Environmental Challenges Facing the Watershed

A. Pollution and pollutants

Both pollution (e.g. alteration of natural water flows) and pollutants (e.g. phosphorus and sediment) degrade water quality in the Middle Snake River. The Snake River is a "managed or working river" in which water flow is manipulated for numerous beneficial uses including flood control, irrigation, power generation, recreation, and aquatic habitat. The entirety of the Snake River water at Milner Dam can be diverted for irrigation agriculture during some months of the year. Reduced streamflow and 5 reservoirs within the Middle Snake River have the potential to effect sediment and nutrient processing. Nutrient processing refers to the biological and physical cycling of nutrients and is often referred to as nutrient spiraling.

In accordance with the Idaho Constitution and the "priority doctrine" water from the river, its tributaries, and from aquifers that feed the river can be appropriated for "beneficial uses". This means water can be physically removed (abstracted) from the river and consumed. At times during irrigation periods, all-of-the water above Milner Dam is completely appropriated. The Idaho State Water Plan and the Idaho Milner Zero Minimum Flow Policy essentially divides the Snake River into two separate rivers by allowing zero flow in the Snake River at Milner Dam during the irrigation season (mid-April to mid-November). Because water flow at Milner Dam can be brought to zero to fulfill upstream beneficial uses, significant water flow reductions occur that impact downstream water quality and achievement of Idaho designated beneficial uses including aesthetics and recreation. Generally, flow alterations can dramatically change ecosystem function and integrity. Known impacts include sediment transport (trapping) and sediment characteristics, water temperature (increase), water residence time, flood frequency, light, availability of dissolved substances, and upstream-downstream connectivity. Elevated water flow impacts aquatic plants can through mechanical damage and uprooting, nutrient and gas exchanges, and competitive interactions. Upstream plants will recolonize downstream weed beds. Low water flows can increase nutrient concentrations and cause sediments to accrue creating legacy issues difficult to mitigate.

Water quality and habitat in the Middle Snake River is degraded because of altered water flows, diversion of water from the river for other uses, and the cumulative impact of nutrient-laden organic and inorganic material from non-point and point sources in the watershed. Occasional drought some of multi-year duration, nutrient inputs from upstream sources, and from the aquifers located on both sides of the river further contribute to water quality concerns. Most notably during summer months, the Middle Snake River may exhibit extensive aquatic vegetation growth that have reached "nuisance" levels.

B. Historic Efforts to Improve Water Quality in the Middle Snake River

There have been substantial efforts over the past 30 years to improve water quality in the Mid Snake River. For example, the Middle Snake Regional Water Resource Commission, comprised of members from Gooding, Jerome, Lincoln, and Minidoka Counties have developed a Coordinated Water Resource Management Plan (CWRMP) for the Middle Snake River.

To date, federal and state agencies have relied primarily on the TMDL requirements of the Clean Water Act to improve water quality in the Middle Snake River. EPA modeling (RBM10) in the early 1990s concluded that plant biomass, rooted macrophytes and epiphytes, would respond to instream total phosphorus nutrient reduction. Modeling indicated excess plant biomass would be reduced by 20-30% following proposed industry total phosphorus reductions restoring recreational beneficial uses.

The Middle Snake River Watershed Advisory Group (WAG) was created in 1995 as an outgrowth of House Bill 1284 ("WAG-BAG Law"). The primary purpose was to provide input to DEQ and EPA in restoring the beneficial uses and water quality standards of the Snake River, Rock Creek and their major tributaries. The Middle Snake River WAG encompasses one major subbasin, the Upper Snake Rock Subbasin. DEQ, with advise from the WAG, developed the Middle Snake River Watershed Management Plan (approved 1997), the Upper Snake Rock Watershed Management Plan (2000), and the Upper Snake Rock TMDL Modification (2005). Ground water is also a concern to the WAG and is included in the TMDLs.

The WAG is comprised of stakeholder industries representing agricultural irrigation, confined animal feeding operations, food processors, aquaculture, municipalities, grazing, water based recreation, environmental interests, and forestry. Currently, the WAG meets monthly (or as needed) to provide input to DEQ and EPA on the 5-year review of the Middle Snake River Subbasin Assessment, TMDL, and Implementation Plan.

Key documents and events resulting from the TMDL process include the following:

- (1998). The Middle Snake River Watershed Management Plan
- (1999). The Upper Snake Rock Watershed Management Plan
- (2000). TMDL Executive Summary Upper Snake/Rock Subbasin TMDL
- (2001). The Upper Snake Rock Implementation Plan 2001
- (2004). Upper Snake Rock TMDL Modification, Part 1
- (2005). Upper Snake Rock TMDL Modification, Part 2
- (2005). Upper Snake Rock TMDL Modification, Part 3
- (2005). Upper Snake Rock TMDL Modification
- (2010). Upper Snake Rock/Middle Snake TMDLs
- (2011). Upper Snake Rock Subbasin TMDL (2000 & 2005) City of Twin Falls TSS Revision
- (2014). Idaho's 2014 Integrated Report
- (2017). Idaho agrees to revise the TMDL to account for different, lower water flows than initially used in designing the initial TMDL.

The initial TMDL process set the following implementation pollutant goals at Gridley Bridge in Hagerman, Idaho:

- Instream Total Phosphorus (TP) – 0.075 mg/L
- Instream Total Suspended Solids (TSS) – 52.0 mg/L
- Instream *Escherichia coli* (E. coli) – 126 CFU Geometric Mean, 406 CFU Instantaneous Maximum

However, attainment is monitored at seven discrete locations in the Middle Snake River (Figure 2, Table 19 from 2010 Update).

C. Water Quality Issues and TMDLs

The Idaho Department of Environmental Quality (IDEQ), in cooperation with the Middle Snake River Watershed Advisory Group, developed a TMDL for the Middle Snake River in 1998. This has been updated and modified through 2011. The last monitoring report was prepared by the IDEQ in 2010. Substantial improvements have been realized through implementation of actions to meet the allocations identified in the TMDL. Specifically, when the Middle Snake River TMDL was first implemented, total suspended solids, total phosphorus, and E. coli were identified as the primary pollutants of concern. After heavy capital improvements by several members of the Coalition, total suspended solids and E. coli have been recommended for removal from the Middle Snake River TMDL. Further, there have been significant reductions in total phosphorus levels throughout the Snake River. Tetra Tech (2014) estimated reductions in total phosphorus at 4 locations within the Middle Snake Reach range from 0.008 – 0.0055 mg/L/year. However, further improvements in the Snake River and tributaries are still necessary to restore all beneficial uses.

Changing flow conditions in the Snake River and its tributaries have raised questions about the adequacy of TMDL load reduction targets to meet instream water quality targets. In addition, there is now improved understanding about the riverine ecosystem complexity, hydrological and biogeochemical processes affecting water quality within the Middle Snake River. Specifically, the potential to control nuisance aquatic growth through phosphorus controls is uncertain. While, past efforts implemented within the framework of the TMDL have been effective, a more expansive effort than relying solely on a TMDL to achieve water quality improvement is necessary to achieve water quality goals. . The Coalition has recognized the complexities related to water quality and is promoting an approach based on the proven successes since the implementation of the TMDL, and knowledge gained over the past decades.

A significant uncertainty related to the current TMDL is the assumption that phosphorus reductions will result in reductions of nuisance macrophytes. The coalition is proposing to look for, and promote, viable flow enhancement efforts and projects that have the potential to limit excessive aquatic macrophyte growth.

1. Load Reduction Goals

In-stream target concentrations for *E. coli*, suspended sediment, and total phosphorus have not changed since the original TMDL in 1998 However, changes in flow conditions, and uncertainties related to the effectiveness of phosphorus concentrations ultimately controlling problematic aquatic macrophytes have resulted in questions regarding the adequacy of existing load allocations in meeting water quality targets. The IDEQ is currently revising the existing TMDL to better account for low water flows in the Middle Snake River during critical times.

The current goal for the instream total phosphorus concentration is set at 0.075 mg/L throughout the Middle Snake River. The goals initially set the location for compliance at Gridley Bridge in Hagerman, Idaho. Due to the action of the Coalition members, total phosphorus concentrations have been reduced from 0.112 mg/L to 0.095 mg/L (as an annual mean?), as measured over a

three-year period from 2013 to 2016 at Gridley Bridge (?). In other reaches, particularly where the Middle Snake River passes King Hill, the outlet to the system, the concentrations have been lowered to 0.062 mg/L (is this still true and is this an annual mean?). It remains unclear whether these reductions have resulted in aquatic macrophyte conditions that are not at nuisance levels.

2. Schedules for Compliance

The original compliance goal, set in the 1998 plan, was to meet required loading levels in five years. However, with numerous modifications, the date has been shifted many times. The Coalition is now partnering with the IDEQ with the primary goal is to continue the improvements and to get the whole reach, and the associated tributaries, in compliance as fast as possible based on the specific complexities of the Middle Snake River and its tributaries.

Applying the Tetra Tech (2014) trends of -0.008 to -0.0055 mg/L/year, if there are no future changes in phosphorus reduction projects or rates, it could take from 4 to 25 years to attain the 0.075 mg/L TMDL target. Obtaining more project funding and implementing the most effective phosphorus reduction projects is required to meet these goals.

D. Coalition Goals and Objectives

Building on the past efforts of the Middle Snake Watershed Advisory Group, the Coalition has engaged a broad spectrum of area land and water users to identify, manage, and increase awareness for water quality issues, projects, and partnerships benefiting the Mid-Snake River and tributary rivers, streams, and creeks. The Coalition's interest is to encourage comprehensive water quality improvement projects and programs that achieve conformance with state water quality standards and the designated beneficial uses.

E. Completed Projects

Since 1998, members of the Coalition have completed over 50 projects to improve water quality in the Middle Snake River and its tributaries. Projects range from wastewater treatment improvements, the creation of treatment wetlands, modification to feed and management practices in fish hatcheries, improved nutrient management by agricultural land-owners, and extensive public education. The results of these projects are seen in the improved water quality in the Middle Snake River and its tributaries.

F. Monitoring of Benefits

IDEQ established monitoring locations in the TMDL process. While they have not updated their monitoring since the 2010 update and report, several Coalition members have continued monitoring and providing the results to IDEQ and the Coalition. Additionally, Coalition members have been monitoring the inflow and outflow water quality and flow rates from specific projects to quantify effectiveness. As part of this master plan, the Coalition is further looking to improve their monitoring to better track the progress of the implementation efforts over time.