

Appendix E. Water Quality

Appendix 5. Water Quality Sampling of Wild & Scenic River Segments

Water quality samples were collected along designated Wild & Scenic River segments during low flow and high flow periods to form baseline water quality data against which subsequent Wild & Scenic River monitoring could be evaluated, as required by the Wild and Scenic Rivers Act of 1968. The following parameters were selected for sampling based on research conducted on the Selway and Middle Fork of the Salmon Rivers by the Idaho Department of Environmental Quality (IDEQ), and consistent with guidelines developed by the Interagency Wild and Scenic Rivers Coordinating Council:

- **Conductivity:** Measures the ability of water to pass an electrical current, which indicates the presence of inorganic dissolved solids in water, such as chloride, nitrate, sulfate, and phosphate anions (negative ions) or sodium, magnesium, calcium, iron, and aluminum cations (positive ions). Conductivity is measured in micromhos per centimeter ($\mu\text{mhos/cm}$) or microsiemens per centimeter ($\mu\text{S/cm}$).
- **pH:** The measure of acidity or alkalinity, with 7.0 being neutral. Measures above 7.0 are increasingly basic (alkaline), and measures below 7.0 are increasingly acidic. Optimum values should be within the range of 6.5 to 9.0.
- **Dissolved Oxygen:** The measure of the amount of oxygen dissolved in the water, usually expressed in milligrams per liter (mg/L). Measurements should exceed 6 mg/L at all times for aquatic systems.
- **Ammonia + Nitrate + Nitrite:** Ammonia in most waters is a product of the biological degradation of nitrogenous organic matter. Nitrate is formed from the complete oxidation of ammonium by certain micro-organisms in which nitrite is an intermediate product.
- **Total Phosphorus:** Phosphorus is an essential nutrient for plant and animal development. However, too much of the nutrient can cause accelerated plant growth, algae blooms, and increase the amount of material available for decomposition (which lowers dissolved oxygen). An acceptable range for total phosphorus is 10 $\mu\text{g/L}$ to 40 $\mu\text{g/L}$.
- **Total Suspended Solids (TSS):** The measure (mg/L) of undissolved organic and inorganic matter suspended in surface water. TSS can be measured by the level of conductivity (see above).
- **Turbidity:** A measure of the clarity of water; how much the suspended material absorbs and/or scatters light rays - usually determined by measuring light diffraction [reported in Nephelometric Turbidity Units (NTU)]. Materials that increase turbidity (reduce clarity) are suspended clay, silt, sand, algae, plankton, microbes, and other substances.

- **Temperature:** The degrees, in Centigrade and/or Fahrenheit, of the water column in a stream. Aquatic systems require water temperatures of 22°C or less with a maximum daily average of no greater than 19°C. Waters supporting salmonid spawning require temperatures of 13°C or less, with a maximum daily average no greater than 9°C.

Protocol for collecting low flow water quality data and samples:

- Bring water kit from lab with sealed containers.
- Take water sample upstream of disturbances (i.e., road, bridge, trail crossing, etc.) in a location that is representative of the sampled stream segment.
- Place container into the water column near the middle of the stream, ensuring you are standing downstream of the sample. Do not collect sample from a pool or slow moving water.
- Record water temperature and observations of turbidity (clarity) of water, as well as stream segment name in the field using a Trimble Juno GPS unit.
- Keep collected samples in a cooler with ice and deliver to the lab within 24 hours.

Protocol for collecting high flow water quality data (High flow data was collected with the Scout II probe and the HANNA probe instruments, which were only capable of reading temperature, dissolved oxygen, pH, and conductivity):

- Place the data collection probe in moving water, allowing 2-3 minutes for the setting and instrument to adjust.
- Record data from display screen both in a notebook and in a Trimble Juno GPS unit.
- Take a photo point to ensure that data collection point is recorded.
- Note time of day and weather conditions.

High (H) and low (L) flow water quality sampling results (2011) for the 16 Wild and Scenic River segments.

Water Segment/ Collection dates	Temp °C/°F	Conductivity (µS/cm)	pH	Dissolved Oxygen (mg/L)	Ammonia/ Nitrate/ Nitrite	TSS/total suspended solids (mg/L)	Turbidity (NTU)	Total Phosphorus (µg/L)
Seasonal Cold Water Biota Standards	<23C	Baseline use only (BO)	BO	>5mg/l	Calculation varies	BO	<25 NTU	BO
Battle Creek L - 11/04/10	7°C/45°F	142.0	7.5	n/a	.02/<0.03/<0.01	3.0	clear	0.026
Battle Creek H - 4/13/2011	7°C/45°F	0.44	7.7	9.74	n/a	n/a	Moderately cloudy	n/a
Bruneau River L - 11/16/2010	10°C/50°F	172.0	8.1	n/a	<0.01/<0.30/<0.01	6.0	clear	0.013
Bruneau River H	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Big Jacks Creek. L - 12/16/2010	3°C/37°F	n/a	7.9	n/a	0.10/0.45/<0. 01	11.0	Slightly cloudy	0.080
Big Jacks Creek. H - 4/28/2011	11°C/52°F	1.2	8.5	8.3	n/a	n/a	Slightly cloudy	n/a
W. Fork Bruneau L - 11/17/2010	7°C/45.6°F	226.0	8.0	n/a	<0.01/<0.30/<0. 01	16.0	clear	0.016
W. Fork Bruneau H	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Deep Creek L - 11/2/2012	9°C/48°F	114.0	n/a	n/a	0.01 n/a n/a	3.0	clear	0.020
Deep Creek H - 4/13/2011	6°C/42.8°F	0.38	7.4	10.04	n/a	n/a	Moderately cloudy	n/a
Cottonwood Creek L - 2/8/2011	5°C/41°F	1	7.8	10	0.06/0.52/<0.01	5.0	Slightly cloudy	0.093
Cottonwood Creek	9°C/48°F	1.09	7.9	8.2	n/a	n/a	Slightly cloudy	n/a

Water Segment/ Collection dates	Temp °C/°F	Conductivity (µS/cm)	pH	Dissolved Oxygen (mg/L)	Ammonia/ Nitrate/ Nitrite	TSS/total suspended solids (mg/L)	Turbidity (NTU)	Total Phosphorus (µg/L)
H - 5/4/2011								
Duncan Creek L - 12/16/2010	3°C/37°F	n/a	7.8	n/a	0.26/<0.30/<0.01	5.0	Slightly cloudy	0.076
Duncan Creek H - 4/28/2011	12°C/54°F	1.24	8.3	7.6	n/a	n/a	clear	n/a
Jarbidge River (top) L - 11/09/2010	4°C/39°F	62.3	7.4	n/a	<0.01/<0.30/<0.01	<1.0	Clear	0.019
Jarbidge River (end) L - 11/17/2010	5°C/41°F	69.9	7.5	n/a	<0.01/<0.30/<0.01	19.0	clear	0.010
Jarbidge Rvr H	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Little Jacks Creek L - 2/7/2011	15°C/59°F	1	7.7	11.8	0.01/<0.30/<0.01	<1.0	Slightly cloudy	0.056
Little Jacks Creek H - 6/15/2011	13°C/55°F	n/a	8.3	8.2	n/a	n/a	clear	n/a
North Fork Owyhee Rvr L - 11/2/2010	5°C/41°F	89.7	n/a	n/a	<0.01/<0.30/<0.01	2.0	clear	0.021
North Fork Owyhee Rvr H - 4/17/2011	7°C/45°F	0.4	7.7	10	n/a	n/a	Extremely cloudy	n/a
Owyhee Rvr L-11/04/2010	9°C/48°F	317.0	8.3	n/a	0.03/<0.30/<0.01	3.0	clear	0.035
Owyhee Rvr H - 4/12/2011	7°C/45°F	1.76	8.3	10.2	n/a	n/a	Moderately cloudy	n/a

Water Segment/ Collection dates	Temp °C/°F	Conductivity (µS/cm)	pH	Dissolved Oxygen (mg/L)	Ammonia/ Nitrate/ Nitrite	TSS/total suspended solids (mg/L)	Turbidity (NTU)	Total Phosphorus (µg/L)
Red Canyon Creek L 11/03/2010	10°C/50°F	83.8	n/a	n/a	<0.01/0.51/<0.01	3.0	Slightly cloudy	0.019
Red Canyon Creek H	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Sheep Creek L- 11/18/2010	6°C/43°F	159.0	8.3	n/a	0.05/<0.30/<0.01	<1.0	clear	0.015
Sheep Creek H	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
South Fork Owyhee Rvr L - 1/4/2011	0°C/32°F	357.0	n/a	n/a	0.05/<0.30/<0.01	9.0	clear	0.048
South Fork Owyhee Rvr H - 4/26/2011	7°C/45°F	2.7	8.4	9.6	n/a	n/a	Extremely cloudy	n/a
Wickahoney Creek L - 2/01/2011	0°C/32°F	2	8	11.58	0.04/<0.30/<0.01	7.0	Slightly cloudy	0.130
Wickahoney Creek H - 4/28/2011	14°C/57°F	1.52	8.1	7.4	n/a	n/a	Slightly cloudy	n/a
*Dickshooter Creek L,H	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

*Due to the remote location and proximity to private lands, Dickshooter Creek data will be collected at a later time.

Section 051 of Idaho's Water Quality Standards (IDAPA 58.01.02.051)