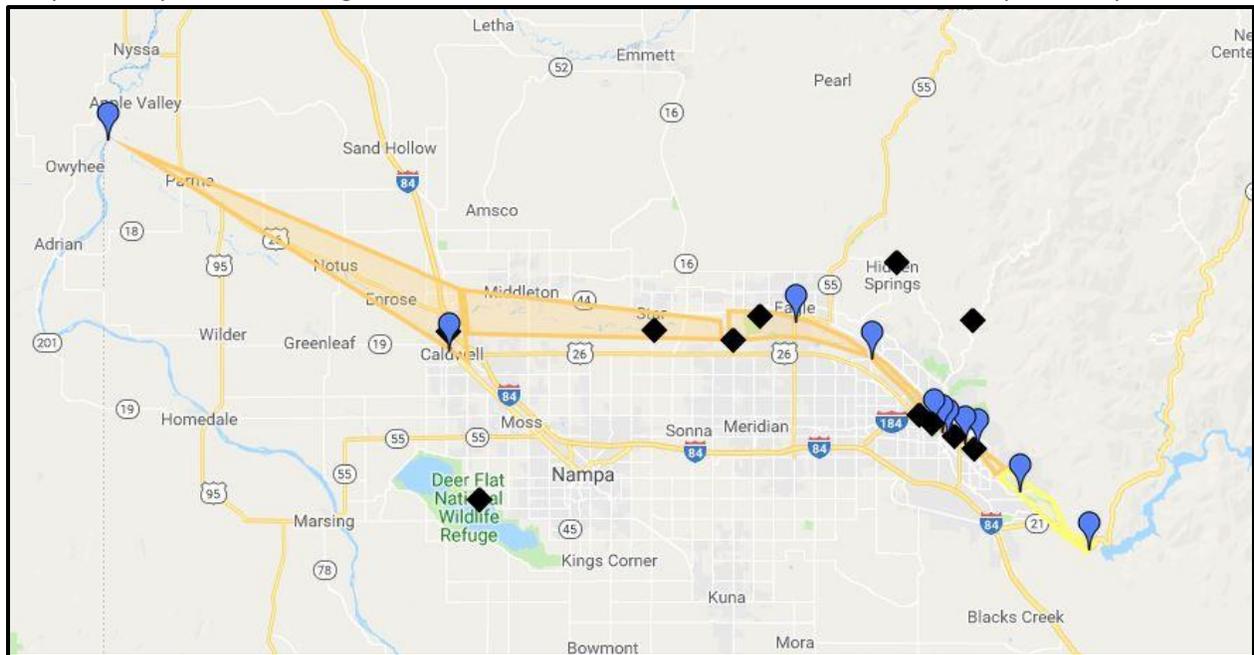


## Watershed Watch! Data Report 2018

Watershed Watch! is a one-day water quality monitoring educational event that aims to raise the awareness of citizens about the health of the lower Boise River watershed. On September 29, 2018, during this eleventh annual event, 177 volunteers and 18 trainers participated at twelve sites along the lower Boise River, Indian Creek and the Snake River. Experienced trainers along with volunteers collected important water quality, habitat and biological data. Enthusiastic individuals, families, elementary, middle and high school students, and college students from BSU and CWI were among this year's volunteers.

The sites monitored from upstream to downstream were: Discovery Park (1), Barber Park (3), Warm Springs Golf Course (5), MK Nature Center (27), BSU Friendship Bridge (31), Capitol Blvd. Bridge (32), Ann Morrison Park (7), Glenwood Bridge (16), Eagle Bardenay (35), Indian Creek in Caldwell (37), Martin's Landing in Parma on the Boise River (38A), Martin's Landing on the Snake River (38B). Four grab water quality samples were collected from Whittenberger Park in Caldwell (36), Middleton (42), Dixie Access at Parma (43), and Hwy 95 at Parma just below Dixie Drain on the Boise River (44). See blue drops on map for monitoring locations. Black diamonds indicate sites monitored in previous years.



Total phosphorus (TP), total suspended solids (TSS), and *Escherichia coli* (*E. Coli*) Bacteria samples collected from 8 sites upstream of Glenwood Bridge were analyzed at the Bureau of Reclamation Water Quality Laboratory on Garrison Road in Boise, Idaho. Three samples collected downstream of Glenwood Bridge, and grab samples were analyzed for the same constituents at the City of Meridian Wastewater Laboratory on Ten Mile Road in Meridian.

A description of river observations and water quality samples measured at each site are described below.



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

### In-stream Flow

Discharge (flow) in the lower Boise River was measured at the United States Geological Survey (USGS) Glenwood Bridge streamgauge (13206000) just downstream of the Glenwood sampling site. The daily average discharge measured on September 29, 2018 was 566 cfs (cubic feet per second). The highest monthly discharge measured at this site for September was 1,183 cfs in 1984. Long term statistics for this gage can be found at URL:

[https://waterdata.usgs.gov/usa/nwis/uv?site\\_no=13206000](https://waterdata.usgs.gov/usa/nwis/uv?site_no=13206000)

### Temperature

Aquatic species are sensitive to changes in water temperature and require an optimum range to survive. Temperature can be affected by the amount of shade and warmer input from runoff. Beneficial uses of the mainstem lower Boise River are support of cold water aquatic life with sections above Eagle Island designated for salmonid spawning, primary contact recreation, and agricultural and domestic water supply. Idaho state water quality standards state that the lower Boise River should not exceed an instantaneous maximum daily maximum temperature (MDMT) 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 for Boise River reaches designated for salmonid spawning beneficial uses (IDAPA 58.01.02.250.02(f)). Instantaneous water temperatures at the sampling sites were between 14.7° - 19° C. The highest temperature of 19° C was recorded at Martin's Landing near Parma on the Boise River. All instantaneous measurements during Water Watch did not exceed water quality standards.

### pH

Hydrogen-ion activity or pH is a measurement of the acidic or basic quality of water. Freshwater aquatic organisms prefer water with a pH between 6.5 and 8.0. State water quality standards specify that a range of 6.5 to 9.0 must be maintained to support aquatic life (IDAPA 58.01.02.250.01(a)). Sources that determine the level of pH in freshwater can be surrounding geology, pollution sources such as street runoff, wastewater effluent, and atmospheric sources such as acid rain. The sampling sites had an average pH between 7 and 8, values acceptable to support the aquatic life.

## **Dissolved Oxygen**

Dissolved oxygen in freshwater systems is necessary to support aquatic life. Some natural and human-caused changes can lower dissolved oxygen levels, such as decomposition of plants (consumption of oxygen by microorganisms), suspended particles (turbidity) which decrease plant photosynthesis, and groundwater sources that have minimal oxygen. Temperature can affect oxygen saturation in freshwater with cold water able to hold more oxygen ions than warm water. Idaho waters designated to support cold water aquatic life should maintain dissolved oxygen concentrations above 6.0 mg/L (IDAPA 58.01.02.250.02(a)). The dissolved oxygen values measured at the sampling sites ranged from 6.3 mg/L (milligrams per liter) to 11 mg/L, within the range to support a healthy aquatic community.

## **Turbidity**

Turbidity is a measure of the relative clarity of water. Turbid water is caused by suspended particles and measured as total suspended solids or TSS. These particles can include clay, silt, organic and inorganic matter, and microscopic organisms. Turbidity in rivers can be elevated by runoff from soil erosion due to construction, mining, agriculture, fires, storm water, and phytoplankton and bottom sediment disturbances. Idaho water quality standards require a turbidity level no greater than 50 NTU (Nephelometric Turbidity Units) above background or 25 NTU over a 10-day period to ensure support of cold water aquatic life (IDAPA 58.01.02.250.02(e)). The turbidity measurements at the sampling locations were taken with transparency tubes that measure water clarity in centimeters. These values were converted to NTU and were between < 5 and 40 NTU. In addition, grab samples were analyzed at the Bureau of Reclamation and Meridian water quality laboratories for TSS. The State of Idaho has a durational target of 50 mg/L TSS for no more than 60 days or 80 mg/L for no more than 14 days (IDEQ, 1999). Although this sampling data cannot be directly compared to target levels, the one-day sampling event did measure TSS within the levels to support aquatic life, between 2 and 28 mg/L, with the highest value measured at the Indian Creek.



Volunteers used transparency tubes to assess clarity of the water.

## **Escherichia coli (E. Coli) Bacteria**

There is a variety of sources of bacteria in the lower Boise River that include runoff or direct contact with animal and human feces from water and soil. *E.coli* is a gut bacteria that can indicate potential fecal contamination. The mainstem lower Boise River is designated for primary contact recreation. Idaho water quality standards state that *E. coli* bacteria are not to contain a single sample of 406 organisms or colony forming units (CFU) per 100 mL or a geometric mean of 126 CFU/100 mL based on at least 5 samples taken within 3 to 5 days in a 30-day period (IDAPA 58.01.02.251.01(b)) to protect public health. A water sample exceeding the single sample maximum value of 406 organisms per 100 ml indicates likely exceedance of the geometric mean criteria but is not alone a violation of water quality standards.

Samples collected contained *E. coli* concentrations between 2 to 344 organisms per 100 mL and were below this single sample standard. The highest *E. coli* values was found at Hwy 95 Parma just below Dixie Drain on the Boise River.

### Total phosphorus



Volunteers interpret and discuss data

Phosphorus is a nutrient that in high concentrations has the potential to cause nuisance plant growth such as freshwater algae. The issues associated with nuisance algae can be to lower dissolved oxygen levels as algal cells die. This could threaten the ability of the river to support aquatic life.

Idaho standards have narrative criteria that the state's rivers 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 Idaho Department of Environmental Quality (IDEQ) completed the

Lower Boise River Total Maximum Daily Load (TMDL) for total phosphorus (TP) in an addendum that was approved by EPA in December 2015. The TP limit is based on meeting downstream Snake River Hells Canyon (SR-HC) TP seasonal (May – September) TMDL target of 0.07 mg/L at the mouth. 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. The lower Boise River samples were between  $<0.019$  and 0.311 mg/L. While this sampling event was outside of the May-September season, there were 5 sites with TP values greater than 0.07 mg/L target. The sites with higher TP concentrations are Indian Creek (0.311 mg/L), Martin's Landing on the Boise River (0.148 mg/L) and grab samples from Whittenberger Park (0.109 mg/L), Dixie Access (0.128 mg/L), and Parma below Dixie Drain (0.14 mg/L).

### Macroinvertebrates

Aquatic macroinvertebrates are a diverse group of organisms that are the primary food source for fish living in the lower Boise River. These organisms are also a good indicator of water quality because they are sedentary and can be continuously exposed to pollutants over time. They are easy to see, identify and count. The more diverse a community and the presence of species that are sensitive to pollution usually indicates better water and habitat quality.



Volunteers are engaged with collecting macroinvertebrates

Tools have been developed to assess macroinvertebrate communities. A tool that was developed by the University of Wisconsin Extension Program was used to assess macroinvertebrates in the lower Boise River. This tool divides certain macroinvertebrate orders or families into groups using an index key. The index key values range between good (2.6 – 3.5), fair (2.1 – 2.5), and poor (1.0 – 2.0). The lower Boise River sites had index values between 1.25 and 3.1 (poor to good). The sites with poor values were the upstream site below Lucky Peak dam at Discovery Park, a site with of human disturbance near Ann Morrison Park, an agriculture/industrial drainage site at Indian Creek, and at the mouth of the Boise River at Martin’s Landing near Parma. Overall the diversity in the lower Boise is low due to regulated flow from upstream dams compared to unaltered rivers in Idaho. Despite the lower macroinvertebrate diversity, the lower Boise River maintains species that are intolerant to pollution at the upstream sites and populations that support a valuable freshwater fishery.



Surveying for native mussels

### Invasive Species

The presence of invasive plant and animal species can also alter the health of the aquatic communities in the lower Boise River. Site physical surveys included visual observation to search for invasive species such as New Zealand Mudsnails, Zebra/Quagga Mussels, Asian Clams, Parrotfeather Watermilfoil, Eurasian Watermilfoil, Flowering Rush, and Common Reed/Phragmites. New Zealand Mudsnails were found at Glenwood Bridge and Indian Creek where they have been found in the past. Asian Clam and Eurasian Watermilfoil were also found in Indian Creek but this finding has not yet been confirmed by the Idaho State

Department of Agriculture (ISDA) Invasive Species Coordinator. Parrotfeather Milfoil, Eurasian Watermilfoil, and Common Reeds were found near the mouth of the Boise River at Martin’s Landing.

### **Native mussels**

This was the first year that a visual survey was attempted in the lower Boise River to look for native mussels. Limited areas were surveyed using clear bottom totes. It is unknown if freshwater mussels occur in the lower Boise River. These surveys found no mussels at the sampling locations.

### Summary

Watershed Watch! continues to be a success in its eleventh year. 177 individuals sampled twelve locations on the mainstem lower Boise River, Indian Creek and the Snake River. All sites met state numeric water quality standards for temperature, dissolved oxygen, turbidity, TSS, pH and *E. coli*. Total phosphorus concentrations were low, with the exception of five downstream sites. Macroinvertebrate results indicated poor conditions at impacted sites with aquatic invasive species found at only three sites.

Parameter	Met Water Quality Standards	Not Optimal
Temperature	All sites	
pH	All sites	
Dissolved Oxygen	All sites	
Turbidity	All sites	
E. coli	All sites	
Total Phosphorus	All sites except #36, #37, #38A, #43 & #44	Grab Sample Site #36 Whittenberger Park Site #37 Indian Creek, Site #38A Martin's Landing Boise River, Grab Sample #43 Parma at Dixie Drain Grab Sample #44 Parma below Dixie Drain
Macroinvertebrates	No standards	Poor ratings at Site #1 Discovery Park, Site #7 Ann Morrison Park, Site #37 Indian Creek, Site #38A Martin's Landing Boise River
Invasive Species	No standards	Site #37 Indian Creek: Eurasian Watermilfoil, Asian Clam, and New Zealand Mudsnails. Site #16: New Zealand Mudsnails, Site #38A Martin's Landing on the Boise River: Parrotfeather Milfoil, Eurasian Watermilfoil, and Common Reeds.

Watershed Watch! data continues to be a valuable source of information on the quality of the lower Boise River and provides for public education on this area's most valuable resource. This year's data is also available at 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 2018 data.

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

