Taking the Pulse of the Fraser

Background Information on the Fraser River:

The Fraser River was named after Simon Fraser (1776-1862) who explored the river in 1808 on behalf of the North West Company in search of a navigable route for fur trading. Simon Fraser believed that he was traveling on the Columbia River to its ocean outlet. It was another explorer, David Thompson, who later named the river after Simon Fraser.

First Nations people had lived along the Fraser River for thousands of years before Simon Fraser's arrival. Some of the archaeologists estimate up to 9000 years before. (A site under the Alex Fraser Bridge has been dated back that far). While we can't know an exact arrival date, it would have been after the last ice age, 10-14 thousand years ago. It is worth noting, though, that within the oral traditions of First Nations groups, there are no stories of them arriving in what we now call Canada. For them, they have always been here.

The Fraser River starts as a trickle at Mount Robson (Headwaters) and ends in the Strait of Georgia in the Pacific Ocean. There are many tributaries that add water to the Fraser, including the Thompson River (22% of the total water flow).

The Fraser River is estimated to be 1,375 kilometers long. If it was stretched out across Canada, it would span the distance between Vancouver and Regina, Saskatchewan. The Fraser River is longest river in BC, and the fifth largest river in Canada. It is less than 15,000 years old.

The characteristics and landscapes of the Fraser River change from the beginning of its journey to its end. As you exit the headwaters on Mount Robson and enter the Upper Basin region, the river's sediment load increases creating more turbulent waters with the water appearing grey or brown in colour. The river then passes through drier lands with low vegetation as a result of little rainfall and hot temperatures. In the Fraser Canyon, the river is squeezed between the Coast and the Cascade mountain ranges, increasing the speed and creating many impressive rapids.

The point at which the fresh water of the Fraser River meets the salty water of the Pacific Ocean is called the estuary, (also sometimes called "between land" by the First Nations people because as the tides ebb and flow, the estuary mudflats alternate between being exposed and submerged). Because estuaries have access to both riparian (river) and marine nutrients, they are home to an incredible diversity of life.

A habitat can be defined as a place where an organism can get food, water and shelter. The major habitat types along the Fraser River include: brackish and freshwater marshes, salt marshes, tidal flats, sloughs, and flood-plain forests among others.

The Fraser River watershed is also home to 60% of BC's population, approximately 2.7 million people. A watershed is an area of land that drains all the water into one main river. The Fraser River watershed is also called a drainage basin, since it collects so much water and drains such a large area (25% of BC's area).

Program Overview:

Students follow the scientific method to conduct a water quality investigation of the Fraser River to test whether the temperature, turbidity, and pH of their sample fall within the acceptable levels for salmon.

The two-hour program begins outside along the river where students can observe their surroundings and take a sample of the river. They will do background research to allow them to make hypotheses of their expected results. Students will be able to determine the health of the river water by testing its pH and turbidity.

Program Objectives

- To examine the conditions necessary for salmon survival
- To acknowledge the importance of salmon to BC
- To be able to compose hypotheses using background research and observation
- To understand the difference between and acid and a base
- To carry out tests on the water that will lead them to their experiment results

Helpful Vocabulary

Effluent: liquid waste or sewage discharged into a river or the sea
Freshet: the flood of a river from heavy rain or melted snow
Hypotheses: a supposition or proposed explanation made with limited evidence as a starting point for further investigation
Litmus: a dye obtained from certain lichens that is red under acid conditions and blue under alkaline conditions
pH: is a measure of how acidic or basic a solution is; could stand for "potential hydrogen"; it is a measure of the activity of hydrogen (H+) ions in solutions
Secchi disk: an opaque disk, typically white, used to gauge the transparency of water by measuring the depth (Secchi depth) at which the disk ceases to be visible from the surface
Sediment: matter that settles to the bottom of a liquid
Trade: the action of buying and selling goods and services
Turbidity: the cloudiness or haziness of a fluid caused by large numbers
Watershed: an area or ridge of land that separates waters flowing to different rivers, basins, or seas

In- class activities:

Here are some ideas to help prepare your class for the program, and to continue the learning back in the classroom.

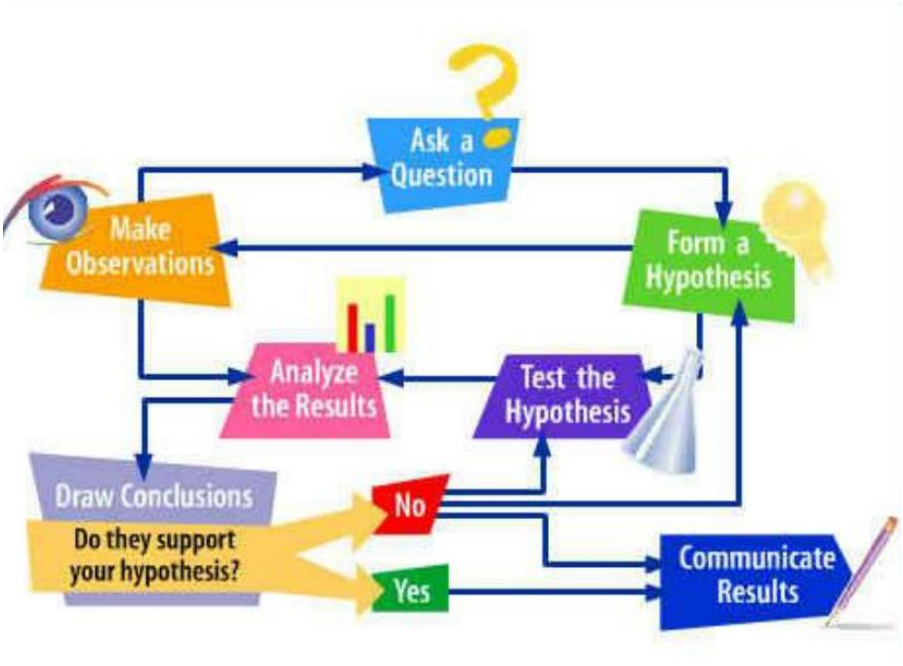
Pre-visit:

1. In this program we'll be talking about pH, turbidity, watersheds, and the scientific method. If you'd like an intro to any of these, try these short videos.
    a. Turbidity
        i. A short intro to turbidity and the effect of urban runoff.
            1. https://www.youtube.com/watch?v=igqfFKGi9tg
    b. pH
        i. A short intro to pH and pH testing.
            1. https://www.youtube.com/watch?v=ckbsHM2igT0
        ii. A parody of Meghan Trainor's "All About That Bass", about bases and acids. Perhaps not useful as a stand-alone introduction, but a clever song!
            1. https://www.youtube.com/watch?v=IAJsZWhj6GI
    c. Watersheds or basin
        i. https://www.youtube.com/watch?v=QOrVotzBNto
    d. Scientific method
        i. https://www.youtube.com/watch?v=yi0hwFDQTSQ

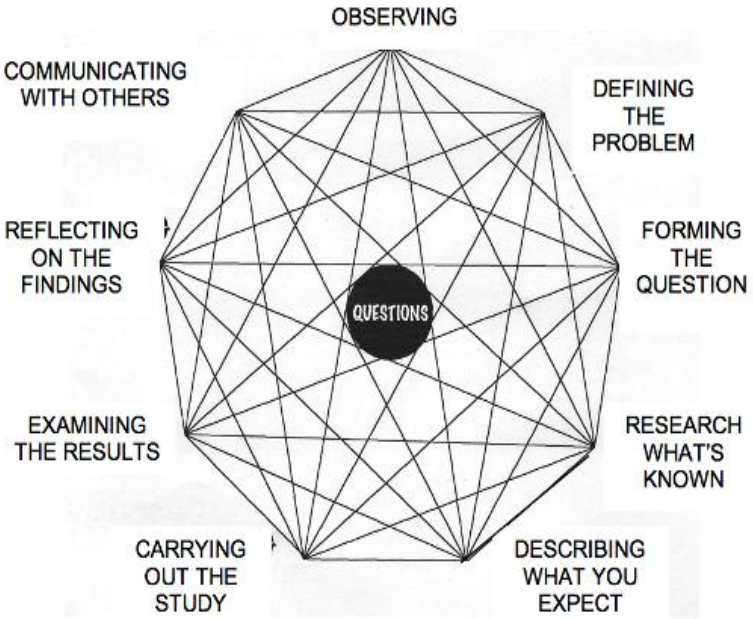
Post visit:

1. Continue learning about urban pollution with *Solve a Pollution Mystery* (pages 1-17), from the Georgian Bay Biosphere Reserve. This activity challenges students to identify the source of pollution, using clues revealed to them through the activity.
    a. https://www.gbbr.ca/wp-content/uploads/2019/04/Grade-5-Water-Protection-1.pdf
2. In the program, we used a linear model of the scientific method. Spend some time with your class discussing how science is more often non-linear, iterative, generating more questions as it goes and leading back to previous steps. Below are two models of inquiry, or a non-linear science method.

a.



b.



i. https://www.curriki.org/oer/What-is-inquiry-vs-the-scientific-method-