

**Program Name:** Water Quality Testing Lab

**Grade Level(s):** 7-9

**Curriculum Connection(s):** Planet Earth (Gr. 7); Freshwater and Saltwater Systems (Gr. 8); Environmental Chemistry (Gr. 9)

**Approximate time required:** 3 hours (not including travel or eating time)

**Key Concepts and Terms:**

Aquifer	Chemical Components	Dissolved Oxygen
Groundwater	pH	Residence Time
Sampling	Surface Water	Turbidity
Water Quality	Wetland	

**Student Learning Objectives:**

Demonstrate proper use of research equipment.

Demonstrate group work, leadership, and division of responsibilities.

Develop lifestyle strategies that foster contact with the natural world and encourage responsibility for local and global environments.

**Brief Description of Program:**

A one day program where students work together to obtain and analyze water samples in a field research setting in order to develop an understanding of basic field research principles, their application, and how water quality relates to broader environmental health.

Students will learn about factors affecting water quality, will test for chemical components in various water samples, will identify invertebrates, and will use water quality measurement data as evidence to develop theories on how water composition affects aquatic life.

**Activities:**

Discussion:

Discuss sources of water and the water cycle in the Station interview room, garage, or outside, weather permitting.

Introduce the activity by describing the components of water that can be measured in the water test kit. Dependent on the brand of kit available at any given time, components may include tests for: dissolved oxygen content, pH, turbidity, salinity, chlorides, etc. (Specific kits available can be described to you when booking the program.)

Discuss the importance of each component and how it affects water quality (or ask students how water quality will be affected, dependent on previous knowledge).

Explain how to use the water sampling kits, doing a dry demonstration. Include safety instructions (never drink the water, do not go into the water to collect samples, do not touch your eyes or face when using the chemical testing kits (not that they are particularly hazardous, but it's a good research habit to get into), etc.

### Water Sampling:

Break into groups equal to the number of kits (typically 5 kits), assigning one supervisor to each group. Send groups to collect samples from assigned water sources/areas (ex. different areas around the lake, standing water on a road / trail / in the forest, a boggy wetland, a pond, etc.). Have students record visible characteristics of their sample (colour, clarity, particles, smell, turbidity, etc.) and their site (location, nearby influences on water quality, etc.) while they are at the sample site.

Once all of the groups have returned with their samples and site data, have each group test their sample for each component testable in the water quality testing kits. Have as many students as possible test for different components so that everyone is included in the actual research aspects. Samples can be tested in the wet lab, garage, and outside if more room is required.

Have students identify (if possible) and give an estimate of how many of each invertebrate they can observe in their samples using magnifying glasses. Students should record all of their data. Compare tested samples from each group to visualize differences in samples with different pHs, colours, invertebrate life, etc.

Discuss within groups what different water characteristics, including sample site, visible characteristics, turbidity and chemical components could mean for water quality and for broader environmental health.

### Information Sharing:

Have groups present their findings and theories on water quality to the class, including the chemical compositions and the amount and diversity of invertebrates included in their own samples. As a class, discuss why different samples may have shown different components and invertebrate diversity and abundance.

Discuss what different samples could be used for (drinking, irrigation, recreation, etc) and what could be done to improve the quality of the water.

### Closing:

Clean equipment according to equipment instructions (sample water can be dumped outside). Return equipment to proper storage location.

Tidy the Station to its previous condition, collecting all belongings. Remember to turn off all water and lights, and deposit your key **before** exiting the Station **after** ensuring both exterior doors are locked and windows are closed.

### **Equipment and Resources Provided:**

Research Station Facilities - 2 washrooms; fully equipped kitchen; wet lab space, meeting room, and interview room for indoor lesson and work space

Reusable water quality testing kits (x5)

Invertebrate identification packages/books

Magnifying glasses

**Contact the Station Manager at [gth@ualberta.ca](mailto:gth@ualberta.ca) for pricing and more details.**