

Watershed Watch! Data Report 2016

Watershed Watch! is a one-day water quality monitoring educational event that aims to raise the awareness of citizens about the health of the Boise River watershed. On October 1, 2016, during this ninth annual event, 105 volunteers and 16 trainers participated at eleven sites along the Boise River. Trained professionals led the water testing activities. Volunteers were comprised of individuals, families, elementary, middle and high school students, college students, and Girl Scouts. On September 29, an additional 99 students from Star Elementary participated in a similar sponsored event on the Boise River at Star Road Bridge.

The sites monitored in order from upstream to downstream were: #3 Barber Park, #5 Warm Springs Golf Course, #27 MK Nature Center, #32 Capitol Blvd. Bridge, #7 Ann Morrison Park, #11 Whitewater/ Esther Simplot Park, #16 Glenwood Bridge, #25 Star Road Bridge, #37 Indian Creek (Caldwell), #38 Martin's Landing in Parma, and #40 Snake River at confluence. Additionally, two grab samples were taken at Dixie Slough and the Snake River downstream of the confluence with the Boise River.

During this year's event the Bureau of Reclamation Laboratory analyzed total phosphorus (TP) and total suspended solids (TSS) in addition to *E. coli* concentrations for six sites. The City of Meridian Laboratory analyzed TP, TSS and *E. coli* concentrations for four sites (#25, #37, #38, #40) and the two additional grab samples.

Below is a summary of the parameters recorded or measured on the sampling day by citizen volunteers.



Volunteers sample the physical, chemical and biological health of the Boise River

In-stream Flow

Flows in the Boise River during the sampling event were recorded at United States Geological Survey (USGS) gages. The gage located at the Glenwood Bridge (Sampling Site 16) read 531 cfs (cubic feet per second). A discharge of 6,500 cfs is considered bank full. This sampling period represented low flow conditions.

Temperature

Aquatic animals are sensitive to changes in water temperature and require a certain temperature range to survive. Temperature can be affected by the amount of shade, thermal pollution and runoff. Water temperature of the Boise River measured during the sampling event ranged from 8° - 21° C, which is an acceptable range to support the river's beneficial uses. The highest temperatures, 20.25° C and 21° C were recorded at Warm Springs Golf Course in Boise and at Martin's Landing in Parma, respectively. The beneficial uses of the Boise River mainstem are designated as cold water aquatic life, primary contact recreation, and agricultural water supply, with some segments additionally designated for salmonid spawning and domestic water supply. During this time period, the Boise River sites have an instantaneous maximum daily maximum temperature (MDMT) limit of 22° C and a maximum daily average temperature (MDAT) water quality standard of 19° C (IDAPA 58.01.02.250.02(b)). These become more stringent (13° C for maximum weekly maximum temperature [MWMt]) November 1 – May 30 ((IDAPA 58.01.02.250.02(f)) for Boise River reaches designated for salmonid spawning beneficial uses.

pH

pH is a measurement of the acidic or basic quality of water. Most aquatic organisms prefer a range of 6.5 to 8.0 S.U. pH can be affected by the surrounding geology and pollution sources such as runoff, effluent and acid rain. Reported pH values for the sample locations averaged between 6.25 to 7.6 S.U. Reported pH values are acceptable for the types of aquatic life and beneficial uses associated with each sampled water body. State water quality standards specify that a range of 6.5 to 9.0 must be attained (IDAPA 58.01.02.250.01(a)).

Dissolved Oxygen

Dissolved oxygen is important for aquatic life to survive. Some natural and human-caused changes lower dissolved oxygen levels, such as decomposition of plants (consumption of oxygen by microorganisms), suspended particles which decrease plant photosynthesis, and groundwater infiltration. Additionally, temperature affects saturation levels - cold water holds more dissolved oxygen than warm water. The range of dissolved oxygen values measured during the sampling event ranged from an average of 6.8 mg/L (milligrams per liter) to 11 mg/L. All readings were within an acceptable range. Waters designated for cold water aquatic life are to have dissolved oxygen concentrations above 6.0 mg/L (IDAPA 58.01.02.250.02(a)).

Turbidity



Volunteers sample Turbidity using a Transparency Tube

Turbidity is a measure of the relative clarity of water. Turbid water is caused by small particles called suspended solids, such as clay, silt, organic and inorganic matter, and microscopic organisms. Turbid water may be the result of soil erosion from construction, mining, agriculture, fires, stormwater runoff, phytoplankton and bottom sediment disturbances. State water quality standards prescribe that turbidity in water bodies designated for cold water aquatic life in Idaho should not be greater than 50 NTU (Nephelometric Turbidity Units) above background instantaneously or 25 NTU above background for more than 10 consecutive days (IDAPA 58.01.02.250.02(e)). The turbidity measurements during the sampling event ranged from 0 to 30 NTU, and all sites met standards. Turbidity measurements were taken with transparency tubes and visibility in cm was converted to NTU. Grab

samples were analyzed by two laboratories for TSS (total suspended solids). Data ranged from < 1 - 21 mg/L. The highest values were recorded at Indian Creek (20 mg/L) and the grab sample at Dixie Slough (21 mg/L).

Bacteria – E. coli

Bacteria are present in water from a variety of sources including animal and human feces and soil. Measuring *E. coli* specifically can indicate potential fecal contamination. Mainstem Boise River sites are designated as primary contact recreation areas; therefore state water quality standards indicate that they are not to contain *E. coli* bacteria in concentrations exceeding a geometric mean of 126 *E. coli* organisms per 100 ml. A water sample exceeding the single sample maximum value of 406 *E. coli* organisms per 100 ml indicates likely exceedance of the geometric mean criteria, but is not alone a violation of water quality standards. All samples collected were below this single sample maximum number, ranging from 8 to 228 *E. coli* per 100 mL, with Site #37 Indian Creek yielding the most colony forming units. Even though this had instantaneous values above the state mandated 30-day geometric mean (126/100 ml), it is likely that additional samples collected to analyze the 30-day geometric mean would demonstrate compliance with water quality standards (IDAPA 58.01.02.251.01(b)).

Total phosphorus

Phosphorus is a nutrient that in high concentrations can cause water quality problems like nuisance algae blooms. When the algae die, and bacteria decompose it, oxygen is robbed from the water. This poses a threat to trout and salmon that depend on well oxygenated water to live.

Idaho currently does not have numerical water quality standard for nutrients. The narrative standard says that the waters of the state shall be free from excess nutrients that cause visible slime growths or other nuisance algae growth impairing designated beneficial uses (IDAPA 58.01.02.200.06).

The total phosphorus numbers ranged from <0.017 to 0.042 mg/L in samples between Barber Park to Glenwood Bridge. All downstream samples below Glenwood were at levels < 0.20 mg/L. Further analysis would be needed to determine if these sites met the target level. The Snake River Hells Canyon (SRHC) Total Maximum Daily Limit (TMDL) total phosphorus implementation plan set a target for the Snake River tributaries at ≤ 0.07 mg/L seasonally. While this sampling event was outside of the May-September season, it is a number to watch. Sources of phosphorus include animal and human waste, fertilizer runoff from storm drains and farms, and industries to name a few.

The Idaho Department of Environmental Quality (IDEQ) completed the Lower Boise River TMDL Total Phosphorus Addendum which EPA approved in December 2015. Allocations in the TMDL are designed to achieve two targets: (1) the May 1- September 30 SR HC TP target of ≤ 0.07 mg/L at the mouth of the Boise River and (2) TP targets to achieve a mean monthly benthic chlorophyll a (periphyton) target of ≤ 150 mg/m² in the Lower Boise River (Middleton to the mouth) year –round.

Macroinvertebrates

Aquatic macroinvertebrates are a diverse group of organisms that are large enough to see with the eye and lack a backbone. The presence of a diverse community of macroinvertebrates in a stream is often a more sensitive indicator of water quality than the physical or chemical tests because of their short life cycles, sedimentary life style, and varying tolerance to pollution. Some macroinvertebrates are sensitive to pollution, which means if the waterway was to become polluted they will die or move elsewhere. Other macroinvertebrates are tolerant to pollution, meaning they can survive in polluted water.

This year's sampling used a new biotic index developed by the University of Wisconsin Extension program. Most groups reported a cumulative index value based upon estimated counts of species of macroinvertebrates. The index key stated 2.6 – 3.5 = Good, 2.1 – 2.5 = Fair, 1.0 – 2.0 = Poor. Cumulative index ranged from 1.75 – 3.3 (poor to good). The sites with poor ranges were Site #7 Ann Morrison Park, Site #11 Whitewater/Esther Simplot Park, and Site #38 Martin's Landing Parma. Many factors impact the data, including accuracy and time spent on sampling methods and heavy foot traffic from recreation. We plan to continue the macroinvertebrate sampling at all sites in future years to continue to gain knowledge and track the communities.



Young volunteers are engaged with collecting macroinvertebrates

Invasive Species

The presence or absence of aquatic invasive species was recorded. Participants were specifically looking for New Zealand Mudsnails, Zebra/Quagga Mussels, Asian Clams, Eurasian Watermilfoil, and Purple Loosestrife. Only one site, Indian Creek, reported New Zealand Mudsnails (last year some were found at Glenwood Bridge) and three sites reported Eurasian Watermilfoil (#7 Ann Morrison Park, #37 Indian Creek, and # 40 Snake River). In high concentrations Eurasian Watermilfoil can interfere with recreation, such as boating and swimming, and can crowd out native water plants. In past sampling events Purple Loosestrife had been reported at several sites, but none in the past two years. Most notably, the Asian Clam and possibly Zebra/Quagga Mussels were spotted at Site #40 Snake River. In reviewing the data with the ISDA Invasive Species Coordinator, Asian Clams have been seen in that area, however Zebra/Quagga Mussels have not. In examining the mussel found, the Invasive Species Coordinator concluded it was not a Zebra/Quagga Mussel. This demonstrates the importance of verifying citizen-collected data with local expertise.

Summary

Watershed Watch! continues to be a success in its ninth year. 121 individuals sampled eleven locations on the mainstem Boise River and Indian Creek stretching from Barber Park in Boise to the Snake River.

All sites met state numeric water quality standards for temperature, dissolved oxygen, pH, turbidity, and *E. coli* bacteria. Total suspended sediment concentrations were below TMDL targets. Total phosphorus concentrations measured from Barber Park to Glenwood Bridge were below the May – September target set for the mouth of the Boise River May – September. Total phosphorus concentrations at sites collected downstream of Glenwood were less than the laboratory MDL of 0.2 mg/L. Macroinvertebrate sampling results indicated poor to good conditions. The macroinvertebrates will continue to be sampled each year to give a more accurate bioassessment of the reach that was sampled. New Zealand Mudsnails were found at Indian Creek, and Eurasian Watermilfoil was again found at the Indian Creek site, as well as Ann Morrison Park and Snake River sites. Its presence will continue to be tracked in future years. Asian Clams were present at the Snake River site.

This year's data will be entered into ARC GIS Collector thanks to the support of the College of Western Idaho and the NSF EPSCoR grant. The map and associated data will be viewable on the web site: www.BoiseWatershedWatch.org

Thank you to this year's sponsors which made the event possible:

