

## Watershed Watch! Data Report 2017

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 September 30, 2017, during this tenth annual event, 185 volunteers and 17 trainers participated at fourteen 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 from BSU, CWI and College of Idaho, 4H and Girl Scouts.

The sites monitored in order from upstream to downstream were: #3 Barber Park, #5 Warm Springs Golf Course, #27 MK Nature Center, #31 BSU Friendship Bridge, #32 Capitol Blvd. Bridge, #7 Ann Morrison Park, #11 Garden City, #16 Glenwood Bridge, #35 Eagle Bardenay, #29 Linder Road, #25 Star Road Bridge, #37 Indian Creek (Caldwell), #38A Martin's Landing in Parma on the Boise River, #38B Martin's Landing on the Snake River. Additionally, three grab samples were taken at Site #44 Parma just below Dixie Slough, Site #42 Middleton and Site #40 Nyssa on 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 the eight sites upstream of Glenwood Bridge. The City of Meridian Laboratory analyzed TP, TSS and *E. coli* concentrations for the nine downstream sites and grab samples.



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 530 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 15° - 22° C, which is an acceptable range to support the river's beneficial uses. The highest temperature of an averaged 22.33° C was recorded at Site # 37 Indian Creek. 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 7 to 8 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)).



Volunteers test for Dissolved Oxygen

### **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. 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)). Turbidity measurements were taken with transparency tubes and visibility in cm was converted to NTU. The turbidity measurements during the sampling event ranged from 60 – 13.7 cm, equivalent to <10 to 90 NTU. Grab samples were analyzed by two laboratories for TSS (total suspended solids). Data ranged from 2 - 58 mg/L. The highest value was recorded at Site #7 Ann Morrison Park (58 mg/L). Additionally, the turbidity levels were reported high (90 NTU) at Site #38B Martin’s Landing, but TSS data was in normal range (9 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 14 to 192 *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 <0.015 to 0.284 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  $\leq 0.07$  mg/L seasonally. While this sampling event was outside of the May-September season, it is a number to watch. Three sites were found to have levels >0.07 mg/L: Site #37 Indian Creek (0.284 mg/L), Site #38A Martin's Landing on the Boise River (0.163 mg/L) and grab sample #44 Parma below Dixie Slough (0.179 mg/L). 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  $\leq 0.07$  mg/L at the mouth of the Boise River and (2) TP targets to achieve a mean monthly benthic chlorophyll a (periphyton) target of  $\leq 150$  mg/m<sup>2</sup> 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, sedentary 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 the 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 1.67 – 3.2 (poor to good). The sites with poor ranges were Site #37 Indian Creek and Sites #38A & B 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.

**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 Eurasian Watermilfoil, although it was not confirmed by the ISDA Invasive Species Coordinator. In high concentrations Eurasian Watermilfoil can interfere with recreation, such as boating and swimming, and can crowd out native water plants. Additionally, Site #32 Capitol Boulevard Bridge reported Purple Loosestrife. In previous years, New Zealand Mudsnails were found, but none were noted during this year’s sampling event. Data is shared with the ISDA Invasive Species Coordinator.

**Summary**

Watershed Watch! continues to be a success in its tenth year. 202 individuals sampled fourteen locations on the mainstem Boise River and Indian Creek stretching from Barber Park in Boise to the Snake River.

<b>Parameter</b>	<b>Met Water Quality Standards</b>	<b>Not Optimal</b>
Temperature	All sites	
pH	All sites	
Dissolved Oxygen	All sites	
Turbidity	All sites except #38B	Site #38B Martin’s Landing Snake River
E. coli	All sites except #37	Site # 37 Indian Creek

Total Phosphorus	All sites except #37, #38A & #44	Site #37 Indian Creek, Site #38A Martin's Landing Boise River, Grab Sample #44 Parma
Macroinvertebrates	No standards	FAIR ratings at Site #37 Indian Creek, Site #38A Martin's Landing Boise River Site #38B Martin's Landing Snake River
Invasive Species	No standards	Eurasian Watermilfoil at Site #37 Indian Creek Purple Loosestrife at Site #32 Capitol Blvd. Bridge

All sites met state numeric water quality standards for temperature, dissolved oxygen, and pH. All turbidity levels were within acceptable range, with the exception of Site #38B Martin's Landing, but TSS data was in normal range (9 mg/L). E. coli values were within acceptable range except Site #37 Indian Creek. Even though this had instantaneous values above the state mandated 30-day geometric mean, it is likely that additional samples collected would demonstrate compliance with water quality standards. Total phosphorus concentrations were low with the exception of three sites: Site #37 Indian Creek (0.284 mg/L), Site #38A Martin's Landing on the Boise River (0.163 mg/L) and grab sample #44 Parma below Dixie Slough (0.179 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. Only two sites reported aquatic invasive plants: Eurasian Watermilfoil at Site #37 Indian Creek and Purple Loosestrife at Site #32 Capitol Boulevard Bridge.

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 data can be viewed in the attached PowerPoint. Additionally, data has been entered into the IDAH2O Master Water Stewards on-line interactive map of citizen water quality data. This final report will be viewable on the web site: [www.BoiseWatershedWatch.org](http://www.BoiseWatershedWatch.org)

Attached you'll find Appendix A, a summary spreadsheet of 2017 data.

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

