



Making a difference...together

BEAVER ENGINEEVER

Educators Guide

Program at a Glance

Elk/Beaver Lake Regional Park contains valuable wetlands that are home to many plants and animals, including beavers! This fun and interactive program focuses on beavers and their unique ability to help “engineer” their environment and enhance the biodiversity of wetland ecosystems. Students are introduced to beavers through a fun dress up activity followed by an opportunity to look at and feel a beaver pelt and skull. In smaller groups, we search for signs of beavers, build a model wetland, and demonstrate an understanding of food web interactions in a wetland community.



In this program, your students will...

- Observe a diverse wetland community
- Identify some of the wetland plants and animals
- Identify how beavers with their unique abilities can help create a wetland
- Explore a wetland and understand how it provides for a diversity of plants and animals
- Discover the unique value that beavers have in helping to create wetland ecosystems
- Evaluate the impact of our actions on beavers and other animals and their wetland home

Curriculum Connections

Our place based school programs directly relate to the K-5 science curricula. Below you will find some big ideas, curricular competencies and content that will be addressed on your program.

Big Ideas from BC Curriculum:

- Life cycles adapted to their environment (grade 2)
- Water is essential to all living things and, it cycles through the environment (grade 2)
- Forces influence the motion of an object (grade 2)
- Living things are diverse, can be grouped, and interact in their ecosystems (grade 3)

- Wind, water and ice change the shape of the land (grade 3)

Curricular Competencies from BC Curriculum:

- Demonstrate curiosity and a sense of wonder about the world
- Observe objects and events in familiar or unfamiliar contexts
- Ask questions about familiar objects and events
- Make predictions about familiar objects and events
- Safely manipulate materials to test ideas and predictions
- Make observations about living and non-living things in the local environment
- Experience and interpret the local environment
- Identify simple patterns and connections
- Transfer and apply learning to new situations
- Consider some environmental consequences of their actions
- Make simple inferences based on their results and prior knowledge
- Demonstrate an understanding and appreciation of evidence
- Represent and communicate ideas and findings in a variety of ways
- Express and reflect on personal or shared experiences of place

Content from BC Curriculum:

- Water sources including local watersheds (grade 2)
- Biodiversity in the local environment (grade 3)

Suggested Pre-Trip Activities

- On the classroom bulletin board, have students draw pictures of the field trip topic or write predictions about what they might see.
- Create a K-W-L chart (what I know, what I want to know, and what I learned), and fill out the first two categories as they relate to beavers at Elk/Beaver Lake. Have students develop questions they would like to investigate.
- Read stories about beavers, including First Nations stories and historical accounts.

Follow-up Activities

- Revisit the K-W-L chart and fill in the “L” (What I learned). Discuss answers to their investigative questions.
- Trace food chains and webs involving beavers.

- Make a model wetland with a beaver dam and lodge and pictures of various plants and animals found there.

Background Information on Beavers

Wetlands:

A wetland is any area of land that is covered with water for a part of the day or year. There are two classes of wetlands: freshwater and saltwater. Wetlands perform many essential services as functional ecosystems, such as: water supply and regulation of flows, preventing floods and droughts; water purification; prevention of downstream and shoreline erosion; maintenance of biodiversity; provision of wildlife habitat; recreational, educational and cultural opportunities; and in some cases production of medicinal and food plants.

Wetlands are one of the most important life support systems on earth. Currently comprising about 5.6% or 5.28 million hectares of British Columbia, they provide critical habitat for fish, birds, and other wildlife. There is a growing concern over the escalating rate of wetland losses in British Columbia. In the Fraser Vancouver Island, it is estimated that 50% to 70% of the original wetland habitat has disappeared. In the ecologically critical South Okanagan, wetland losses have reached 85%.

Action is required to help reduce wetland losses and provide for coordinated conservation and management efforts. Because wetlands occur across a range of ecosystem types and can be affected by various land use activities, a comprehensive approach is needed to ensure the protection and management of wetlands. It is intended that several initiatives currently under development, including the Biodiversity Strategy, Species at Risk Strategy, the Living Rivers Strategy, as well as ongoing Land Use Planning and Protected Areas management, will all play an important role in protecting, maintaining and restoring wetlands (Canada. BC Ministry of Environment. 2017)

Beavers in Wetland Ecosystems:

Beavers, being ecosystem engineers, are among the few species besides humans that can significantly change the geomorphology, and consequently the hydrological characteristics and biotic properties of the landscape. Dams built by beavers dramatically alter riparian landscapes leading to the formation of extensive wetland habitat capable of supporting herbaceous plant species and animal species not found elsewhere in the riparian zone. Thus beavers increase

habitat and species diversity. Beaver foraging also has a considerable impact on the course of ecological succession, species composition and structure of plant communities, making them a good example of ecologically dominant species (e.g. keystone species).

Life cycle:

Beavers live in colonies (the parents plus two generations of young) and work together to gather food, repair the dam and the lodge. Beavers can live up to 19 years. Beavers are monogamous. They breed from January – February of every year and gestation lasts 120 days (4 months). Litter sizes are 1-8 kits but on average a beaver will have 4 kits. Kits are protected and live with their parents until they are 2 years old when they leave to start their own colony away from their parents. At this point they can travel up to 5.6km to find their own territory.

Cultural history:

The beaver is Canada's official national animal. Beavers were also the major reason for westward expansion and the opening of many portions of Canada. Beaver pelts were highly valued and were traded for goods. The pelts were used to make felt top hats that were very much in demand in Europe. In the early 1900's beavers were almost extinct because of extensive logging and fur trapping. With stricter regulations on trapping, aspen regeneration, and low populations of predators, beaver populations have since revived in North America. Now in BC beavers are not a conservation concern and are managed as a fur-bearer. The trapping of beavers is regulated under the provincial Wildlife Act.

In addition to pressure from trapping, the beavers at Elk/Beaver Lake suffered from loss of habitat when in 1872 Elk Lake was recommended as Victoria's main domestic water source. In 1879, at the recommendation of the provincial government's chief surveyor Thomas Buckley, the water supply system was completed. This \$100, 000 project involved clearing the willow swamps and removing the beaver dams that separated Elk Lake and Beaver Lake, laying pipes, and damming Colquitz Creek at the outlet of Beaver Lake to join the two lakes and raise the water level. As a result, there were no beavers at Elk/Beaver Lake until 2014 when residents noticed flooding on the trails and a beaver lodge was spotted in the park.

Beaver keywords:

rodent - Mammals of the scientific Order Rodentia, which are characterized by a single pair of continuously growing front teeth in the upper and lower jaws. Rodents are found almost

everywhere in the world and are the most diverse group of mammals, including rats, mice, squirrels, beavers, chipmunks, gerbils, hamsters, lemmings, guinea pigs, and porcupines.

castoreum - A chemical compound that mostly comes from a beaver's castor glands (not from the oil glands), which are located between the pelvis and the base of the tail. Castoreum was and is still used as a fixative in expensive perfumes. From spring-time to mid- June, beavers build mounds of mud with their hands and squirt castoreum on top of them to mark territory and attract mates.

habitat – The natural home or environment of a plant, animal or other organism. It includes all that the organism needs to survive, including food, water, shelter and space arranged in a particular configuration.

Watershed - A watershed is an area of land that drains precipitation and groundwater to a common point, such as a creek, wetland, lake or ocean. A healthy watershed functions to slow, clean and store water, by allowing the water to absorb into the landscape.

Biodiversity - Biodiversity is the term used for the incredible variety of life on Earth – from the smallest microbes to the coastal rainforests. Biodiversity includes:

- Genetic diversity: the variation in genetic characteristics of a species
- Species diversity: the number and types of different species that inhabit an area or ecosystem
- Ecosystem diversity: the variety of habitat types or ecosystems found within a landscape

food web - A food web consists of all the food chains in a single ecosystem. Each living thing in an ecosystem is part of multiple food chains. Each food chain is one possible path that energy and nutrients may take as they move through the ecosystem. All of the interconnected and overlapping food chains in an ecosystem make up a food web. They consist of producers, consumers, detritivores and decomposers.

Online Resources

NatureWatch

NatureWatch is a community that engages all Canadians in collecting scientific information on nature to understand our changing environment. Find out how you can be a citizen scientist in your local area.

<https://www.naturewatch.ca/>

Capital Regional District Watershed Information

<https://www.crd.bc.ca/education/our-environment/watersheds>

Capital Regional District

Information about the features, amenities and directions to Capital Regional District Parks

<https://www.crd.bc.ca/parks-recreation-culture/parks-trails/find-park-trail>

Additional Resources

Teacher References

Backhouse, Frances. Once They Were Hats: In Search of the Mighty Beaver. ECW Press, 2015.

Runtz, Michael. Dam Builders: The Natural History of Beavers and Their Ponds. Fitzhenry and Whiteside Publications. 2015.

Westcott, Frank. The Beaver: Nature's Master Builder. Hounslow Press, 1989.

Student References and Storybooks

Simpson, Caroll. Coastal Spirit Tales: The First Beaver. Heritage House Publishing, 2015.

Crewe, Sabrina. Canadian Symbols: Beavers. Oxford University Press, 2015.

Walters, Eric. Saving Sammy. Orca Echoes, 2014 (CHECK- fiction, wildlife rescue/orphaned beaver)