protect cold water aquatic life use and prevent nuisance aquatic growths. Idaho's water quality standards do not list cold water

aquatic life as a designated use in Hatwai Creek, but DEQ applies presumed use protection for cold water aquatic life use to Hatwai Creek. DEQ presumes most waters of the state will support aquatic life use (IDAPA 58.01.02.101.01). Elevated nutrient concentrations can lead to reduced dissolved oxygen concentrations or other conditions that negatively affect aquatic life. Idaho also has narrative nutrient water quality criteria stating surface waters "shall be free of excess nutrients that can cause visible slime growths or other nuisance aquatic growths impairing designated beneficial uses" (IDAPA 58.01.02.200.06).

2.2.1 Pollutant Targets

In the TMDL, DEQ defined targets for NO_3+NO_2-N and TP (unfiltered phosphorus, all forms). DEQ assigned a year-around critical period to the targets. For Hatwai Creek, DEQ selected EPA ambient water quality criteria recommendations for the Columbia Plateau ecoregion as target concentrations (NO_3+NO_2-N = 0.072 mg/L, TP = 0.03 mg/L) (EPA 2000). EPA calculated these thresholds as the 25th-percentile of 1990–1998 nutrient data from the Columbia Plateau ecoregion (based on 71 NO_3+NO_2-N data points and 127 TP data points) (EPA 2000, Table 3b). EPA stated their thresholds "represent conditions of surface waters that are minimally impacted by human activities and protective of aquatic life and recreation uses" (EPA 2000).

However, EPA's thresholds have limitations when applied to Hatwai Creek: (1) they were developed for the Columbia Plateau ecoregion as a whole rather than for Hatwai Creek specifically, and (2) they were based on the statistical distribution of nutrient data rather than the relationship between nutrient concentrations and a specific ecological response that affects support of beneficial uses, such as algal growth.

Still, the TP targets are similar to values used to protect against excessive algal growth in other studies. Evans-White et al. (2013) reviewed stream nutrient criteria developed across the United States and reported TP thresholds based on benthic algal responses to nutrients (rather than a statistical approach) ranged from 0.006–0.20 mg/L. The TMDL target (0.03 mg /L) falls within this range. The TMDL target is less than half of the target DEQ developed for the lower Boise River to protect against nuisance benthic algal growth (0.07 mg/L) (DEQ 2015). For nitrogen, thresholds are more frequently defined for total nitrogen (TN) than NO_2+NO_3-N. TN thresholds typically range from 0.15–1.5 mg/L (Evans-White et al. 2013; Tetra Tech 2017).

It is not clear if the TMDL targets represent thresholds that impair beneficial uses in Hatwai Creek. However, considering current nutrient concentrations are very high and likely contributed to algal growths observed in 2018 (DEQ 2018), DEQ believes revising targets should be a low priority. NO_3+NO_2-N concentrations at the mouth ranged from 2.0–7.7 mg/L (Figure 2) compared to typical TN thresholds of 0.15–1.5 mg/L (Evans-White et al. 2013). TP concentrations ranged from 0.09–0.22 mg/L (Figure 2) compared to typical TP thresholds of 0.006–0.20 mg/L (Evans-White et al. 2013). Current concentrations also appear to have ecological effects; DEQ observed extensive algal growths and one brief period when dissolved oxygen was < 90% saturation required for protection of salmonid spawning (DEQ 2018). Developing representative nutrient targets for Hatwai Creek would require a detailed watershed-specific study because the relationship between nutrient concentrations and algal growth is often complex and site specific. DEQ believes facilitating efforts to reduce nutrient concentrations should be its highest priority. Interim nutrient goals could be established in the meantime if needed, and nutrient targets could be revisited when interim goals are achieved.

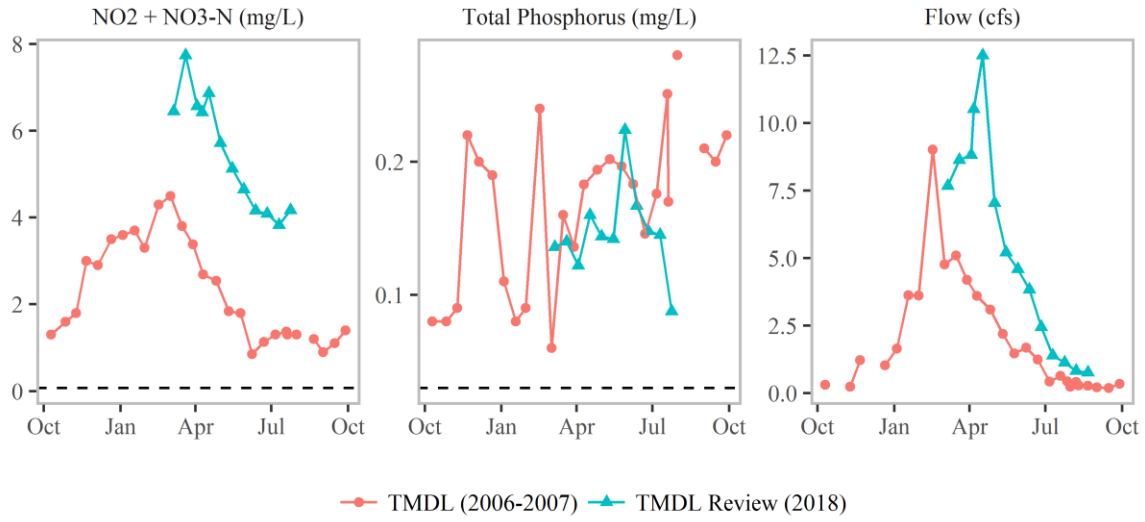

Figure 2. Comparison of nutrient concentrations and stream flow at the Hatwai Creek mouth during TMDL development (2006–2007) and the TMDL review (2018). Dashed horizontal lines are the TMDL target concentrations.

2.2.2 Control and Monitoring Points

In the TMDL, DEQ used flow and nutrient data collected near the mouth of 067_03 to calculate existing loads and develop nutrient load allocations. DEQ assumed nutrients impaired beneficial uses in 067_02 based on data collected in 067_03. Load capacities and allocations developed based on 067_03 data were assumed to apply to 067_02. EPA approved nutrient TMDLs for both AUs (EPA 2010), and DEQ placed the AUs in Category 4a of the Integrated Report.

In 2018, DEQ collected nutrient data in both AUs (Figure 1). The sample site in 067_03 (HC67_03, Figure 1) is located near the mouth and is representative of the AU. The sample site ID17060306CL067_02 (HC67_02, Figure 1) is a 1st-order stream draining Palouse wheat fields with very low flows year-round (< 1 cfs). While this site demonstrated that nutrient concentrations exceed targets at the headwaters, it likely is not representative of patterns in other tributary segments within 067_02, especially larger segments such as McGuire Creek (Figure 1).

Considering DEQ must evaluate beneficial use support and review TMDLs at the AU scale, DEQ should continue to monitor both AUs and collect additional data in representative perennial segments of 067_02. In 2018, DEQ sampled only one location within the AU due to private property access constraints.

2.2.3 Load Capacity

In the TMDL, nutrient load capacities (pounds per day) were calculated by multiplying stream flow measured in 067_03 by target concentrations and a unit conversion factor. Both daily and monthly load capacities were calculated; monthly values were calculated using average monthly flow and concentrations. Data were only collected in 067_03 due to access constraints, so separate load capacities were not developed for each AU.

The TMDL nutrient load capacities have two limitations. First, stream flow and load capacities are likely much larger in 067_03 compared to 067_02. In 2018, DEQ collected stream flow data in both AUs; flows were consistently < 1 cfs in a headwaters stream segment compared to 0.8–12.5 cfs near the Hatwai Creek mouth in 067_03 (DEQ 2018). Ideally, separate load capacities should be calculated for each AU.

Second, TMDL load capacities were developed using data from low precipitation year (water year 2007). At the Lewiston airport, 8.43 inches of precipitation fell in water year 2007, compared to 15.24 inches in water year 2018, a high precipitation year. Average annual calendar year precipitation at the Lewiston airport (1981–2010) was 12.31 inches (NOAA 2018). Stream flows were consistently higher in 2018 than in 2007 (Figure 2).

Until additional stream flow data become available within 067_02, the mouth of Hatwai Creek should be used as a TMDL control point. Flow data collected in the headwaters segment are not likely representative of flow in larger tributaries in 067_02, such as McGuire Creek (Figure 1). Additional flow measurements are needed to calculate a separate load capacity for 067_02. Using load capacities developed from a low precipitation year is conservative (protective); data from a higher flow year would have yielded a higher load capacity.

2.2.4 Load Allocations

In the TMDL, DEQ calculated nutrient load allocations by subtracting a 10% MOS (section 2.2.5) from load capacities. DEQ attributed all nutrient loads to nonpoint sources and did not develop load allocations for specific tributaries or nonpoint source types (e.g., fertilizer, livestock, wildlife, and septic systems).

Current daily loads, load capacities, and load allocations were calculated using 2018 flow and nutrient data collected at the mouth in 067_03 (Figure 1, HC67_03; Table 3; Table 4). Nutrient concentrations greatly exceeded targets. Stream flows were also higher in 2018 than in 2006–2007 when the TMDL was developed because 2018 was an unusually wet year. Current loads exceeded load capacities and allocations, and substantial load reductions are needed.

Table 3. Hatwai Creek subbasin NO_3+NO_2-N load allocations based on 2018 data.

Sample Date	Flow (cfs)	NO_3+NO_2-N (mg/L)	Current Load	Load Capacity	Load Allocation[a]	Load Reduction Required[b]
				(lbs/day)		(%)
3/6/18	7.68	6.45	267	2.98	2.68	99
3/20/18	8.63	7.74	360	3.35	3.02	99
4/3/18	8.83	6.57	313	3.34	3.09	99
4/17/18	12.51	6.87	463	4.85	4.36	99
5/1/18	7.05	5.72	217	2.74	2.47	99
5/15/18	5.21	5.13	144	2.02	1.82	99
5/29/18	4.59	4.65	115	1.78	1.60	99
6/12/18	3.84	4.16	86.1	1.49	1.34	98
6/26/18	2.45	4.09	54.0	0.951	0.856	98
7/10/18	1.39	3.83	28.7	0.539	0.485	98
7/24/18	1.13	4.17	25.4	0.439	0.395	98
8/7/18	0.82	3.91	17.3	0.318	0.286	98
8/21/18	0.76	3.70	15.2	0.295	0.265	98
9/4/18	0.81	3.43	15.0	0.314	0.283	98
9/18/18	0.96	3.34	17.3	0.373	0.336	98

a. Load allocation (lbs/day) = load capacity – (load capacity * 10% margin of safety)
b. Load reduction required (lbs/day) = current load – load allocation; load reduction required (%) = 1-(load allocation/current load) * 100
Note: pounds (lbs)

Table 4. Hatwai Creek subbasin TP load allocations based on 2018 data.

Sample Date	Flow (cfs)	TP (mg/L)	Current Load	Load Capacity	Load Allocation[a]	Load Reduction Required[b]
				(lbs/day)		(%)
3/6/18	7.68	0.136	5.63	1.24	1.12	80
3/20/18	8.63	0.140	6.51	1.40	1.26	81
4/3/18	8.83	0.122	5.81	1.43	1.29	78
4/17/18	12.51	0.160	10.80	2.02	1.82	83
5/1/18	7.05	0.144	5.47	1.14	1.03	81
5/15/18	5.21	0.142	3.99	0.842	0.758	81
5/29/18	4.59	0.224	5.54	0.74	0.668	88
6/12/18	3.84	0.167	3.46	0.621	0.559	84
6/26/18	2.45	0.148	1.95	0.396	0.356	82
7/10/18	1.39	0.145	1.09	0.225	0.202	82
7/24/18	1.13	0.088	0.534	0.183	0.165	69
8/7/18	0.82	0.164	0.725	0.133	0.120	83
8/21/18	0.76	0.160	0.660	0.123	0.111	83
9/4/18	0.81	0.141	0.616	0.131	0.118	81
9/18/18	0.96	0.139	0.719	0.155	0.140	81

a. Load allocation (lbs/day) = load capacity – (load capacity * 10% margin of safety)
b. Load reduction required (lbs/day) = current load – load allocation; load reduction required (%) = 1-(load allocation/current load) * 100
Note: pound (lbs)

2.2.5 Margin of Safety

A MOS accounts for uncertainties that may affect the protectiveness of the TMDL, and reduces the pollutant load available for allocation to nonpoint and point sources. In the TMDL, DEQ defined an explicit 10% MOS for both nutrient targets. The MOS accounted for uncertainties in the relationship between nutrient concentrations and relevant ecological responses (i.e., aquatic plant growth cycles, biochemical oxygen demand, and dissolved oxygen) (DEQ 2010). DEQ believes a 10% MOS is still reasonable.

2.2.6 Seasonal Variation

NO_3+NO_2-N concentrations vary seasonally with stream flow; higher concentrations occur during higher flow periods (Figure 2; Figure 3). In 067_03, TP concentrations do not have a clear seasonal pattern during the years where data are available (Figure 2). In 067_02, data are only available for 2018, and TP concentrations increased as flow decreased from 0.19 to 0.01 cfs (Figure 3), possibly due to a greater particulate fraction in samples as flows decreased to very low levels.

The TMDL noted nutrient concentrations are most likely to cause nuisance algal growth and reduced dissolved oxygen from May through September, when temperatures are high and flows are low. DEQ applied nutrient targets year-round (DEQ 2010, Tables 13–15) and believes a year-round nutrient target is protective of the Hatwai Creek subbasin and still reasonable.

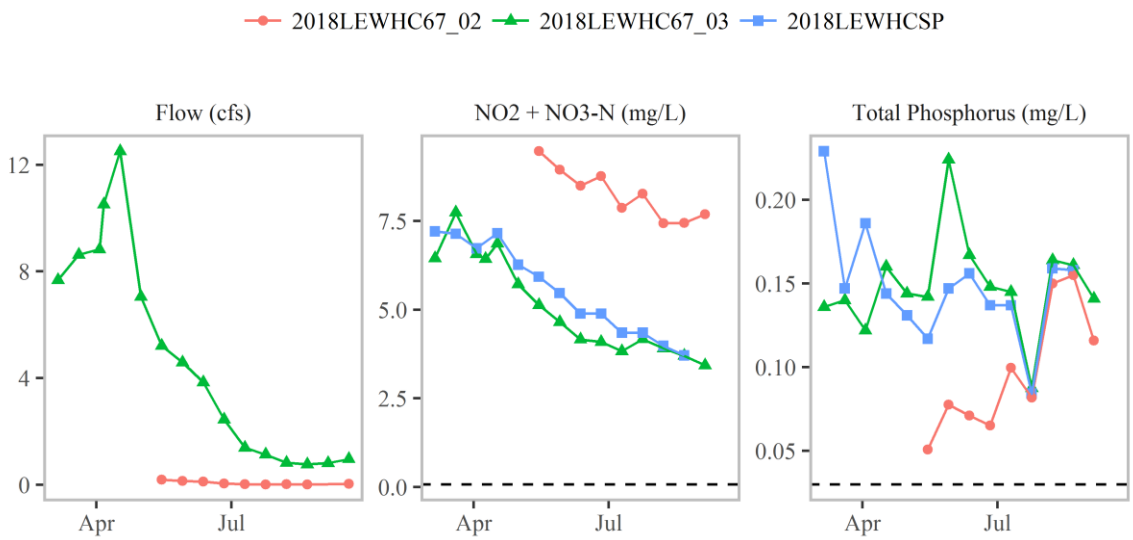

Figure 3. Stream flow and nutrient concentrations at 2018 Hatwai Creek monitoring sites.

2.2.7 Reserve

The TMDL did not include a reserve for growth. Considering the nutrient target concentrations are relatively low and applied year-round, DEQ believes it is still reasonable to not include a reserve for growth in the nutrients TMDL. Any new source would be assigned a portion of the existing load allocation through a future TMDL addendum.

2.3 Changes to Subbasin Characteristics

No significant changes have occurred in subbasin characteristics since the TMDL was developed. There still are no point sources permitted under the National Pollution Discharge Elimination System or Idaho Pollutant Discharge Elimination System, or major land use changes or significant new developments within the watershed.

3 Beneficial Use Status

IDAPA 58.01.02 lists beneficial uses and sets water quality goals for waters of the state. IDAPA 58.01.02.050.02 requires that surface waters of the state be protected for beneficial uses, wherever attainable. These beneficial uses are interpreted as existing uses, designated uses, and presumed uses and are described in more detail at *www.deq.idaho.gov/water-quality/surface-water/beneficial-uses*. The *Water Body Assessment Guidance* (DEQ 2016) provides a more detailed description of beneficial use identification for use assessment purposes.

Beneficial uses include the following:

- Aquatic life support—cold water, seasonal cold water, warm water, salmonid spawning, and modified
- Contact recreation—primary (e.g., swimming) or secondary (e.g., boating)
- Water supply—domestic, agricultural, and industrial
- Wildlife habitats
- Aesthetics

3.1 Beneficial Uses

Beneficial uses addressed by the Hatwai Creek TMDLs are provided in Table 5. DEQ presumes most waters in Idaho will support cold water aquatic life and primary or secondary contact recreation beneficial uses and applies water quality criteria to protect cold water aquatic life and primary or secondary contact recreation in waters where these uses are not designated (IDAPA 58.01.02.101.01). DEQ applies secondary contact recreation presumed use protection to both Hatwai Creek AUs. Secondary contact recreation activities are those where water immersion and ingestion are unlikely (wading and fishing). Primary contact recreation activities, where immersion and ingestion are likely, such as swimming, have not been documented in Hatwai Creek to DEQ's knowledge and are unlikely considering Hatwai Creek is shallow. DEQ considers salmonid spawning an existing use in the main stem of Hatwai Creek (067_03) but not in the tributaries (067_02). Steelhead spawn in the main stem (NPSWCD 2014; Joe DuPont, Idaho Department of Fish and Game, personal communication August 28, 2018); however, steep canyon slopes within 067_02 serve as a natural fish passage barrier (NPSWCD 2014).

Table 5. Beneficial uses of water bodies addressed by this 5-year review.

Assessment Unit Name	Assessment Unit Number	Beneficial Uses	Type of Use
Hatwai Creek—1st and 2nd order	ID17060306CL067_02	Cold water aquatic life	Presumed
		Secondary contact recreation	Presumed
Hatwai Creek—3rd order	ID17060306CL067_03	Cold water aquatic life	Presumed
		Salmonid spawning	Existing
		Secondary contact recreation	Presumed

Beneficial uses are protected by a set of water quality criteria, which include *numeric* criteria for pollutants such as bacteria, dissolved oxygen, pH, ammonia, temperature, and turbidity (Appendix B), and *narrative* criteria for pollutants such as sediment and nutrients (IDAPA 58.01.02.250–251).

Narrative criteria for excess sediment are described in the water quality standards:

> 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 Subsection 350. (IDAPA 58.01.02.200.08)

Narrative criteria for excess nutrients are described in the water quality standards:

> Surface waters of the state shall be free from excess nutrients that can cause visible slime growths or other nuisance aquatic growths impairing designated beneficial uses. (IDAPA 58.01.02.200.06)

Based on input from Joe Dupont, Idaho Department of Fish and Game, personal communication August 28, 2018, and the *Geography and Timing of Salmonid Spawning in Idaho* (BioAnalysts et al. 2014), DEQ applied salmonid spawning criteria February 1 through August 15 in 067_03 (DEQ 2018).

3.2 Summary and Analysis of Current Water Quality Data

Table 6 lists data collected since the TMDL was approved in 2010. The 2017 Beneficial Use Reconnaissance Program (BURP) results are not yet available; DEQ expects the results will be available by mid-2019. The 2018 monitoring results are summarized in Table 7 and described in *Hatwai Creek Surface Water Monitoring Report: 2018* (DEQ 2018).

Table 6. Data collected since the Hatwai Creek TMDL was approved in 2010.

Data Type	Agency	1st and 2nd order (067_02)	3rd order (067_03)
BURP	DEQ	—	2017
Instantaneous stream flow	DEQ	2018	2018
Continuous stream flow and rating curve	DEQ	—	2018
Nutrients (NO_3+NO_2-N, TP)	DEQ	2018	2018
E. coli	DEQ	2018	2018
Temperature logger data	DEQ	2018	2018
	NPSWCD	—	2011
Water column dissolved oxygen	DEQ	—	2018
April 6–9, 2018, storm event monitoring with field sensors (water level, NO_3-N, dissolved oxygen, temperature, conductivity)	DEQ	—	2018
Turbidity	NPSWCD	—	2011–13

In 2018, nutrient and *E. coli* concentrations exceeded TMDL targets in both AUs (Table 7). Numeric temperature criteria were exceeded in 067_03 but not in the headwaters segment monitored within 067_02 (Table 7). DEQ documented late summer algal growths and reduced dissolved oxygen concentrations in 067_03 that likely resulted from elevated nutrient concentrations, high stream temperature, and low flows (DEQ 2018). Near the mouth of 067_03, DEQ installed a stream gauge and sensor that records the water level at 15-minute intervals. DEQ developed a stream rating curve and hydrograph for Hatwai Creek that may be useful in future projects (DEQ 2018).

Table 7. Summary of 2018 DEQ monitoring (DEQ 2018).

Parameter	Threshold	Threshold Source	Result	
			Headwaters (067_02)	Mouth (067_03)
NO_3+NO_2-N	0.072 mg/L	Hatwai Creek TMDL target (DEQ 2010)	7.4–9.5 mg/L Threshold exceeded	2.0–7.7 mg/L Threshold exceeded
TP	0.03 mg/L	Hatwai Creek TMDL target (DEQ 2010)	0.05–0.16 mg/L Threshold exceeded	0.09–0.22 mg/L Threshold exceeded
E. coli	126 mpn/100 mL geometric mean	Hatwai Creek TMDL target (DEQ 2010), IDAPA 58.01.02.251.01	367.8 mpn/100 mL (summer) Threshold exceeded	645.1 mpn/100 mL (spring), 227.8 mpn/100 mL (summer) Threshold exceeded
Dissolved oxygen (year-around)	6 mg/L (minimum)	IDAPA 58.01.02.250.02a	No data	8.8–11.8 mg/L Threshold not exceeded
Dissolved oxygen (during salmonid spawning)	6 mg/L or 90% saturation, whichever is greater	IDAPA 58.01.02.250.02f	Not applicable	8.8–11.8 mg/L 88.7–103% <90% saturation on 8/8/18 Threshold exceeded
Temperature (cold water aquatic life protection)	19ºC daily average	IDAPA 58.01.02.250.02b	8.51–17.9°C Threshold not exceeded	4.45–17.8°C daily average Threshold not exceeded
	22ºC daily maximum	IDAPA 58.01.02.250.02b	9.58–21.5°C threshold not exceeded	4.51–22.2°C daily maximum Threshold exceeded one day
Temperature (during salmonid spawning)	13ºC daily maximum	IDAPA 58.01.02.250.02f	Not applicable	4.51–22.2°C daily maximum Threshold exceeded
	9ºC daily average	IDAPA 58.01.02.250.02f	Not applicable	4.45–17.8°C daily average Threshold exceeded

3.3 Assessment Unit Summary

This section includes AU support status recommendations for the next Integrated Report. All AUs evaluated are summarized in Table 8. Section 3.3.1 provides more detailed information.

Table 8. Summary of recommended changes for AUs and pollutants evaluated.

Assessment Unit Name	Assessment Unit Number	Pollutant	Recommended Changes to Next Integrated Report	Justification
Hatwai Creek—1st and 2nd order	ID17060306CL067_02	NO_3+NO_2-N	Retain in Category 4a	Target exceeded; limited data in some segments
		TP	Retain in Category 4a	Target exceeded; limited data in some segments
		E. coli	Retain in Category 4a	Target exceeded
Hatwai Creek—3rd order	ID17060306CL067_03	NO_3+NO_2-N	Retain in Category 4a	Target exceeded; extensive algal growth
		TP	Retain in Category 4a	Target exceeded; extensive algal growth
		E. coli	Retain in Category 4a	Target exceeded

3.3.1 Assessment Units in TMDL That Are Still Impaired

ID17060306CL067_02, Hatwai Creek—1st and 2nd order

- NO_3+NO_2-N, TP, temperature, and *E. coli* are in Category 4a of the Integrated Report because EPA approved TMDLs for these pollutants in 2010.
- In 2018, NO_3+NO_2-N, TP, and *E. coli* concentrations exceeded TMDL targets in this AU. The monitoring methods and results are described in the *Hatwai Creek Water Quality Monitoring Report: 2018* (DEQ 2018).
- The 2018 data were collected from a small headwaters stream segment with low flows not representative of most of 067_02. Data were only collected at this location in the AU due to property access constraints.
- No BURP data are available within this AU.
- NO_3+NO_2-N, TP, and *E. coli* should remain in Category 4a of the Integrated Report because TMDL targets were exceeded and data from additional 067_02 locations are needed.

ID17060306CL067_03, Hatwai Creek—3rd order

- NO_3+NO_2-N, TP, temperature, and *E. coli* are in Category 4a of the 2014 Integrated Report because EPA approved TMDLs for these pollutants in 2010.
- In 2018, NO_3+NO_2-N, TP, and *E. coli* concentrations exceeded TMDL targets in this AU. In addition, extensive filamentous green algal growths were observed near the mouth, and on August 8, 2018, dissolved oxygen percent saturation was briefly less than the 90% required for protection of salmonid spawning. The monitoring methods and results are described in the *Hatwai Creek Water Quality Monitoring Report: 2018* (DEQ 2018).
- BURP data were collected in this AU in 2017, but the results are not yet available.
- NO_3+NO_2-N and TP should remain in Category 4a of the Integrated Report because TMDL targets were exceeded and ecological effects of elevated nutrients and temperatures (i.e., algal growth and a brief period of reduced dissolved oxygen) were observed. *E. coli* should remain in Category 4a of the Integrated Report because TMDL targets were exceeded.

3.4 Beneficial Use Recommendations

In 067_02, secondary contact recreation use remains impaired because *E. coli* concentrations exceed TMDL targets. Cold water aquatic life use remains impaired because NO_3+NO_2-N and TP concentrations exceed TMDL targets in 067_02 and downstream at in 067_03 at the mouth.

In 067_03, secondary contact recreation use remains impaired because *E. coli* concentrations exceed TMDL targets. Cold water aquatic life use also remains impaired because NO_3+NO_2-N and TP concentrations exceed TMDL targets and ecological effects of elevated nutrients and temperatures (i.e., algal growth and a brief period of reduced dissolved oxygen) were observed. When available, 2017 BURP data should also be considered.

4 Review of Implementation Plan and Activities

After the TMDL was finalized, two implementation plans were developed. The Nez Perce Soil and Water Conservation District (NPSWCD) and Hatwai Creek WAG developed the *Hatwai Creek Watershed Total Maximum Daily Load Implementation Plan for Agriculture* (NPSWCD 2012). This plan identified agricultural best management practices (BMPs) for cropland and riparian zones and recommended priorities for BMP implementation. In addition, the *Hatwai Creek Steelhead Habitat Restoration Plan* (NPSWCD 2014) was developed, which identified potential factors limiting steelhead productivity and restoration strategies (Table 9) (NPSWCD 2014).

Table 9. Hatwai Creek steelhead habitat restoration strategies recommended by NPSWCD (2014).

Strategy	Extent
A - Improve Riparian Condition	49 miles riparian restoration
B - Reduce Streambank Erosion	41 miles streambank protection
C - Remove or Retrofit Fish Barriers	1 barrier
D - Improve Watershed Hydrology	Install 40 acres wetland enhancements, 760 acres
E - Reduce Sediment Delivery to Stream from Uplands	11,132 acres upland treatment
F - Reduce Road Related Sediment Delivery to Streams	23.9 miles road improvements
G - Restore Floodplain Access and Reconnect Channel	41 miles
H - Water Withdrawals	17 water withdrawals
I - Protection	1.56 miles of stream protection

4.1 Responsible Parties

Idaho Code §39-3612 states “Total maximum daily load processes shall be used by all designated agencies for achieving water quality standards.” Idaho Code §39-3602(9) identifies designated management agencies, and their responsibilities (Table 10).DEQ relies on designated management agencies and other stakeholders to implement pollution control measures or BMPs for pollutant sources identified as a priority.

Table 10. Designated management agencies and their responsibilities, per Idaho Code §39-3602(9).

Designated Management Agency	Responsibility
Idaho Soil and Water Conservation Commission	Grazing and agriculture activities
Idaho State Department of Agriculture	Aquaculture
Idaho Transportation Department	Public roads
Idaho Department of Lands	Timber harvest, oil and gas exploration, mining
Idaho Department of Environmental Quality	All other activities

Additional stakeholders that can implement water quality improvement projects in the watershed include Nez Perce County, the Nez Perce Soil & Water Conservation District (NPSWCD), Public Health – Idaho North Central District (PH-INCD), and private land owners. NPSWCD provides technical assistance and funding to help growers identify and implement agricultural best management practices. Nez Perce County, PH-INCD, and DEQ all play a role in management of septic systems. Nez Perce County manages land use planning and roads within Nez Perce County areas of the watershed.

4.2 Activities Planned and Implemented

The *Hatwai Creek Watershed Total Maximum Daily Load Implementation Plan for Agriculture* (NPSWCD 2012) and *Hatwai Creek Steelhead Habitat Restoration Plan* (NPSWCD 2014) described best management practices, recommended implementation actions, and implementation priorities.

Since the TMDL was developed, NPSWCD produced documents that used geographic information systems analysis to characterize Hatwai Creek:

- *Hatwai Creek Erosion Assessment Using WEPP (*2014) *http://www.nezperceswcd.org/Portals/2/DynamicDocs/Publications//Hatwai%20Creek%20Erosion%20Assessment%20Using%20WEPP%20-%202014.pdf*
- *Hydrologic Analysis of the Hatwai Creek Watershed, Nez Perce County, Idaho: Level-1 Reconnaissance Report* *http://www.nezperceswcd.org/Portals/2/DynamicDocs/Publications//Hatwai%20Creek%20Hydrologic%20Analysis%20-%202014.pdf*
- Lower Canyon Tributaries Stream Inventory and Assessment (2014) *http://www.nezperceswcd.org/Portals/2/DynamicDocs/Publications//Lower%20Canyon%20Tributaries%20Stream%20Inventory%20and%20Assessment%20-%202014.pdf*

NPSWCD also developed documents focused on Hatwai Creek fisheries:

- *Hatwai Creek Fisheries and Fish Habitat Assessment* (2014) *http://www.nezperceswcd.org/Portals/2/DynamicDocs/Publications//Hatwai%20Creek%20Fisheries%20and%20Fish%20Habitat%20Assessment%20-%202014.pdf*

- *Hatwai Creek Steelhead Habitat Restoration Plan* (2014) *http://www.nezperceswcd.org/Portals/2/DynamicDocs/Publications//Hatwai%20Creek%20Steelhead%20Habitat%20Restoration%20Plan%20-%202014.pdf*

From 2010 to 2018 the Nez Perce Soil and Water Conservation District (NPSWCD) began addressing the limiting factors for steelhead within the Hatwai Creek watershed. During this time, the NPSWCD completed an erosion assessment using WEPP, a stream inventory and assessment, a hydrology assessment, and a fisheries assessment.

In 2014, the NPSWCD applied for an EPA 319 grant throught the Idaho Department of Environmental Quality to address phosphorus and nitrogen pollutants identified in the TMDL agricultural implementation plan as well as fish habitat limitations identified in the steelhead recovery plan. The grant proposed the installation of 800 linear feet of streambank protection, 1,000 linear feet of road improvements, 12 acres of grass seeding, 5 erosion control structures and 1,000 acres of upland nutrient treatments. The project was not funded, so implementation work was not completed. However, should funding become available, many pre-planning activites were completed.

This proposal identified 3 objectives 1) reduce instream sedimentation and associated nutrients from uplands, 2) enhance riparian areas to reduce nutrients and reduce stream temperatures, and 3) reduce road related sediment and nutrient delivery to the stream. Planned efforts are described below and in Figures 4-6.

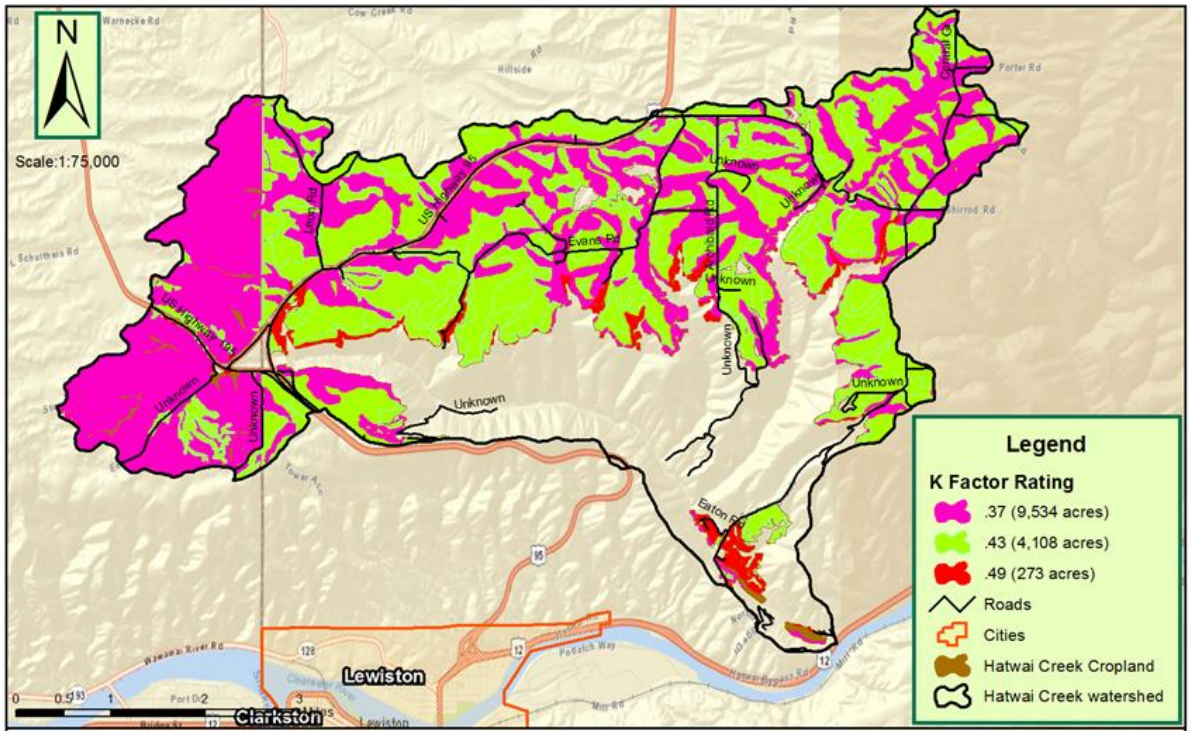

Figure 4. Priority areas to reduce nutrients and sediment from cropland (figure provided by NPSWCD).

Figure 4 was used to prepare the 319 grant proposal in 2014 and identifies geographic areas proposal to address sediment, phosphorus and nutrients in cropland acres with the highest susceptibility for erosion. The green, red and pink areas shown on the map are the priority areas for erosion control projects.

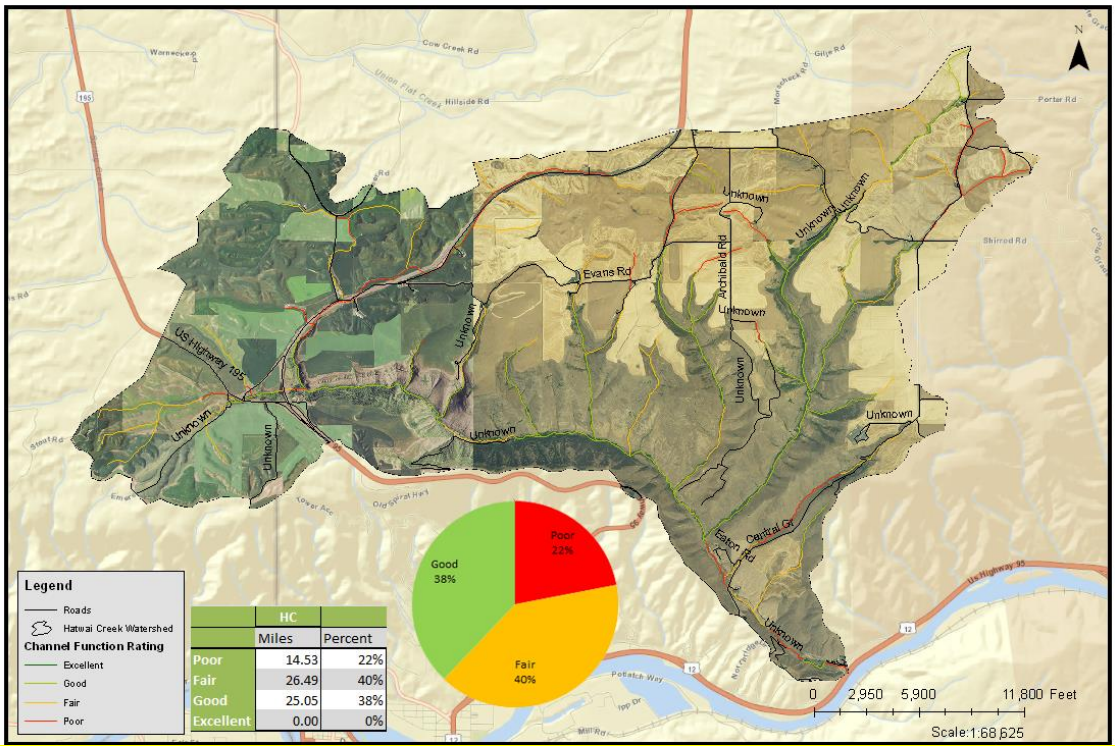

Figure 5. Priority Stream Improvement areas (figure courtesy of NPSWCD).

Figure 5 shows stream segments where NPSWCD planned streambank treatments (red or orange segments). These segments are those that were identified during a stream inventory as eroding at excessive levels, having a lack of riparian vegetation and the highest potential for nutrient delivery to the stream. These reaches are typically confined, have minimal floodplain access, and are actively down cutting or widening. This project proposed to treat 800 linear feet of streambanks within the highest priority cropland areas. Treatments will include a mixture of bioengineering, rock and vegetative practices.

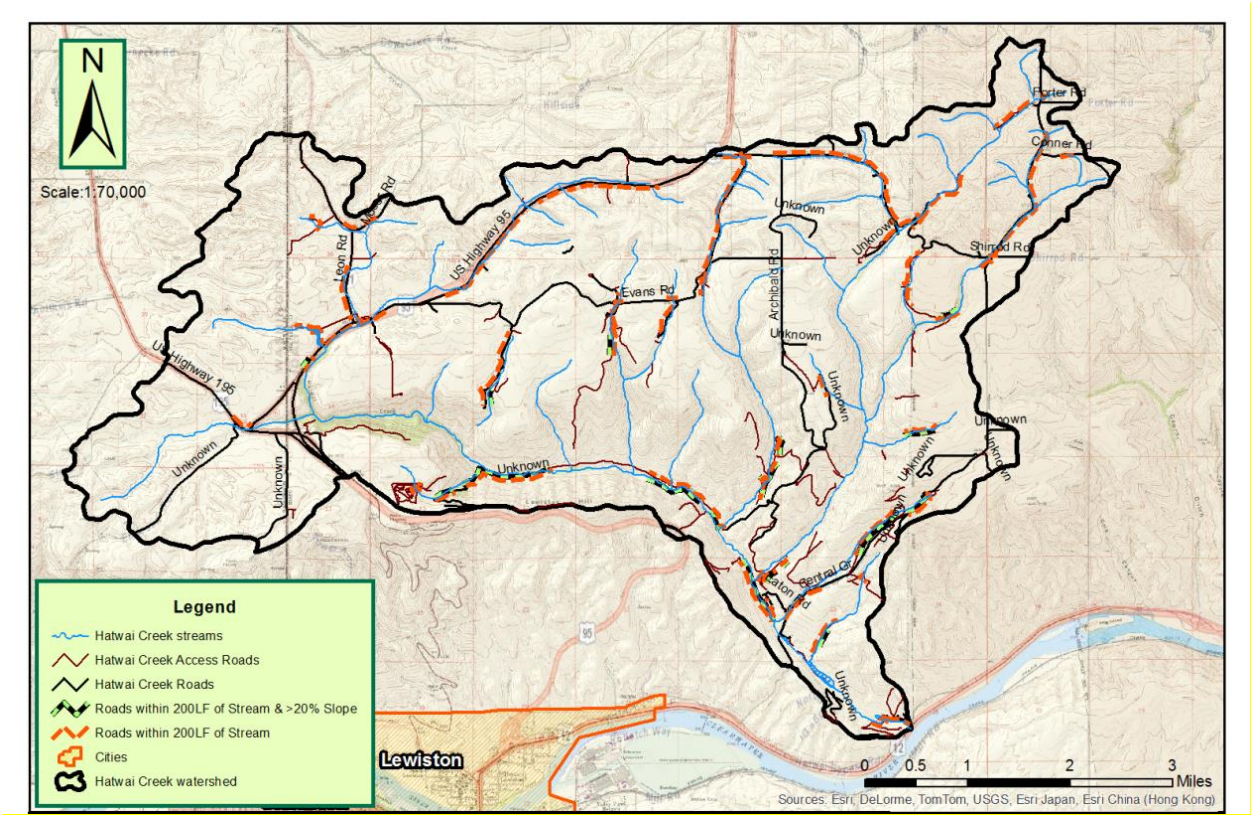

Figure 6. Priority Road Treatment areas (figure provided by NPSWCD).

NPSWCD planned road erosion treatment for road segments within 200 feet of the stream. Road segments identified as being within 200 feet of the stream with slopes exceeding 20% were considered the highest priority. The high priority areas are identified by the green and black dotted lines in Figure 6. Treatment measures include cross drains, culvert replacement, bank shaping and vegetation, improving road surface conditions, road relocation and road obliteration. Over 1000 feet of road was planned for treatment.

As of 2017, the NPSWCD has started planning work on two restoration projects within the watershed focusing on in-stream habitat and riparian restoration. No funds are committed to implementing these projects.

United States Department of Agriculture – Natural Resources Conservation Service

The USDA – Natural Resources Conservation Service has worked with agricultural producers within the Hatwai Creek watershed using the Conservation Security Program and Environmental Quality Incentive Program. These programs are available to agricultural producers who participate in Farm Bill programs. BMPs installed from 2010 to 2018 include tillage management using both mulch till and no-till; nutrient management ranging from basic soil testing to precision agriculture applications;integrated pest management, and vegetative buffers.

4.3 Future Strategy

The Hatwai Creek TMDL stated "permanent monitoring stations for water quality monitoring should be established at the mouth and at the assessment unit boundary" and "beneficial use support status monitoring and assessment will be conducted within each assessment unit" (DEQ 2010). DEQ established a monitoring station at the mouth in 2018, including a stream gauge site that records the water level, stream temperature, and conductivity data every 15 minutes (DEQ 2018). DEQ collected data within both AUs in 2018, but the site in 067_02 was not located at the bottom of the AU as recommended in the TMDL because of private property access constraints. In the future, a monitoring station should be established at a representative perennial reach of 067_02 to better characterize pollutant patterns in this AU.

4.4 Planned Time Frame

The TMDL predicted that reductions in nutrient and bacteria loads may occur within 10 years of TMDL completion, assuming "active implementation and consistent funding" (DEQ 2010). The TMDL also stated "implementation strategies for TMDLs may need to be modified if monitoring shows that the water quality standards are not being met" (DEQ 2010). Nutrient and *E. coli* concentrations greatly exceeded TMDL targets in 2018 and were much higher than those observed in 2006–2007 during TMDL development. It is unlikely water quality standards will be met within 10 years of the TMDL (2020). The Hatwai Creek WAG, designated management agencies, and other stakeholders should revisit the watershed implementation plans, level of effort devoted to implementation, and funding.

5 Conclusion

This 5-year review addresses NO_3+NO_2-N, TP, and *E. coli* TMDLs previously developed for Hatwai Creek (Table 1). In 2018, DEQ collected water quality data in the Hatwai Creek subbasin to evaluate progress towards meeting water quality goals previously defined in the Hatwai Creek TMDLs (DEQ 2010). The 2018 monitoring methods and results are summarized in this review and described in the Hatwai Creek monitoring report (DEQ 2018). In 2018, NO_3+NO_2-N, TP, and *E. coli* concentrations exceeded TMDL targets in both AUs. NO_3+NO_2-N concentrations were much higher in 2018 than in 2006–2007, when data were last collected. Much greater precipitation, stream flow, and ground water nutrient inputs in 2018 are one potential reason for the observed NO_3+NO_2-N increase. Extensive filamentous green algal growths were observed near the mouth and dissolved oxygen percent saturation was briefly less than the 90% value required by Idaho's water quality standards for protection of salmonid spawning. These patterns were likely a symptom of elevated nutrient concentrations and water temperatures. *E. coli* concentrations also exceeded the *E. coli* water quality criterion in both AUs. Water quality goals established in the Hatwai Creek TMDLs have not been met.

Recommended changes to the next Integrated Report are summarized in Table 11.

Table 11. Existing TMDLs and recommendations for the next Integrated Report.

Assessment Unit Name	Assessment Unit Number	Pollutant	Recommended Changes to Next Integrated Report	Justification
Hatwai Creek—1st and 2nd order	ID17060306CL067_02	NO_3+NO_2-N	Retain in Category 4a	Target exceeded; limited data in some segments
		TP	Retain in Category 4a	Target exceeded; limited data in some segments
		E. coli	Retain in Category 4a	Target exceeded
Hatwai Creek—3rd order	ID17060306CL067_03	NO_3+NO_2-N	Retain in Category 4a	Target exceeded; extensive algal growth
		TP	Retain in Category 4a	Target exceeded; extensive algal growth
		E. coli	Retain in Category 4a	Target exceeded

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GIS Coverages

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Appendix A. Hatwai Creek Listing History

- 1989: DEQ included Hatwai Creek in the list of stream segments, lakes, and reservoirs that were assessed as not supporting a beneficial use (Appendix A of *Idaho Water Quality Status Report and Nonpoint Source Assessment 1988*). Hatwai Creek is identified as PNRS #1142.

- 1992: DEQ included Hatwai Creek in the list of impaired stream segments requiring further assessment (Appendix D of *The 1992 Idaho Water Quality Status Report*). Hatwai Creek was identified as PNRS #1142.

- 1994: EPA promulgated Idaho's 1994 §303(d) list under court order. Hatwai Creek was included on the 1994 Idaho §303(d) list as PNRS 1142, "Headwaters to Clearwater River." Hatwai Creek was listed as impaired by nutrients, thermal modifications, habitat alterations, and pathogens.

- 1998: Hatwai Creek was included on Idaho's 1994 §303(d) list as WQLS #3142 for bacteria, habitat alterations, nutrients, and temperature (Figure C1).

- 2002: DEQ began using assessment units for §303(d) and §305(b) reporting. Hatwai Creek was divided into two assessment units, one for 1st- and 2nd-order segments (067_02), and one for the 3rd-order segment (067_03). Although PNRS 1142 included both 2nd- and 3rd-order stream segments, the §303(d) listings were transferred only to 067_02. 067_03 was listed as fully supporting beneficial uses, despite the previous PNRS 1142 and WQLS 3142 listings and failing 1996 and 1998 BURP scores within 067_03. Failure to include 067_03 on the 2002 §303(d) list was likely a mistake.

- 2010: EPA approved Hatwai Creek TMDLs for both 067_02 and 067_03. The TMDL approval letter described ID17060306CL067_02 as a §303(d) listed water and 067_03 as "waterbodies which were not meeting water quality standards for temperature, e-coli bacteria and nutrients, but had not previously been included on Idaho's List." It also stated "EPA understands that these waters would have been included on the List had the State been aware of the impairments at the time the List was completed."

- 2012: DEQ places 067_02 and 067_03 in Category 4a of the Integrated Report, reflecting TMDL approval.

- 2014: both AUs remain in Category 4a of the Integrated Report.

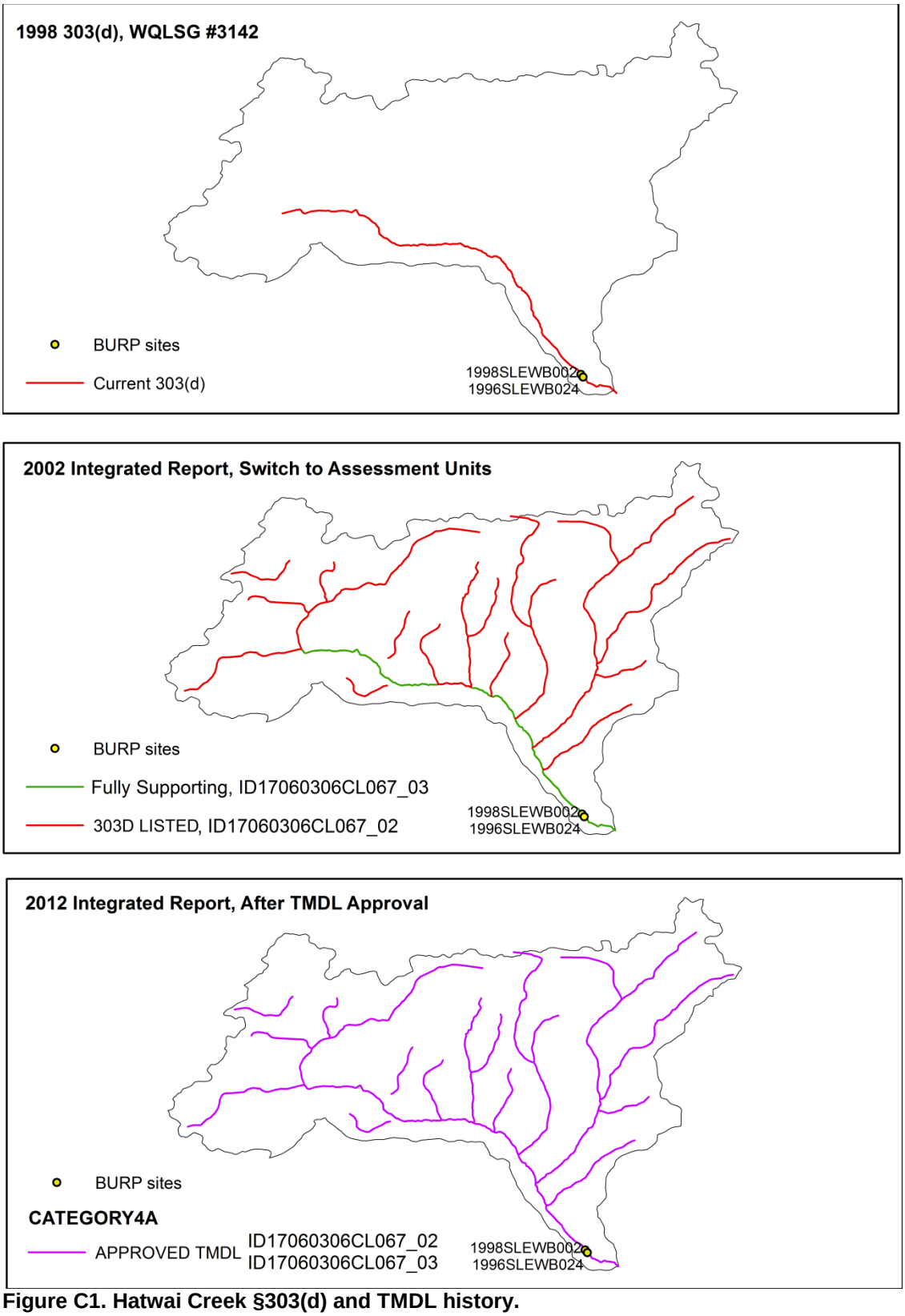

Figure C1. Hatwai Creek §303(d) and TMDL history.

Appendix B. Water Quality Criteria

Table A1. Selected numeric criteria supportive of designated beneficial uses in Idaho's 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	—	—
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
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.

Appendix C. Water Quality Data

DEQ water quality data collected in 2018 are described in the *Hatwai Creek Surface Water Quality Monitoring Report 2018* (DEQ 2018). Water chemistry and flow data are publically available through the *Water Quality Portal*, a national public data repository. To access Hatwai Creek 2018 data, query data using Project ID 'IDEQ LEW HC' or query data spatially. DEQ will also provide project data to interested parties in response to data requests.