# River Champions

*Grades 6-12*

## Program Overview:

In recent years, residents of the Fraser River Basin have witnessed several weather records: The village of Lytton reached 49.6 degrees Celsius in June of 2021, and the town of Hope received 252 millimeters of rain within the span of a weekend the following November. These records are not just anomalies, they are a result of how climate change is affecting the *frequency* and *magnitude* of extreme weather events. River Champions seeks to introduce how climate change has been affecting flooding events across the Fraser River Basin. Increasing rainfall, decreasing snowpacks, and rising sea levels in coastal areas pose risks to communities who inhabit spaces close to the Fraser River. Students will be able to participate in two different activities to explore how to design a sustainable floodplain that can adapt to extreme flooding events.

This 70–90-minute program begins with an overview presentation, after which students will be divided into 2-3 groups. Each group will switch between using the stream table to model flood barriers and designing their own floodplain map. The program will end with a discussion of what was learned and connect to real-life examples of flood management practices and research taking place along the Fraser.

## Program Objectives

- Introduce the reasons as to why humans choose to settle along a floodplain
- To understand how a river can change shape over time through erosion and deposition processes
- To explore different ways in which a river can be managed to adapt to more frequent and larger flooding events

## Pre-Visit Activities:

Here are some short activities to help prepare your class for the program.

Pre-Visit:

Central Question: *What can cause a flood?*

1. A flood is defined as when water reaches over the bounds of a channel. But what are some of the causes of flooding events?

2. Using the attached graphic organizer below, have your students create a "mind map" to list as many potential contributors to flooding as possible.
    a. A "mind map" is a technique used to organize a hierarchy of information. In the center of the mind map is an oval containing the "main theme," or the subject we are going to expand upon. In this case, the main theme is "causes of flooding."
    b. When a student thinks of a contributor to flooding, they will draw an arrow outward from the main theme, draw another oval at the end of the arrow, and then write down that contributor within the second oval. This is the first "level."
    c. Once students have listed all the contributors to flooding in the first level, they will move onto the second level, and list the reason that the contributor exists.
        i. The order of the mind map might look like:
            1. Causes of flooding – Melting snow – Warmer temperatures
3. Once students have finished their mind map, show your class the following videos:
    a. "What causes a flood" by The Telegraph: https://www.youtube.com/watch?v=UZEiQocp6-A
    b. "Rapid snowmelt near mountain range causes flooding" by 9NEWS (KUSA): https://www.youtube.com/watch?v=vhmibEdaeK0
    c. "Winter storm causes devastating flooding in coastal communities" by CBS New York: https://www.youtube.com/watch?v=ARkW_8B60oA&t=36s (play video from 0:08-1:04)
    d. Make sure to remind students to listen carefully to find out what can cause a flood
4. Using the second page of the graphic organizer, have students write down the things they heard from the video. Feel free to use this time as well to discuss as a class about what each student learned, in case a student missed some information
5. Have each student write down something that they learned, and something that they want to learn more about.

Central Question: *Why do humans settle on a floodplain?*

1. A floodplain is an area that has been eroded over time by flooding events. But despite the risks of floods, why have humans always chosen to settle on a floodplain close to a river?
2. Using the attached graphic organizer below, have your students create a second mind map to list all the potential reasons as to why humans would choose to live on a floodplain.
    a. After listing each reason in the first level of the mind map, have students create a second level, in which they list each reason's benefits.
        i. The order of the mind map might look like:
            1. Why humans settle on a floodplain – Good soil – Different agriculture types
3. Once students have written down their predictions, show your class this video from Darron Gredge's Geography Channel (up until 1:25) describing the use of floodplains: https://www.youtube.com/watch?v=70hQbRp_OSA
4. Using the second page of the graphic organizer, have students write down the things they heard from the video. As with above, use this time to discuss with the class about what they heard throughout the video.
5. Have each student write down something that they learned, and something that they want to learn more about.

## 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 Salish Sea 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 because 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. 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).

## Helpful Vocabulary

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

**Setback dike:** a dike that is built further back from the riverbank or shoreline, allowing for floodwaters to spill into undeveloped land

**Rip-rap:** an artificial structure made from angular stones or boulders that are used to protect against slope erosion on river banks and coastal shorelines

**Wetland:** a low-lying area that is permanently inundated with water and able support aquatic plants and various wildlife

**Floodgate:** gates used for the controlled flow of water between two different water bodies, able to prevent flooding on either side

**Wet-proofing:** a flood-proofing method that allows for floodwaters to either pass through or enter the bottom portion of the structure, preventing damage to its greater extent

**Dry-proofing:** a flood-proofing method that prevents floodwaters from entering a structure by installing watertight seals or gates

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

**Freshet:** the addition of water to a river channel deriving from the spring thaw of ice and snow, causing flooding events

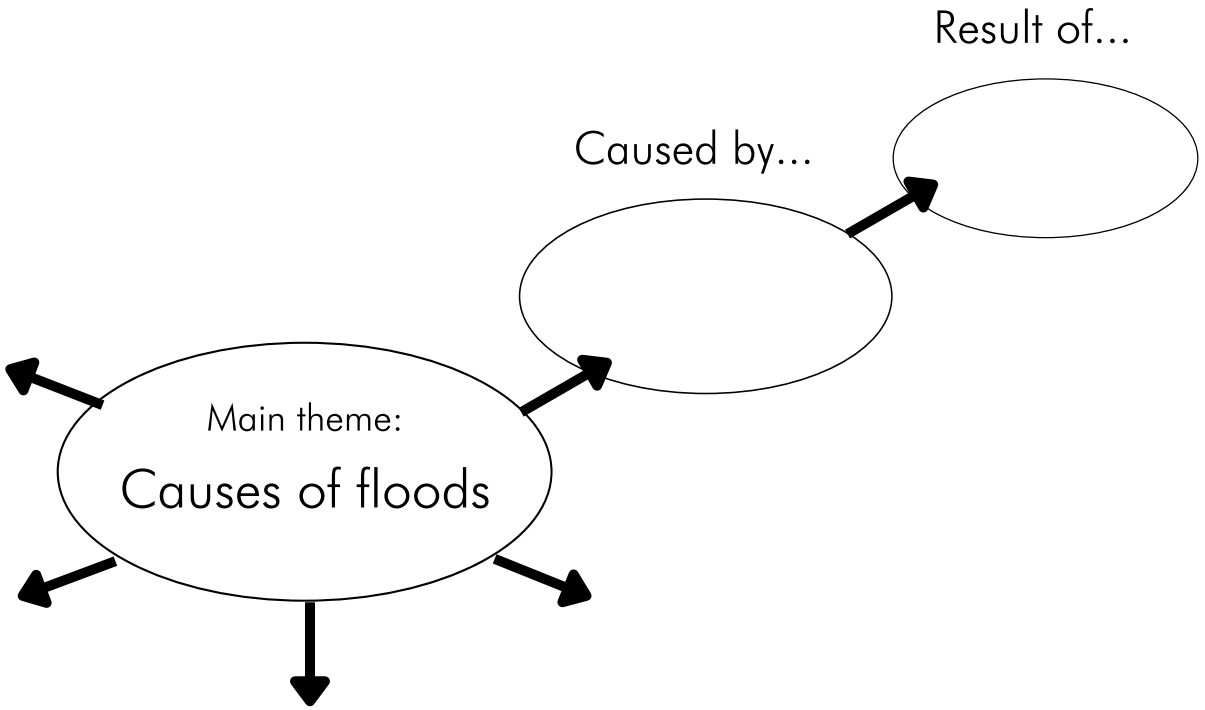
**Cutbank:** the outside bend of a river that is formed through erosion

**Point bar:** the inside bend of a river that is formed through deposition

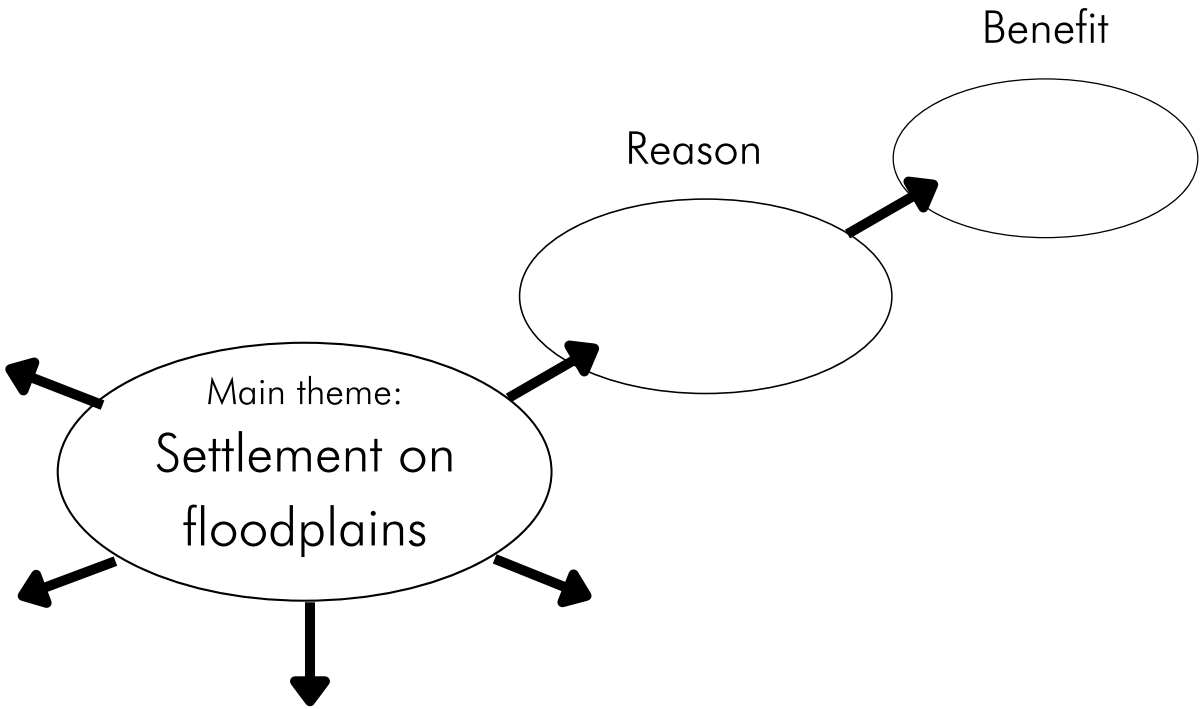
**Meander**: the sinuous curves of a river that are formed through erosion and deposition processes

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

# What Can Cause A Flood?



# Why Do Humans Settle On A Floodplain?



# Observations

We observed that humans settle on a floodplain because there is access to:

What is something I learned?

What is something I want to learn more about?

Fraser River DISCOVERY CENTRE
The Voice of the Fraser

# Observations

We observed that flooding is caused by:

What is something I learned?

What is something I want to learn more about?

Fraser River DISCOVERY CENTRE
The Voice of the Fraser