

## Living Dinosaurs

### 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).

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 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 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 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 the Drylands with low vegetation as a result of little rainfall and hot temperatures. In the 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 changes from land that is covered with water to dry land). Other estuaries include the mouths of great rivers such as the Amazon, the Nile and the Mississippi.

The Fraser River Estuary is as rich in its biodiversity as it is an ideal habitat for many organisms. 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. S 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).

## White Sturgeon:

White Sturgeon (*Acipenser transmontanus*)

White sturgeon are a primitive species of fish dating back to the time of the dinosaurs. Proof of their existence can be seen as far back as 200 million years in the fossil record. Sturgeon have bony plates, similar to those found on dinosaurs, on their back and sides that they use as protective armor. They are grey to pale brown on their backs and pale grey to white on their bellies. The white sturgeon has a skeleton made up of cartilage rather than bone, unlike most other species of fish, leading scientists to believe that their ancestors were a type of prehistoric shark. In addition, their tail is similar in appearance to the tail of a shark. Barbels hang under the sturgeon's snout and help it to detect food. They have a protrusible mouth that is used to suck up food along the river bottom.

Small white sturgeon feed on clams, mussels, shrimp, crayfish, insect larvae, aquatic worms, and fish eggs. At a larger size, they prey on fish such as eulachon and salmon.

White sturgeon can grow very large reaching lengths of over 6 meters and can weigh as much as 800 kilograms. They are the largest freshwater fish in North America.

Mature white sturgeon adults gather to spawn during spring and early summer and they migrate to fast flowing water. The females lay many small sticky eggs which adhere to rocky substrate. The females and males will release both their eggs and their milt (the sperm and seminal fluid) at the same time, a method of reproduction known as broadcast spawning. Larger females can release up to 4 million eggs and unlike many salmon species that spawn once and die, white sturgeon can spawn many times throughout their life. White sturgeon eggs are small and black in colour. Eggs hatch into larvae with a yolk sac, which is eventually absorbed. After about a month's time, the larvae metamorphose into juvenile sturgeon. Juvenile sturgeon reach sexual maturity between 15 and 30 years of age. Adult white sturgeon can live up to 150 years in age.

White sturgeon are found in three watersheds in North America: The Fraser, Columbia and Sacramento. The Fraser River is the only river in the world where white sturgeon still spawn on their own, without the assistance from hatchery facilities. However, their numbers have greatly declined in the past 100 years, so they are now listed as endangered with COSEWIC (Committee on the Status of Endangered Wildlife in Canada). Historic over fishing of sturgeon on the Fraser River, especially for their quality meat and roe, has exhausted white sturgeon populations. Human impacts have altered white sturgeon habitats and have negatively affected their ability to survive and reproduce. Such impacts include: river drainage projects, dyking, gravel removal from side river channels, and hydroelectric dam construction on Fraser River tributaries.

## Program Overview:

White sturgeon are a primitive species of fish dating back to the time of the dinosaurs. Proof of their existence can be seen as far back as 200 million years in the fossil record. They are the largest freshwater fish in North America. The Fraser River is the only river in the world where white sturgeon still spawn on their own, without the assistance from hatchery facilities. However, their numbers have greatly declined in the past 100 years, so they are now listed as endangered. By examining their life cycle and talking about the white sturgeon we hope to teach individuals how we can help these incredible fish.) Students explore the life cycle and habitat of the elusive white sturgeon through real specimens and a fun felt storyboard. Students also learn how people's actions can impact sturgeon in the Fraser River, fostering a sense of responsibility to the local environment.

This 90-minute program begins outside where students can see for themselves all of the different activities happening along the river.

## Program Objectives

- To introduce the unique characteristics of the white sturgeon
- To understand the importance of the Fraser River habitat to the white sturgeon
- To learn about the anatomy and lifecycle of the white sturgeon
- To discover some of the threats to the white sturgeon
- To explore contributing factors to the endangerment of species
- To investigate plans to protect current white sturgeon populations and to conserve the species

## Helpful Vocabulary

**Barbels:** a fleshy filament growing from the mouth or snout of a fish.

**Conservation:** preservation, protection, or restoration of the natural environment, natural ecosystems, vegetation, and wildlife.

**Dredging:** clean out the bed of (a harbor, river, or other area of water) by scooping out mud, weeds, and rubbish with a dredge.

**Dyke:** an embankment for controlling or holding back the waters of the sea or a river

**Ecosystem:** a biological community of interacting organisms and their physical environment.

**Endangered:** (of a species) seriously at risk of extinction.

**Estuary:** the tidal mouth of a large river, where the tide meets the stream.

**Extinct:** (of a species, family, or other larger group) having no living members.

**Fry:** (also referred to as the juvenile) the stage in a sturgeon's life before adulthood

**Habitat:** the natural home or environment of an animal, plant, or other organism.

**Larvae:** is the active immature form of the fish, hatched from the egg, that differs greatly from the adult

**Milt:** the semen of a male fish.

**Population:** all the inhabitants of a particular area.

**Predator:** an animal that naturally preys on others

**Prey:** an animal that is hunted and killed by another for food.

**Scutes:** a thickened horny or bony plate

**Spawn:** (of a fish) release or deposit eggs

**Tributary:** a river or stream flowing into a larger river or lake.

**Watershed:** an area or ridge of land that separates waters flowing to different rivers, basins, or seas.

**Yolk Sac:** a membranous sac containing yolk attached to the larvae of some fish.

## In-Class Activities:

### Pre-Visit:

1. Search through local newspapers to find any news relating to the Fraser River or other local water bodies. Topics may include environment, industry development, wildlife, recreational use, tourism, transportation, housing development, and others. Share the clippings with the class. Together, classify the clippings under three or four headings and create a display.
2. Students should be able to recognize the Fraser River on a map. Have students identify the major cities and tributaries found along the Fraser River. Study the different climate regions found throughout the Fraser River Basin.
3. Learn about sturgeon anatomy:
  - a. Become more familiar with the external anatomy of the white sturgeon by drawing the image of the sturgeon in the box provided.
  - b. Identify the anatomy by connecting the name of the body part to the white sturgeon diagram. Brainstorm what each part's function is.
  - c. Arrange the students side by side. Use a scale or approximate guesses to work out how many students in the class it would take to weigh as much as the largest white sturgeon fished from the Fraser River: 640 kg.  $640\text{kg} \times 2.2 = 1408$  pounds.
  - d. White sturgeon can grow to lengths of 6 meters or more. Use a measuring tape or string 6 meters long and see how many students it takes to span the length.
4. Scientists know how old sturgeon are by measuring them. Sturgeon grow 10 cm per year for the first 5 years. After the first 5 years, sturgeon grow at a rate of 5 cm per year. So how old is a sturgeon that is 3 m 47 cm?  
$$347 - (10\text{cm/year} \times 5 \text{ years}) = 347 - 50 = 297$$
$$297 \text{ cm} / 5 \text{ cm/year} = 59.4 \text{ years}$$
$$59.4 \text{ years} + 5 \text{ years} = 64.4 \text{ years}$$
5. Draw the sturgeon lifecycle stage in the correct order. Have students use the internet to find pictures of each stage and basic information, such as how long each stage lasts and what the sturgeon eat in that particular stage of their life cycle.
6. Brainstorm how the following human uses of the river and technologies can impact the survival of the aquatic wildlife: Fishing, Storm Drains, Mills and Factories, Hydroelectric Dams, Dredging, Dyking, Transportation of goods/materials/people.

7. Check out the Fraser River Sturgeon Conservation Society at <http://www.frasersturgeon.com/> for more information and lesson plans.

Post-Visit:

1. Have students write a poem about sturgeon
2. Have students write 1-2 paragraphs on how sturgeon are adapted to their environment (barbels, scutes, counter-shading, etc.)
3. Students pretend they are sturgeon and write a story of their life using the words: egg, larva, fry and adult
4. Students can do research on animals found in the Fraser River basin. Students can work individually or in small groups to present what they have found either orally to the class or in poster format.

Questions to guide research:

- Where are they found?
- What do they eat?
- How are they specifically adapted to their environment?
- How does form work with function in this organism? Who are their predators?
- What is their prey?
- Find a few interesting or unusual facts
- Tell us what you like about this organism.

5. Have students complete the word search on the following page.