FACT SHEET

Reevaluation of Midsnake/Upper Snake-Rock Subbasin TMDL: Data Summary, Evaluation, and Assessment Report

DRAFT

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Background

In the 1990s, concern over the extensive growth of nuisance aquatic plants (e.g., algal mats and macrophytes) in the Middle Snake River resulted in an effort by Idaho DEQ to address the problem through the TMDL process. Water quality studies identified phosphorus as the limiting nutrient. This led to development of a Total Phosphorus (TP) TMDL for the Mid Snake/Upper Snake Rock Subbasin,

From 1997 through 2005, the following TMDL documentation, developed by IDEQ and approved by EPA, established targets and load and wasteload allocations for achieving the targets:

- Middle Snake River Watershed Management Plan, 1997; revised 1998
- Upper Snake-Rock Watershed Management Plan, 1999
- Upper Snake-Rock TMDL Modification, 2005

The TMDL documentation includes the following targets: (1) total phosphorus (TP) in-stream target of 0.075 mg/L at Gridley Bridge; (2) TP instream target of 0.1 mg/L in the tributaries; (3) a 30 percent reduction (on average) of nuisance aquatic plant growths in the Crystal Springs Reach.

IDEQ conducted a five-year review in 2010, which indicated that the TP targets had not been achieved in the mainstem and multiple tributaries during 2000 to 2008. In particular, significant TP concentration reductions had not been achieved in the Crystal Springs Reach. The review also illustrated that flows have been reduced in the most recent decade, suggesting that the ability of the TMDL wasteload allocations to support use attainability should be reassessed. Possible causes of reduced flows are water withdrawals, drought, and climatic patterns (IDEQ 2010).

Purpose

In light of the above circumstances, IDEQ and EPA Region 10 initiated an assessment and evaluation of all existing data to support the consideration of a potential phosphorus TMDL revision. As the first step, the Data Summary, Evaluation, and Assessment Report (the Report) reviews all relevant documents and existing data. EPA, IDEQ, and Idaho Department of Water Resources (IDWR) provided data, technical guidance, and review of this assessment report.

EPA will accept comments on this Report from September 11 through October 11, 2013. The comments will be reviewed by IDEQ, EPA, and Tetra Tech, and incorporated as appropriate.

Watershed Characteristics

The Middle Snake River flows from Milner Dam (RM 638) to the town of King Hill, Idaho (RM 545). This 2,438-square-mile drainage area is designated as US Geological Survey (USGS) hydrologic unit code (HUC) 17040212, referred to as the Upper Snake-Rock Subbasin (Figure 1). The hydrology of the Subbasin reflects a complex network of springs, streams, aqueducts, canals, irrigation drains, lakes, reservoirs, and geothermal sites. The Subbasin has a semiarid climate with low annual rainfall.

Point sources that discharge nutrients to the Middle Snake River include food processors, municipalities (POTWs), and aquaculture facilities. Nonpoint source pollution in the Upper Snake-Rock Subbasin comes from a variety of sources, including concentrated animal feeding operations (CAFOs), irrigated agriculture, improper grazing practices, stream bank erosion, septic systems, construction activities, hydroelectric impoundment/projects, and off-highway vehicles.

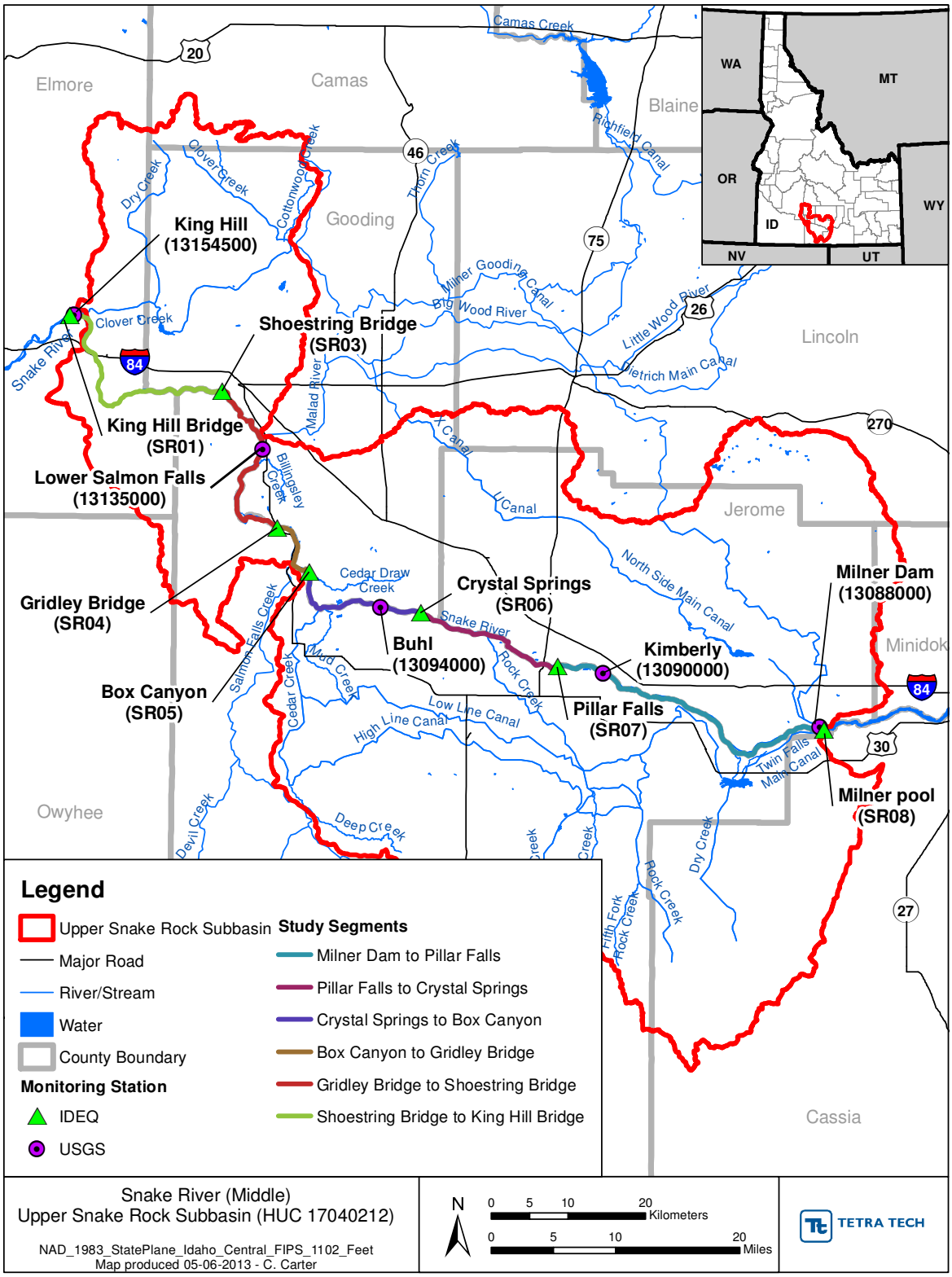

Figure 1. Midsnake/Upper Snake-Rock Subbasin Study Segments.

Report Organization

The Report is organized into the following main sections:

1. **Background:** Provides an overview of the past assessment and TMDL development efforts and describes the purpose of the report.
2. **Setting:** Presents the most current information on general watershed characteristics, climate, soils, land use/ land cover, pollutant sources, and hydrology.
3. **Current TMDL and Allocations:** Documents the current TMDL assumptions and allocations and provides comparison of the TMDL baseline load (1990-1991) to current allocations.
4. **Monitoring Data:** Reviews and evaluates data on flow, instream water quality (phosphorus emphasis), point source discharge water quality, and macrophytes.
5. **Ground Water Modeling:** Describes ongoing efforts to estimate spring discharge to the Middle Snake River, including the most recent version of the Eastern Snake Plain Aquifer Model (ESPAM).
6. **Attenuation:** Defines three types of attenuation (dilution, retention, and removal) and discusses processes by which phosphorus attenuation generally occurs within waterbodies. Reports a flow threshold relevant for the Pacific Northwest that defines where attenuation is most likely to occur in the watershed.
7. **Mass Balance**: Estimates the change in load occurring within each study segment due to inflow occurring within the segment (as opposed to upstream load). Portions of this load were attributed to sources of inflow, using a flow balance analysis.
8. **Assessment Discussion:** Discusses overall findings of the Report.

The Appendices provide additional data comparisons and methods documentation.

Results Summary

The review of the most recent water quality data confirmed that TP concentrations have changed very little since TMDL development and continue to frequently exceed the TP targets, both in the mainstem and along the tributaries. More extreme TP concentrations tend to occur in dry years, indicating that lower flows can lead to higher TP concentrations within the subbasin when less dilution capacity is available. Anecdotal evidence indicates that macrophytes continue to be a problem at Crystal Springs and elsewhere in the Middle Snake River during periods of low flow. While TP concentrations have not changed on average, the report discusses several changes in seasonal and decadal trends occurring at specific monitoring locations.

Available loading data indicated that:

- the large majority of point sources are meeting, on average, their monthly loading targets, and
- TP loads in the mainstem appear to have decreased between the 1990s and 2000s, which may be due to both management and lower flows within the period.
- Some increases in TP loads from gaged tributaries, irrigation return drains, and indirect or direct point source dischargers have occurred within the most recent decade (conclusions from irrigation return drains were inconclusive due to a disparity in sample size between the time periods).

Declines in ground water inflows (both diffuse and from springs) could be influencing the TMDL's ability to achieve designated uses in the Upper Snake-Rock Subbasin despite point sources meeting wasteload allocations. Figure 1 illustrates that recent mean annual flows are well below the 2000 and 2005 TMDL assumptions. Table 1 shows that 2005 TP load allocations for inflow sources likely exceed estimated load capacity based on most recent flow data. Overall, the observed water quality and flow conditions support further investigation of the TMDL assumptions.

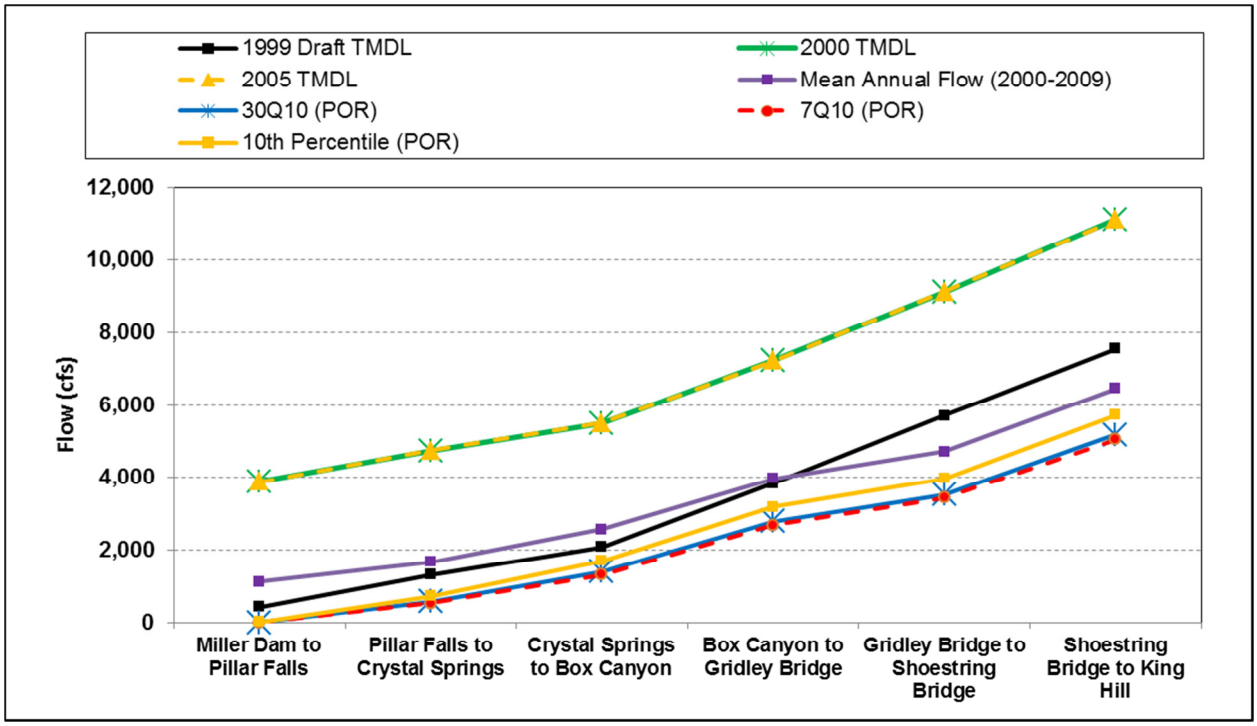

Figure 1. Comparison of TMDL assumptions to 2000-2009 and POR flow statistics.

Table 1. Comparison of Estimated Load Capacity for 2000–2009 Average Annual Inflows to 2005 TMDL Allocations

Study Segment	Average Annual Inflow, 2000–2009 (cfs)[1]	Estimated Load Capacity (lbs/day) for Inflow Only[2]	Total Current (2005) TMDL Allocations (lbs/day) for Inflow Sources[3]
Milner Dam to Pillar Falls	549	222	411
Pillar Falls to Crystal Springs	891	360	2,097
Crystal Springs to Box Canyon	1,403	567	1,819.6
Box Canyon to Gridley Bridge	742	300	1,575
Gridley Bridge to Shoestring Bridge	1,761	712	1,352
Shoestring Bridge to King Hill Bridge	1,228	496	210
Total	**6,574**	**2,658**	**7,464**

[1]From Appendix B, Table 19 of the Report; calculated from flows in Appendix G, Table 28 of the Report. These flows represent all inflow to the main stem within the reach, other than the flow from the upstream study segment. This inflow is the result of base-flow, tributaries, springs, irrigation return drains, indirect point sources, direct point sources, and un-accounted waters.

[2]Average annual inflow multiplied by the 0.075 mg/L TP target, with units conversion.

[3]Total current allocations as reported in Table 5 of the Report (originally from IDEQ, 2010).