Our Estuary

Grades: 4-7

Subject, Science, Language Arts

Time required:1 class

Key Concepts:

The Squamish estuary is where the Squamish River meets Howe Sound.

Objectives:

Students will:

-recognize the location of the Squamish estuary on a map;

-explain the physical characteristics of the Squamish estuary .

Key Words:

estuary, marine (salt) water, fresh water, brackish water, river delta, fiord, slough, estuarine flatlands

Skills:

Observing, gathering information, interpreting

Background:

An estuary is a special place with some unique and important physical characteristics. Estuaries have distinct geographical locations, unique land formations, and are the place where seawater and freshwater mix. This physical setting supports a rich and diverse collection of plants and animals—the estuaries ecosystem—important in many ways.

The Squamish River Estuary has been under formation ever since the retreat of the glaciers from the last ice age some 10,000 years ago. It lies at the head of Howe Sound, approximately 40 kilometers north of Vancouver, B.C. The northern reach of Howe Sound

Materials:

- Map of B.C.
- Overhead of Major Estuaries of B.C.
- Squamish River watershed map
- Squamish Estuary map

Our Estuary

Background Continued
is a typical British Columbian coastal fjord with steep mountain shores, a deep water channel, and a river at its head.

An estuary is the place where a river meets the sea. In Squamish, the Squamish River flows into Howe Sound at the Squamish Estuary. This estuary is one of the largest in south-western British Columbia and functions as important habitat provincially. In this estuary, we can find a generally steep-sided coastal basin with some as estuarine flatlands, sand and gravel bars, and sloughs. This type of estuary, called an estuarine fjord is different than the Fraser Estuary, for example, which has a river delta formation. Estuaries have been the cradle of human civilizations for thousands of years and to this day continue to be attractive places for human use and settlement.

In all estuaries, including the Squamish Estuary, an important feature is the mixing of freshwater and marine (salt) water. Freshwater is less dense than saltwater and will thus flow above the heavier saltwater. However, when the tide flows in at flood tide (high tide) there is a mixing of freshwater and saltwater creating zones of brackish water or diluted saltwater – a common physical feature of estuaries. For the Squamish Estuary, this mixing of freshwater and saltwater extends from the mouth of the Squamish River upriver to the Easter Seals Camp.

Procedure:

1. Explain to students that an estuary is the area where fresh water from a river meets and mixes with salt water from the sea. Study a map of the British Columbia and note all the rivers that flow into the ocean. Then ask students how many large estuaries they think might be found in B.C. There are only 18 major estuaries in all of B.C. – not a lot considering the total number of rivers that flow into the ocean!
2. Show the map of major estuaries of B.C. on the overhead and locate the Squamish (Howe Sound) estuary.
3. Explain how to identify features on a map: including ocean (marine), rivers and streams, roads, and estuary.
4. On the Squamish Estuary map, have students colour in green, the marine or salt water and in blue, fresh water from the river. Ask them to colour in blue/green, the areas where the salt water and fresh water mix over the estuarine flatlands (with the plant/wetland symbol).

Extensions:
1. Go outside to the playground and create a watershed model using a sloped hill and a watering can or hose. Have students observe and predict where the water will flow (river) and pool (ocean). Note the area where the river meets the ocean is the estuary.

Evaluation:

1. Have students:
    a. Label the physical parts of the estuary and watershed on the *Find the Estuary* diagram.
    b. Name two estuaries found in southwestern British Columbia.

Community Connections:
1. Have someone from the Squamish Estuary Conservation Society come in to speak to the class about the Squamish Estuary.

Our Estuary

Taking It Home:
Take the word search home and discuss what all the words mean for the Squamish Estuary.

Resource:
This activity has been adapted from "What is an Estuary" from Discover Your Estuary (1992) and "Where do we find estuaries" from Squamish Estuary Explorations (no date).

References:
Kistritz, Ron. 1992. *Discover Your Estuary*. Environment Canada, Pacific & Yukon Region, North Vancouver, B.C.

Squamish Nation. 2007. *Conceptual Management Plan for Site A of the Squamish Estuary*. Prepared by Golder Associates, Burnaby, BC

Wells National Estuarine Research Reserve/ NOAA. 1997. *Estuary Net: A Water Quality Monitoring Project.* http://inlet.geol.sc.edu/estnet.html

USEPA. *The Water Sourcebook - 324 activities for grades K-12* www.epa.gov/OGWDW/kids/wsb/

Glossary:

Brackish water: water that contains a mixture of seawater and freshwater. Brackish water is somewhat salty.

Estuary: the area where a river empties into the ocean; a bay influenced by ocean tides resulting in a mixture of saltwater and freshwater.

Estuarine flatlands: the lowland marshes and tidal areas associated with an estuary.

Fjord: a long, narrow arm of the sea bordered by steep cliffs: usually formed by glacial erosion.

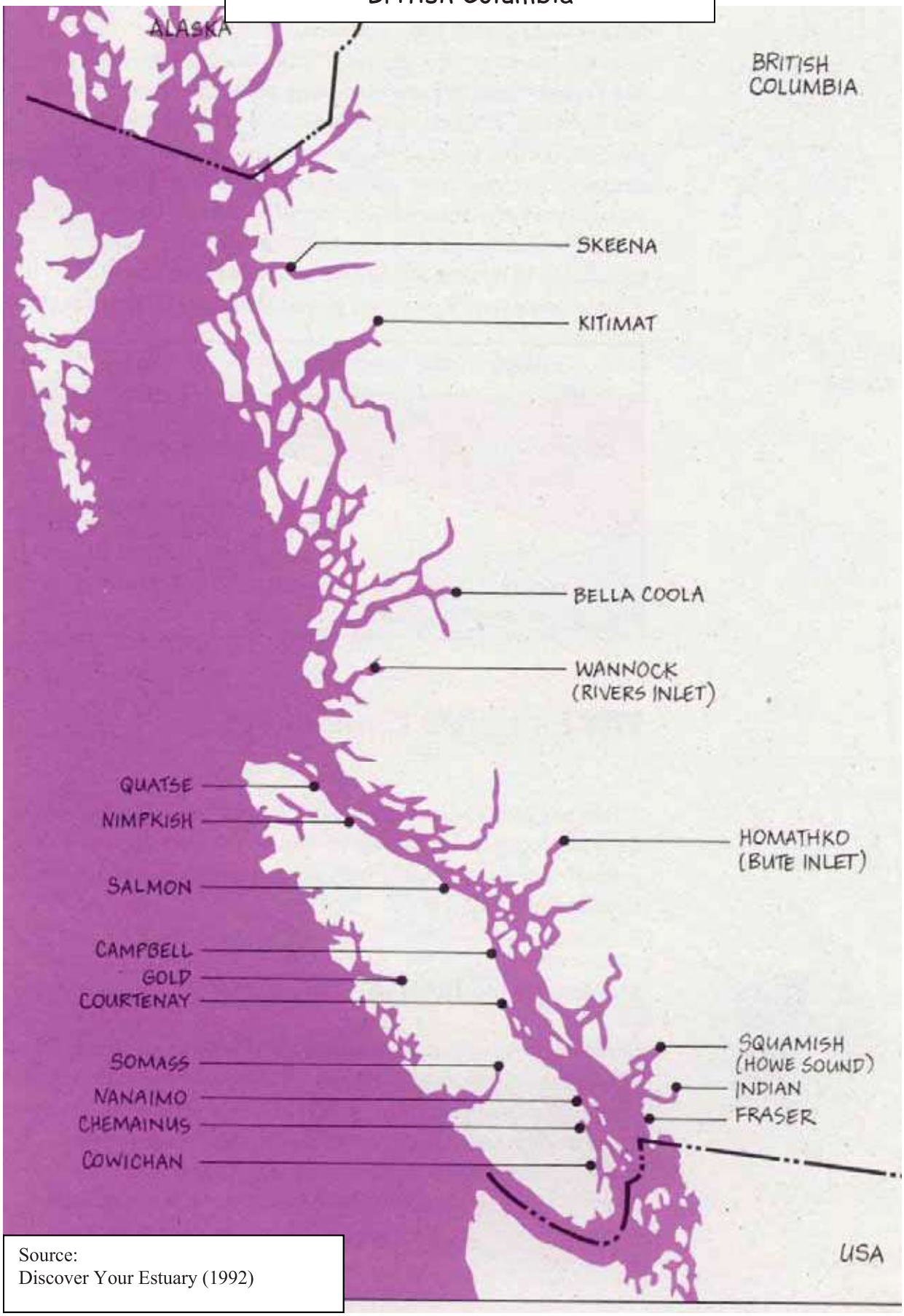
Freshwater: water containing little or no salts, such as inland rivers and lakes.

Marine (salt) water: water that is found in the ocean with high salinity (salts)

River delta: Usually a triangular mass of sediment, especially silt and sand, deposited at the mouth of a river. Deltas form when a river flows into a body of standing water, such as a sea or lake, and deposits large quantities of sediment. They are usually crossed by numerous streams and channels and have exposed as well as submerged areas.

Slough: a marshy or reedy pool, pond, inlet, backwater, or the like.

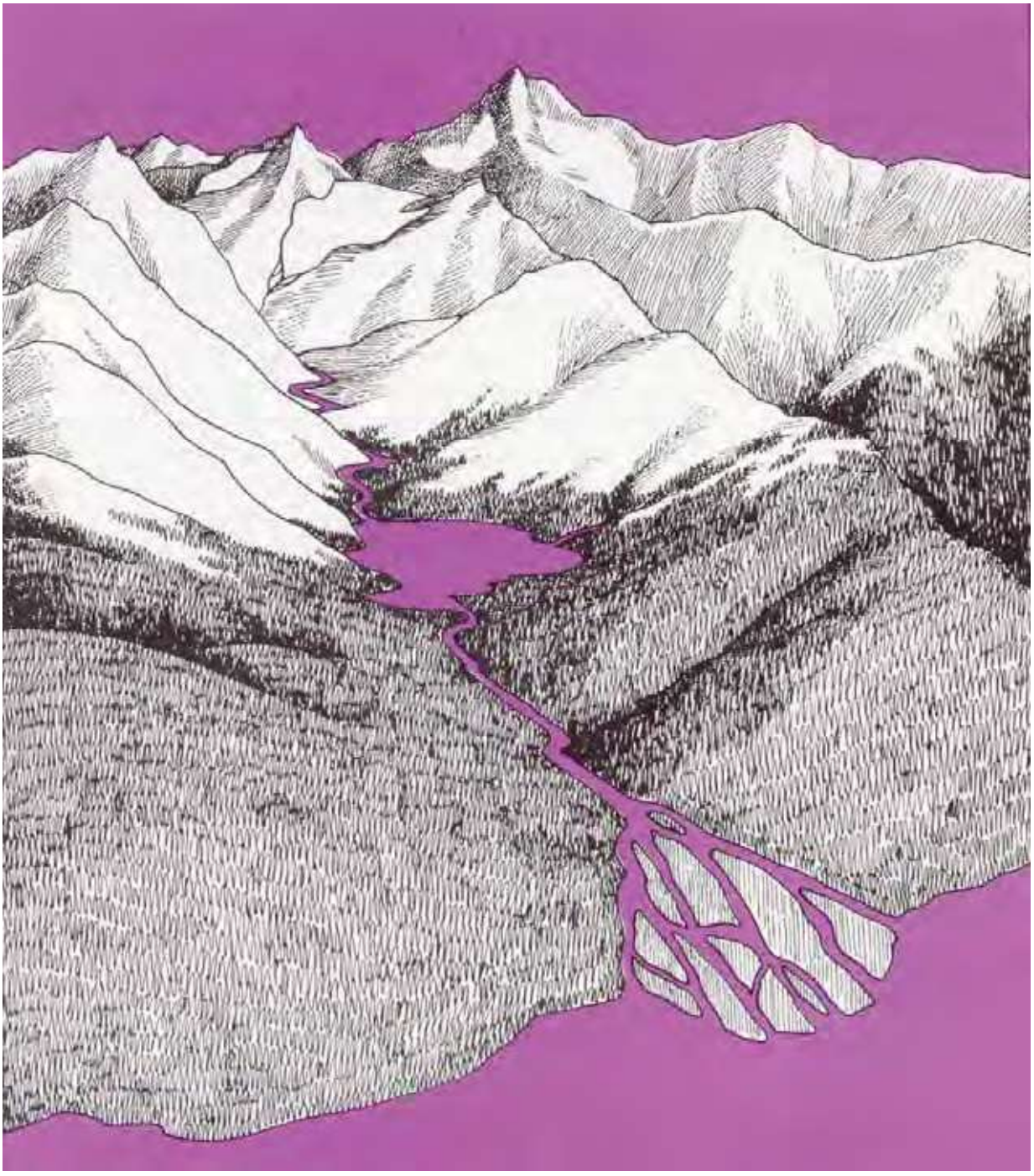
Map of the Major Estuaries of British Columbia



Source:
Discover Your Estuary (1992)

Name:_____

Find the Estuary!



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