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Beaver, Moose, and Freshwater Turtle: The Dependence of Canada's Iconic Species on Freshwater Habitats

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Beaver, Moose, and Freshwater Turtle: The Dependence of Canada's Iconic Species on Freshwater Habitats

■ Level

Grade 6: Saskatchewan and Quebec

Grade 7: Alberta, British Columbia, the Dene Nation, Manitoba, New Brunswick, Nova Scotia, Nunavut, Ontario, Prince Edward Island, and Yukon

Grade 8: Newfoundland and Labrador

■ Curriculum Areas

Science

■ Theme

Freshwater habitats

■ Description

Students will learn about the importance of freshwater habitats for the survival of Canada's iconic species, specifically the beaver, the moose, and the freshwater turtle. They will also learn that changes to an organism's habitat may have serious consequences for the organism in terms of its ability to survive and reproduce. They will understand that all species in nature are interconnected and that if one member is affected, then others will also be affected.

Through a series of four lessons, students will research habitats in a "jigsaw" activity, complete a cause-and-effect graphic organizer, and develop a food chain. The end product will be a brochure that can be used to inform others about their findings.

■ Curriculum Connections

Pan Canadian Common Framework for Science Learning Outcomes, K to 12 Life Science — Interactions Within Ecosystems — Grade 7

306-1: describe how energy is supplied to, and how it flows through, a food web

306-4: identify signs of ecological succession in a local ecosystem

British Columbia and Yukon — Grade 7

Life Science (Ecology)

- describe all organisms in terms of their roles as part of interconnected food webs

- describe ways in which species interact with each other
- determine the limiting factors for local ecosystems

Alberta and Nunavut — Grade 7

Interactions and Ecosystems

- illustrate how life-supporting environments meet the needs of living things for nutrients, energy sources, moisture, suitable habitat, and exchange of gases
- describe examples of interaction and interdependency within an ecosystem
- identify examples of human impacts on ecosystems, and investigate and analyze the link between these impacts and the human wants and needs that give rise to them
- identify signs of ecological succession
- communicate questions, ideas, intentions, plans, and results, using lists, notes in point form, sentences, data tables, graphs, drawings, oral language and other means

Saskatchewan — Grade 6

Ecosystems

- Investigate factors which influence an ecosystem.
 - Appreciate the importance of food webs in conveying information about interrelationships in the local community.
- Inquire into the effects of change in an ecosystem.
 - Identify some events that cause change.
 - Appreciate the fragile nature of ecosystems.
 - Explain how living organisms cooperatively share an environment.
 - Illustrate ways that change cascades through an ecosystem.
- Develop a sense of responsibility for the preservation of the ecosphere.
 - Investigate the impact that humans have on ecosystems.
 - Recognize the role that humans play in protecting or destroying ecosystems.
- Understand how technology both shapes society and is shaped by society (TL).
 - Understand the reciprocal relationships between the natural and constructed worlds.

Dene Nation — Grade 7

Primary Objectives

The beaver is valued by the Dene because it has the gift of wisdom. It is the boss of wisdom. The beaver's existence on this land is very important to the shaping of Dene history.

Moose meat and moose hides are prized by the Dene. Students will assist in hunting and skinning a moose. In learning these skills, students are also carrying on the knowledge and wisdom of a particular teacher, and taking part in an important Dene tradition. Students must also become familiar with the spiritual relationship of the Dene to the moose, and learn how to respect the moose. Respect means preservation of the moose; lack of respect means its extinction.

Manitoba — Grade 7

Interactions within Ecosystems

- identify environmental, social, and economic factors that should be considered in the management and preservation of ecosystems
- identify and describe positive and negative examples of human interventions that have an impact on ecological succession or the makeup of ecosystems
- describe ecological succession and identify signs of succession in a variety of ecosystems

Ontario — Grade 7

Life Systems — Interactions Within Ecosystems

- identify populations of organisms within an ecosystem and the factors that contribute to their survival in that ecosystem
- interpret food webs that show the transfer of energy among several food chains, and evaluate the effects of the elimination or weakening of any part of the food web
- explain the long-term effects of the loss of natural habitats and the extinction of species

Quebec — Grade 6

Living Things (cycles 2 and 3)

Energy

- transformation of energy in living things: food chains (2), and ecological pyramids (3)

Systems and Interactions

- interaction between living organisms and their environment: living things and their habitat (2) between humans and their environment (2 and 3)

Nova Scotia, New Brunswick, and Prince Edward Island — Grade 7

Interactions within Ecosystems (Unit 1)

Knowledge

- describe how energy is supplied to, and how it flows through, a food web
- describe conditions essential to the growth and reproduction of plants and microorganisms in an ecosystem, and relate these conditions to various aspects of the human food supply
- identify signs of ecological succession

Food Webs

- prepare a chart that describes how energy is supplied to, and how it flows through, a food web
- apply the concept of a food web as a tool for interpreting the structure and interactions of a natural system
- describe conditions essential to the growth and reproduction of plants and microorganisms in an ecosystem, and relate these conditions to various aspects of the human food supply: air, temperature, light, moisture

Ecological Succession

- identify signs of ecological succession

Newfoundland and Labrador — Grade 8

Environmental Interactions

- define food chain as the movement of food energy through an ecosystem from producers to different levels of consumers
- illustrate examples of food chains which would be found in Newfoundland and Labrador
- construct a food web from a list of common plants and animals found in the woods of Newfoundland and Labrador
- define succession as the natural series of changes which occur in an area over time
- describe an example of succession occurring in the local environment
- identify examples of how humans have affected their environment

■ Suggestions for Assessment and Evaluation

Assessment

Lesson 1

- Circulate and interact with students to ensure the accuracy and completeness of the information that is being summarized and shared.
- Collect and read students' notes about the three animals and their habitats to assess content accuracy. Make suggestions for improvement and review changes once they have been completed

Lesson 2

- Collect and read students' Cause-and-Effect Graphic Organizers to assess students' understanding of how changes to the freshwater ecosystem affect plants, animals, and humans. Make suggestions for improvement and review changes once they have been completed.

Lesson 3

- Assess the accuracy of students' food chains and webs. Assess their ability to describe the source and flow of energy and their understandings of the interconnectedness of food chains and food webs. Make suggestions for improvement and review changes once they have been completed.

Evaluation

Lesson 4: Performance Assessment Task

- With the class, develop criteria for evaluating the information that will appear in the brochure and use these criteria to create an evaluation rubric. List the criteria and provide a rubric with a 4-point scale to describe how each criterion can be evaluated. Use the rubric for self, peer, and/or teacher assessment of the brochure.

- Have students reflect on what they learned and suggest other information they'd like to understand about the animals studied.

■ **Prior Knowledge and Skills Required**

- the concepts of habitat, community, and freshwater
- basic needs of plants and animals and how those needs are met
- research skills

■ **Materials Needed**

- print and non-print reference materials, such as books, magazines, posters, videos, and websites about the beaver, the moose, the freshwater turtle, and freshwater habitats (See Suggested Resources, page 17)
- computer(s) with Internet access
- Species Fact Sheets (Appendices A1, A2, A3)
- Water Systems Definitions (Appendix B)
- Cause-and-Effect Graphic Organizer (Appendix C)
- variety of sample brochures produced by, for example, the government, businesses, non-profit organizations, environmental groups
- poster paper, writing tools, magazines, glue, scissors, tape, blank paper, construction paper in a variety of colours

■ **Time Required**

4 lessons totaling 300 minutes

■ **Instructional Strategies Used**

- Lesson 1: "Jigsaw" Research
- Lesson 2: Cause and Effect
- Lesson 3: Sketching to Learn
- Lesson 4: Writing to Learn

■ **Lessons**

Lesson 1: Freshwater Species and Their Habitats (100 minutes)

Students will research the beaver, the moose, or a freshwater turtle, and its habitat, and share their findings with the class.

Note to Teacher: This activity may be divided into more than one class period.

Materials Needed

- Species Fact Sheets (Appendices A1, A2, A3)

- Water Systems Definitions (Appendix B) (optional)
- print and non-print reference materials, such as books, magazines, posters, videos, and Internet websites (See Suggested Resources, page 17.)
- computers with Internet access

Procedure

1. Divide the class into “home” groups of three students. Give each student in each home group a number (one, two, or three).
2. Arrange students who have been given the same numbers into “expert” groups. (If necessary, subdivide each of these expert groups into two or more subgroups of more manageable size.)
 - Expert group one will study the beaver and its habitat.
 - Expert group two will study the moose and its habitat.
 - Expert group three will study a freshwater turtle and its habitat. (Assign or have students choose from the painted turtle, Blanding’s turtle, wood turtle, snapping turtle, spotted turtle, musk turtle, northern map turtle, or spiny softshell turtle.)
3. Have each expert group use the resources provided to research their chosen species’ dependence on freshwater habitats. Remind students that all members must understand and be able to discuss the key ideas about their animal.
4. After students have completed their research task, have them return to their home groups to share what they have learned about the animal they researched in the expert group. The other members of the home group should listen carefully and record the information they learn about each animal and its habitat.

Note to the Teacher: See page 5 for assessment.

Lesson 2: Influences of Freshwater Habitats

(40 minutes)

Students will prepare a Cause-and-Effect Graphic Organizer on the animal they researched in Lesson 1 and share their conclusions with the class.

Materials Needed

- Cause-and-Effect Graphic Organizer (Appendix C) — one copy per student

Procedure

1. Provide each student with a copy of the Cause-and-Effect Graphic Organizer.
2. Describe a possible real-life scenario that shows the importance of freshwater habitats to the species that depend on them. For example:

Scenario: A new housing development is being constructed around a local pond. What impact will the construction have on the pond and the species living in and depending on it?

Cause: construction of new housing development around local pond

Effect: species' habitat may be destroyed; species have to find a new habitat; some species may be lost; new species may arrive; pond may be preserved through local action; etc.

3. Model how to complete the task by filling in the graphic organizer.
4. Ask students to think of an alternative cause-and-effect scenario that would affect their animal, and then ask them to share their scenario with a peer.
5. Invite students to explain to the class the scenarios they discussed.
6. Encourage students to suggest additional causes and explain the possible effects of each.
7. Have students complete their own copy of the graphic organizer by filling in the causes and effects that they found.

Note to the Teacher: See page 5 for assessment.

Lesson 3: Food Chains and Food Webs **(60 minutes)**

Students will prepare a food chain about the animal they researched in Lesson 1, share their conclusions with the class, and contribute to the development of a food web.

Materials Needed

- yarn
- resource materials on the beaver, the moose, a freshwater turtle, and freshwater habitats (See Suggested Resources, page 17.)
- drawing paper and drawing materials

Procedure

1. Create a diagram to model a food chain and its components. For example:

sun→trees→beaver→bear <art: show this as a diagram with words and a sketch of each item, connected by a line. Have arrows on each line segment to show the direction in which the energy flows – make the arrows look like pieces of yarn connecting the stages>

2. Discuss the role of each component of the chain, what the arrows mean, the source of the energy, and how energy flows through the chain.
3. Have students work in pairs to produce food chains for the species they researched in Lesson 1. Encourage them to refer to the resource materials as needed. As you circulate through the class, ask students to explain their food chains.
4. Choose several students to display their completed food chains and briefly explain them to the class. Ask students to describe any commonalities among the chains, for example, the beginning links in some chains are the same but the following ones are different. Note to Teacher: The final links will usually be students' respective animals.

5. Create a food web by linking together chains that have at least one common element. This can be done either by writing the names of the components on the board and connecting them by chalk, or by assigning each student to represent a component and using yarn to illustrate the connections. Ask the class to connect the other chains to make food webs. Invite students to describe the food webs created.

Note to the Teacher: See page 5 for assessment.

Lesson 4: Creating an Information Brochure: Performance Assessment Task (100 minutes)

Students will design a three- or four-fold brochure to inform others of the importance of a freshwater habitat for the animal they have researched.

Materials Needed

- variety of sample brochures
- art supplies, such as poster paper, drawing and writing tools, magazines, glue, scissors, tape, and coloured construction paper
- computer and graphics software (optional)

Procedure

1. Explain that each student will be responsible for creating a three- or four-fold brochure to inform others of the importance of a freshwater habitat for the animal they have researched. Brainstorm a list of possible topics.
2. Examine some sample brochures to determine which ones are effective and why. List the students' ideas on the board.
3. Discuss the information that will appear in the brochure. For example, the class might decide that the brochures must include and clearly explain:
 - the name of the animal and its dependence on its freshwater habitat.
 - a food chain for their chosen animal, including the transfer of energy, and its connection to one other food chain.
 - the long-term effects of the loss of the animal's habitat.
4. With the class, develop criteria for assessing the information in the brochures. Base the criteria on selected unit outcomes/expectations and the ideas discussed in Steps 2 and 3 above.
5. Suggest that students do a draft design first and then make revisions and edit the text as needed. Once the draft is completed and a self and/or peer review against the criteria is completed, they can create their final brochure.

Note to the Teacher: See page 5 for evaluation.

■ Strategies for Inclusion

- Pair English as a Second Language (ESL) students with buddies who can help explain information and incorporate their ideas.
- Explain to students why they are working in groups and what you expect from them when they are working in groups (e.g., respect for other people's ideas, responsibility).
- The Species Fact Sheets (Appendices A) may be used as a Special Education and/or ESL accommodation during the Jigsaw lesson (Lesson 1). Readability levels are
 - Painted Turtle: Grade 3.9 (Appendix A1)
 - Beaver: Grade 4.8 (Appendix A2)
 - Moose: Grade 5.7 (Appendix A3)

■ Extension

If possible, organize a field trip to a local freshwater ecosystem so students can conduct scientific investigations in the field.

■ Action Tips

The activities listed below are designed to

- capitalize on students' understanding of the ecological relationships between each animal (beavers, moose, and freshwater turtles) and its freshwater habitat.
- help students connect their new knowledge to actions they can take for positive change.

These Action Tips provide a connection to the Science, Technology, Society, and the Environment (STSE) aspect of the Science curriculum.

Choose one or more activities, depending on your region, students' interest, and students' abilities.

Action Tips for School

- Have students create posters or brochures to promote a class or school cleanup of a local freshwater source. If a freshwater source cleanup is not feasible for the whole school, you might limit it to your own class.
- If your school is located near a freshwater habitat, sign up for the annual shoreline cleanup. For more details or to register, visit the Great Canadian Shoreline Cleanup website at www.vanaqua.org/cleanup/home.php.
- Encourage students to create a Freshwater Habitat Awareness Campaign at the school. In addition to the brochures created in Lesson 4, they can work individually or with their peers to create other promotional tools, such as posters, websites, bulletin board displays, or announcements promoting the importance of healthy

freshwater systems. Since the information presented should be relevant to the local community, students may need to do further research.

- Encourage and organize students to extend the Freshwater Habitat Awareness Campaign beyond the school to inform the nearby community and encourage a cleanup of a local freshwater source, such as a pond, river, stream, or lake.

Action Tips for Home

- Invite students to conduct a water audit at home. They can read the water meter and record how much water is used in one week. Have them challenge their families to commit to using five different strategies for conserving water, for example, taking showers instead of baths, turning off the water when brushing teeth. Have students record the water meter reading again after one week to note the difference.

Action Tips for the Community

- Have students participate in the Yellow Fish Road program. In this program, participants paint a picture of a yellow fish near storm drains to serve as a reminder that hazardous waste materials going down the drains affect everyone. Visit www.yellowfishroad.org for more details.

Action Tips for Consumers

- Invite students to encourage their families to use environmentally friendly cleaning products to reduce water pollution.
- Have students test the flow rate of their shower head at home. The procedures can be found at www.ibuydifferent.org/whatsthedeal/showerhead.pdf. Once they know the flow rate, they can compare the efficiency of their shower head with other brands. (Note to the Teacher: Efficiency in this case is related to flow rate. A shower head with a lower flow rate is more efficient than one with a higher flow rate.) Students can present their findings to their parents and suggest that they install a more efficient shower head to save money and water. If there are showers in the school change rooms, the test could also be conducted there.

■ Appendix A1: Species Fact Sheets

The Painted Turtle (*Chrysemys picta*)²

Appearance

The painted turtle is a small reptile. It has a hard, black shell with red markings. The underside of the painted turtle is yellow. It has smooth, green skin with red and yellow stripes. It has a hard, pointy mouth. It has a tail and claws.

Habitat

The painted turtle lives near ponds, streams, wetlands, and other areas that are near water.

Food

The painted turtle eats small fish, insects, crayfish, and plants.

Predators

Bullfrogs and water snakes will hunt juvenile painted turtles, while raccoons, and hawks will prey on both juveniles and adults.

Special Features

The painted turtle does not chew its food. It cuts its food with its pointy mouth and swallows it. It sheds old skin as it grows.

Winter Adaptations

The painted turtle hibernates in the winter. It buries itself in the mud at the bottom of a pond and sleeps.

■ Appendix A2: Species Fact Sheets

The Beaver (*Castor canadensis*)³

Appearance

The beaver is the largest rodent in North America. It has large front teeth and shiny, brown fur. It has a flat tail shaped like a paddle. Its large, webbed hind feet are good for swimming.

Habitat

The beaver lives near slow-moving streams in forested regions. The beaver builds a dam of logs and mud in a stream to create a new lake. Then, it builds a lodge out of branches and twigs in the lake. The entrance to the lodge is below the surface of the water level and has a ramp that leads to the living quarters, which are above water level.

Food

The beaver eats mostly leaves and bark. It prefers the bark from deciduous^{*} trees, such as aspen, poplar, and birch.

Predators

Bears, wolves, and coyotes are among the predators that prey on the beaver. Hawks and owls hunt young beavers. Humans hunt beavers for their fur, for food, and to keep them from building their dams.

Special Features

Beavers live in colonies of six or more and mainly work at night. They are excellent swimmers and can stay underwater for 15 minutes. The beaver slaps the water with its tail to warn other beavers of danger. The beaver's dam creates wetlands where turtles, fish, frogs, and birds like to live. However, it also dramatically changes the habitat that was there before.

Winter Adaptations

The beaver lives in its lodge for the winter. The lodge has an underwater space for food storage.

** trees that shed their leaves in the autumn*

■ Appendix A3: Species Fact Sheets

The Moose (*Alces alces*)⁴

Appearance

The moose is the largest member of the deer family. A bull (male) moose weighs an average of 400 kg. Males and females are about one and a half metres tall at the shoulder. This large animal has long, stilt-like legs, black fur, a humped back, and a short tail. The moose also has big ears, an overhanging upper lip, and a long piece of fur-covered skin hanging from its neck.

Habitat

Moose live near wetlands, lakes, and rivers. During the winter, moose prefer to stay in forested areas.

Food

Moose eat woody plants and leaves. In the summer, the moose visits lakes to eat water plants. During the winter, it eats twigs, branches, and the bark of trees, as well as grasses it digs up from under the snow. Native people call the moose muse or musu which means “wood eater.”

Predators

Wolves, bears, and humans hunt the moose.

Special Features

Only the bull moose has antlers. Antlers start to grow in the middle of the summer, are used for fighting in the breeding season, and are shed in November every year. The moose is a powerful swimmer and can dive to a depth of more than five metres. It is also a fast runner with a good sense of smell. Moose are generally solitary animals.

Winter Adaptations

Moose grow thick fur in the winter to keep warm and their long legs help them to walk in deep snow.

■ Appendix B: Water Systems Definitions ⁵

Lake

A lake is a large body of still water that is surrounded by land. The moose and raccoon are examples of species that live near lakes, and the largemouth bass is a species that lives in lakes.

Pond

A pond is a body of still water that is smaller than a lake. Ponds host many different kinds of animals and plant life. Some animals, like the largemouth bass and the water snake, may live in the water of the pond. Some animals, such as the mallard duck and the Canada goose, live on the surface of a pond. Others, such as the raccoon, beaver, and moose, live in the area surrounding a pond. The water lily is a plant whose roots are in the soil at the bottom of a pond, and whose leaves are on the surface of the pond. Elodea, a native plant, lives under the water.

Wetland

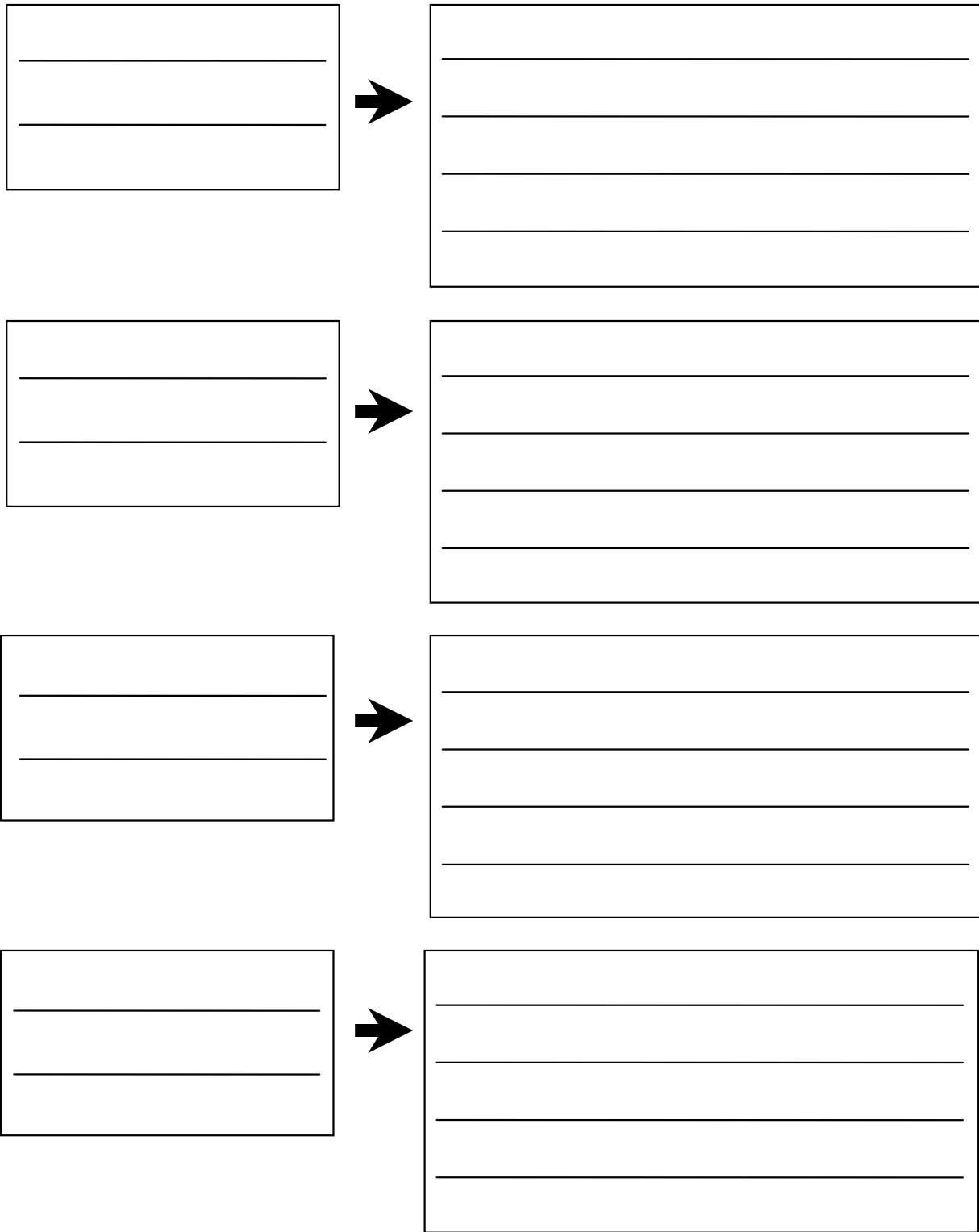
A wetland is a low-lying area that is covered by standing or slow-moving water. Wetlands have an abundance of vegetation, such as coniferous* and deciduous trees, grasses, and other plants. Many animals and birds also live in wetlands; examples include the beaver, bullfrog, osprey, freshwater turtle, and water snake.

** trees that produce cones, such as pines, firs, spruces, and hemlocks*

River

A river is a natural stream of freshwater that flows in a channel across the land's surface and drains into a lake or an ocean. The bullfrog, snowshoe hare, and red squirrel are examples of species that live near rivers.

• **Appendix C: Cause-and-Effect Graphic Organizer**



■ References

¹ adapted from *The Canadian Encyclopedia: Year 2000 Edition*, Toronto: McClelland and Stewart, 2000.

² adapted from
www.fcps.k12.va.us/StratfordLandingES/Ecology/mpages/eastern_painted_turtle.htm

³ adapted from hww.ca/hww2.asp?pid=1&id=82&cid=8 (Hinterland Who's Who)

⁴ adapted from hww.ca/hww2.asp?cid=8&id=93 (Hinterland Who's Who)

⁵ adapted from ec.gc.ca/water/en/info/gloss/e_gloss.htm (Environment Canada Freshwater Website)

■ Suggested Resources

Books

For Students

Blachas, Michelle. *The Moose: Gentle Giant*. Downsview: Monarch Books, 2002.

George, William T. *Box Turtle at Long Pond*. Toronto: HarperCollins Canada, Ltd., 1989.

Hibbert, Adam. *A Freshwater Pond*. St. Catharines: Crabtree Publishing Company, 1998.

Kalman, Bobbie. *What Are Food Chains and Webs?* St. Catharines: Crabtree Publishing Company, 1999.

Lauber, Patricia. *Who Eats What?: Food Chains and Food Webs*. Toronto: HarperCollins Canada, Ltd., 1994.

Rue, Leonard Lee. *Beavers*. Stillwater, MN: Voyageur Press, 2002.

Toupin, Laurie. *Freshwater Habitats: Life In Freshwater Ecosystems*. London, England: Franklin Watts, 2005.

For Teachers

Ernst, Carl H., Jeffrey E. Lovich, and W. Roger Barbour. *Turtles of the United States and Canada*. Toronto: Penguin/Putnam, 2004.

Geist, Valerius. *Moose: Behavior, Ecology, Conservation*. Stillwater, MN: Voyageur Press, 1999.

Long, Kim. *Beavers: A Wildlife Handbook*. Boulder, CO: Johnson Books, 2000.

CD-ROMs

Jewels in the Forest: Lakes of the Boreal Shield. Winnipeg, MB: Freshwater Institute.
See <http://www.umanitoba.ca/institutes/fisheries/edu.html#link> for information.
(undated)

Websites

For Students

Hinterland Who's Who: Mammal Fact Sheets
<http://hww.ca/hww2.asp?pid=1&id=82&cid=8>
Information about the beaver

Hinterland Who's Who: Mammal Fact Sheets
<http://hww.ca/hww2.asp?pid=1&id=93&cid=8>
Information about the moose

Clean Water — Life Depends on It!
http://www.ec.gc.ca/water/en/info/pubs/FS/e_FSA3.htm
Extensive information about water from Environment Canada

Turtles: Order Testudines
<http://www.aquatic.uoguelph.ca/reptiles/books/book3/bookframe1.htm>
Information about Canada's aquatic turtles from the University of Guelph

World Wildlife Fund: Expert Engineers
http://www.panda.org/news_facts/education/middle_school/species/beaver_intro.cfm
Fact sheet about the beaver

World Wildlife Fund: Building Dams
http://www.panda.org/news_facts/education/middle_school/species/building_dams.cfm
Information about beaver dams

World Wildlife Fund: Turtles that Sniff Out Human Corpses
http://www.panda.org/news_facts/education/middle_school/species/snapping_turtle.cfm
Information about the snapping turtle

For Teachers

Hinterland Who's Who
<http://hww.ca/hww.asp?id=1&pid=0> (Hinterland Who's Who)
Information about a wide range of Canadian species, including those that are at risk

The Ramsar Convention on Wetlands

<http://www.ramsar.org/>

Information about the international conservation and wise use of wetlands and their resources

World Wildlife Fund: Living Waters: Conserving the Source of Life

http://www.panda.org/downloads/freshwater/LW_factsheet.pdf

Information about managing and protecting wetlands

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