

Watershed Watch! Data Report 2015

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 10, 2015, during this eighth annual event, 142 volunteers participated at twelve sites along the Boise River. Trained professionals led the water testing activities. Volunteers were comprised of individuals, families, elementary, middle and high school groups, college groups, and Scouts.

The sites monitored in order from upstream to downstream were: #1 Discovery Park/Lucky Peak, #3 Barber Park, #5 Warm Springs Golf Course, #27 MK Nature Center, #31 BSU Footbridge, #32 Capitol Blvd. Bridge, #7 Ann Morrison Park, #11 Whitewater/ Esther Simplot Park, #16 Glenwood Bridge, #25 Star Road Bridge, #36 Whittenberger Park (Caldwell) and #37 Indian Creek (Caldwell).

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 the majority of the sites. The City of Meridian Laboratory analyzed TP, TSS and *E. coli* concentrations for two sites (#25 and #37).



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

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

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 353 cfs (cubic feet per second). A discharge of 6,500 cfs is considered bank full. This sampling period represented low flow (or base 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 14° - 18.3° C, which is an acceptable range to support the river's beneficial uses. The highest temperatures, 18.3° C and 18°C were recorded at Indian Creek in Caldwell and at Glenwood Bridge, 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) November 1 – May 30 ((IDAPA 58.01.02.250.02(f))

pH

pH is a measurement of the basic or 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 effluent and acid rain. Reported pH values for the sample locations averaged between 6.8 to 8.0 S.U. The Whittenberger Park site was the most alkaline at 8.0. 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)).



Volunteers sample Dissolved Oxygen using a CHEMETS kit

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 6.5 mg/L (milligrams per liter) to 11 mg/L. All readings

were within an acceptable range, although the Discovery Park/Lucky Peak site yielded the lowest concentration at 6.5 mg/L. 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

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 < 5 to 40 NTU, and all sites met standards. The TSS (total suspended solids) data did not indicate problem areas at most sites (4-7 mg/L for TSS). However, there were four readings higher than that range: Site #1 Discovery Park was 23 mg/L; Site #7 Ann Morrison Park was 27 mg/L; Site #37 Indian Creek with 20 mg/L TSS; and Site #36 Whittenberger Park with 30 mg/L. Turbidity measurements were taken with a new method this year using transparency tubes and a conversion chart to calculate NTU.

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 <4 to 400 *E. coli* per 100 mL, with Site #7 Ann Morrison Park 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 dies, 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 <0.01 to 0.43 mg/L, the highest was at Site #37 Indian Creek (0.43 mg/L) and Site #25 Star Road Bridge (0.22 mg/L). 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, and not at the mouth of the Boise River, 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 Star Road Bridge site is below the City of Boise wastewater treatment plants which contribute phosphorus. New federal NPDES permits require the City to substantially decrease the amount of total phosphorus discharged as the treatment plants are upgraded over the next ten years.

The Idaho Department of Environmental Quality (IDEQ) completed, and submitted to EPA for approval, the Lower Boise River total phosphorus TMDL. Allocations in the TMDL are designed to achieve two targets: (1) the May 1- September 30 SRHC TP target of ≤ 0.07 mg/L at the mouth of the Boise River and (2) TP targets to achieve the 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



Young volunteers are engaged with collecting macroinvertebrates

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.

Most groups reported a cumulative index value based upon estimated counts of species of macroinvertebrates. The index key stated >22 = excellent, 17-22 = Good, 11-16 = Fair, < 11 = Poor. Cumulative index ranged from 6 - 36 (poor to excellent). The sites with poor ranges were Site #1 Discovery Park, Site #7 Ann Morrison Park, and Site #11 Whitewater/Esther Simplot Park. An excellent range was found at Site #27 MK Nature Center. There were no trends in this data compared to previous years. Many factors impact the data, including accuracy and time spent on sampling methods and heavy foot traffic. We plan to continue the macroinvertebrate sampling at all sites in future years to continue to gain knowledge and track the communities.

Invasive Species

The presence or absence of aquatic invasive species was recorded. Participants were specifically looking for New Zealand Mudsnaileds, Zebra/Quagga Mussels, Eurasian Watermilfoil, and Purple Loosestrife. Only one site, Glenwood Bridge, reported New Zealand Mudsnaileds (same as last year) and three sites reported Eurasian Watermilfoil (#3 Barber Park, #36 Whittenberger Park and #37 Indian Creek). 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 this year. There have been no reports of Zebra/Quagga Mussels during any sampling events.

Summary

Watershed Watch! continues to be a success in its eighth year. 142 individuals sampled twelve locations on the mainstem Boise River and Indian Creek stretching from Discovery Park/Lucky Peak to Whittenberger Park in Caldwell.

All sites met state numeric water quality standards for temperature, dissolved oxygen, pH, turbidity, and *E. coli* bacteria, although *E. coli* was high at Ann Morrison Park. Total Phosphorus was high at two sites (Indian Creek and Star Road Bridge). All mainstem sites sampled met the narrative standard for excess nutrients in that no visible slime growths were observed. Macroinvertebrate sampling results indicated poor to excellent conditions. The macroinvertebrates will continue to be sampled each year to give a more accurate bioassessment of the reach that was sampled. New Zealand Mudsnaileds were found at Glenwood Bridge, and Eurasian Watermilfoil was again found at the Barber Park site, as well as the Whittenberger Park site and Indian Creek. Its presence will continue to be tracked in future years.

This year's data was 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 can be viewed at : <http://arcg.is/1OJvLJf>

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

