



Next Generation Stewards

Introductory Lesson

Duration

1.5 hours, approx.

Lesson at a Glance

Science Journals (10 min)

Pre-Program Assessment (30 min)

"How Wolves Change Rivers" (40 min)

Debrief Discussion (10 min)

Learner Outcomes

Participants will:

- Complete a pre-program assessment in their Science Journal.
- Make a model that illustrates the interconnectedness of the Yellowstone National Park ecosystem.

Materials

Items provided by the Greenway Trust:

- Next Generation Stewards Science Journal (1 per student)
- Example of the Ecosystem Connections activity
- Images of Yellowstone National Park animals and plants
- Link to "How Wolves Change Rivers" video

Items provided by the classroom teacher:

- Blank paper
- Pencils/markers
- Scissors
- Glue
- Printed images of Yellowstone National Park plants and animals

Science Journals (10 min)

1. Give each student a Science Journal. Ask them to write their name, teacher's name, and school on the front.
2. Tell them they will use this Science Journal in the classroom, on the field trip, and back in the classroom to record their observations, new knowledge, and reflections.
3. Ask, "What do you think being a steward of nature means?" Nature stewards do what they can to help take care of the plants, wildlife, water and land. They continue learning about nature, enjoy its many wonders, and share what they know with their friends and family.

Pre-Program Assessment (30 min)

If you are short on time, please prioritize giving your students time to complete the pre-program assessment.

1. Ask your students to open their Science Journal to the first page, titled "Picture This!" Assure them that this not a test. They will make a drawing and answer some questions today and then repeat this after their field trips when a Greenway Educator comes to the classroom for a reflective lesson. The Greenway education team looks at these assessments to see what students are learning from us and to make any needed adjustments to our teaching materials.

2. Give your students 30 minutes to complete the pre-program assessment on pages 1-4. (Approx. 20 minutes to draw and 10 minutes to write).

“How Wolves Change Rivers” (40 min)

1. Students will watch a short video about the reintroduction of wolves to Yellowstone National Park and then do an activity.

Link to the “How Wolves Change Rivers” video (4:34 minutes): <https://blog.ted.com/video-how-wolves-can-alter-the-course-of-rivers>

Note: the narrator refers to elk as deer, which may confuse your students.

2. Introduce the video:

We’re going to watch a video about a special place called Yellowstone National Park. Yellowstone is a park in Wyoming that is larger than King County. It is protected as public land by the federal government. Yellowstone is special because it contains so many types of natural landscape features, plants, and animals. There are canyons, lush forests, meadows, rivers, hot springs, and geysers. In the forests and along rivers, there are aspen and cottonwood trees; and in the meadows there are beautiful wildflowers. It is home to many large animals like moose, bison, elk, mountain goats, and bears; and smaller animals like rabbits, beavers, weasels, fish, frogs, and all sorts of bugs. More than 300 species of birds live there! This video focuses on one animal in particular: the wolf. Although wolf packs used to roam from the Arctic to Mexico, the wolf populations in the United States were almost completely gone by the early 1900s. As white settlers built farms and homesteads, the wolves lost much of their habitat and food. So, they started preying on the farmers’ livestock – cows, goats, sheep, chickens – causing the farmers

to get angry and to try to keep the wolves away from their farms by shooting, trapping, or poisoning them. Wolves weren’t even safe in Yellowstone National Park. By the 1970s – about 35 years ago – scientists couldn’t find any evidence of wolves in the park. Then the Endangered Species Act, passed in 1973, helped protect wolves and other wildlife species. About 20 years ago (between 1995-97), 41 wolves from Canada and Minnesota were released into the Yellowstone National Park ecosystem. This video is about the incredible things that happened as a result.

As we watch this video, pay special attention to the names of plants and animals as well as how they are connected to each other. What are some ways that plants and animals can be connected? (E.g. deer eat grass, birds use trees as homes, etc.).

3. Watch “How Wolves Change Rivers.” You may choose to watch the video more than once.
4. Introduce the Ecosystem Connections Model activity and pass out the materials.
 - On your paper, draw and label at least 5 animals and at least 2 non-animal parts of the Yellowstone National Park ecosystem. You must include a wolf. (Alternative: use the images included in this lesson). Use the whole paper so that each drawing has plenty of space around it.
 - Identify how one part is connected to another. Draw a line between them. Along the line, write a brief description of that connection. For example, between a wolf and rabbit, you could write “wolves eat rabbits”; between a songbird and tree, you could write “birds make nests in trees.” Draw and label as many connections lines you can.

Debrief Discussion (10 min)

Debrief the activity with questions such as:

1. Before the wolves were reintroduced, why were there so many elk?

There were so many elk because their main predators was gone for so long.

2. How did the wolves reduce the amount of erosion along the river?

Wolves drove out elk and other animals from certain areas, allowing vegetation to grow and stabilize the river banks.

3. How would you define “ecosystem?”

A collection of living and non-living (or biotic and abiotic) parts that are connected.

4. Yellowstone National Park is an ecosystem: What smaller ecosystems exist within it? What larger ecosystem is the park part of?

Examples of a smaller system: river system, one tree, one canyon. Example of a larger system: the National Parks system, the Rocky Mountains, the United States, North America.

5. How do think this ecosystem would change if a non-native invasive species were introduced?

Non-native invasive species can spread aggressively in a new ecosystem because their natural pests and predators are not present. These plants can decrease the biodiversity of an ecosystem.

6. After learning about the wolves of Yellowstone National Park, how would you interpret this quote from the famous naturalist John Muir: “When we try to pick

out anything by itself, we find it hitched to everything else in the universe.”

Everything in an ecosystem is connected, directly or indirectly. When the wolves were removed, the ecosystem became unbalanced and less biodiverse.

ECOSYSTEM CONNECTION EXAMPLES:

1. Wolves are carnivores. Their primary prey are elk, but they will also eat small mammals like beavers and rabbits.
2. Bears eat berries, carrion (dead, decaying animals), rodents, insects, elk calves, grasses. Their numbers increased because there was more food (especially carrion and berries).
3. Elk eat grasses, sedges, shrubs, aspen bark. When they started avoiding parts of the park, vegetation regenerated, which stabilized the riverbanks and helped prevent erosion.
4. Beavers eat grasses, sedges, inner tree bark. They are “ecosystem engineers”: their dams create habitat for many other wildlife species.
5. Rabbits eat shrubs, conifer tree needles. Along with mice, their numbers increased because some of their main predators – coyotes – were killed by the wolves.
6. Birds eat seeds, insects, berries, fish. Birds make nests in trees. Their numbers increased when the plants near rivers regenerated.
7. Eagles eat fish, carrion, ducks.
8. Weasels eat rodents, snakes, squirrels, insects, birds, frogs, eggs.
9. Coyotes eat small mammals, carrion, squirrels, birds, deer. Some were killed by the wolves.
10. Otters, Muskrats, Ducks, Reptiles, Amphibians, Fish: More habitat created by the beavers.
11. Trees, especially those near rivers, grew taller and older after wolves were reintroduced, providing more habitat for birds and changing the behavior of the rivers.
12. Rivers: Meandered less. Less erosion. Channels

narrowed. More pools and riffles. All of this is great for wildlife habitat. This was possible because the regenerating vegetation stabilized the river banks, so they collapsed less often.

KEY TERMS:

Biodiversity: the variety of life in an ecosystem.

Carrion: Dead, decaying animals.

Ecosystem: A system of interconnected parts that are living (biotic) and non-living (abiotic).

Erosion: The movement of soil from one location to another by wind, water, ice, or gravity.

Food chain: A series of organisms interrelated by their feeding habits, the smallest one being fed upon by a larger one, which in turn feeds a larger one, and so on. This is also referred to as a food web.

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

Meander: To follow a winding course.

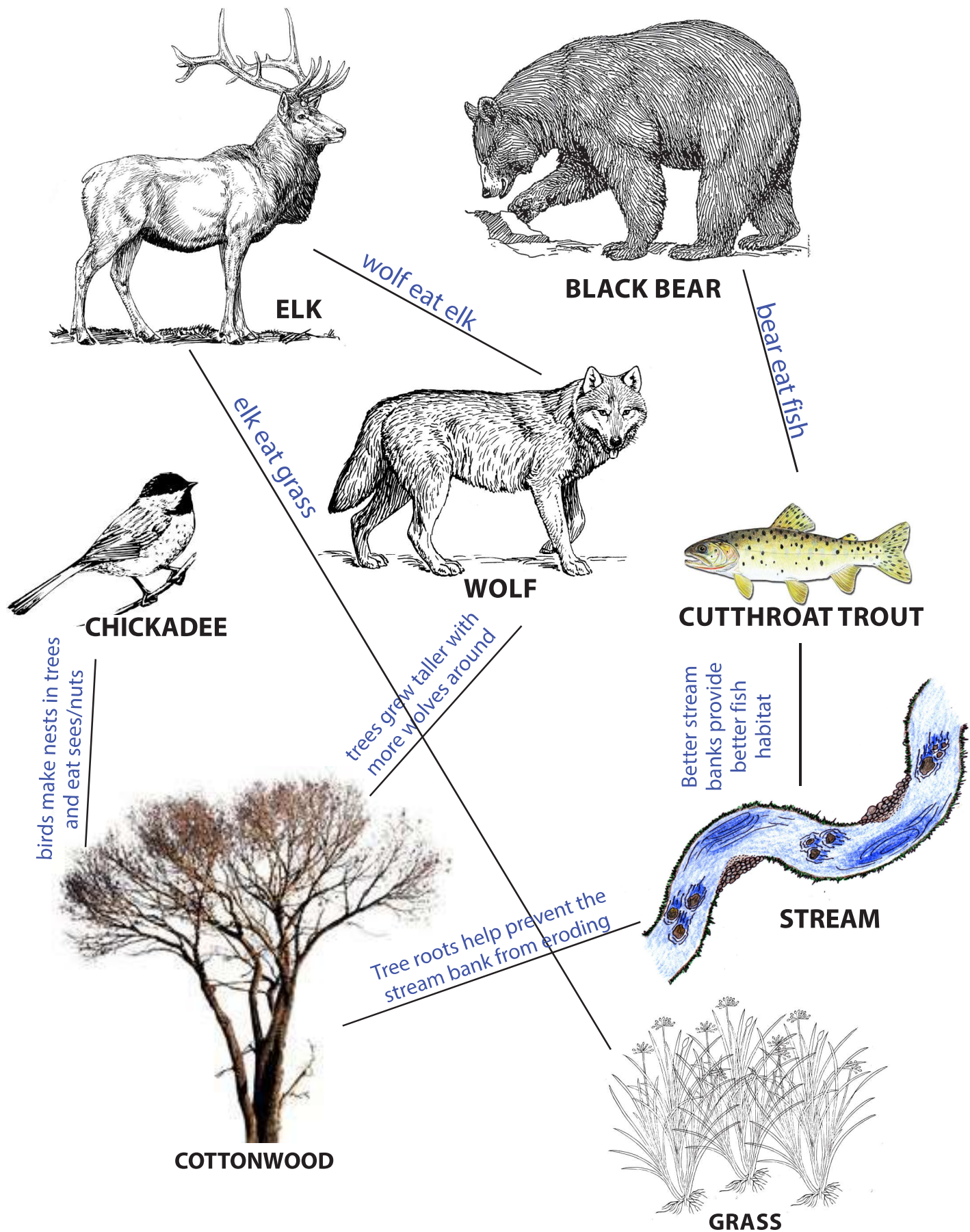
Niche (“neesh”): The place or function of an organism within its ecosystem. Different types of organisms might compete for the same niche.

Regeneration: Growth again after being lost or damaged.

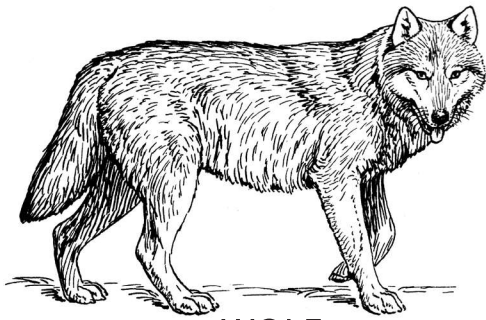
Steward: a person who learns about and protects nature.

Trophic cascade: An ecological process triggered by the removal or addition of a top predator that changes the relative populations of predator and prey throughout a food chain.

EXAMPLE ECOSYSTEMS CONNECTIONS MAP



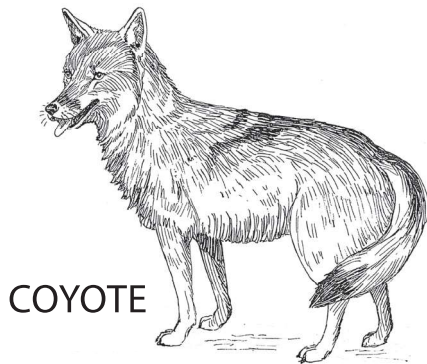
ECOSYSTEM CONNECTIONS IMAGES (TO BE CUT OUT AND GLUED ON BLANK SHEET)



WOLF



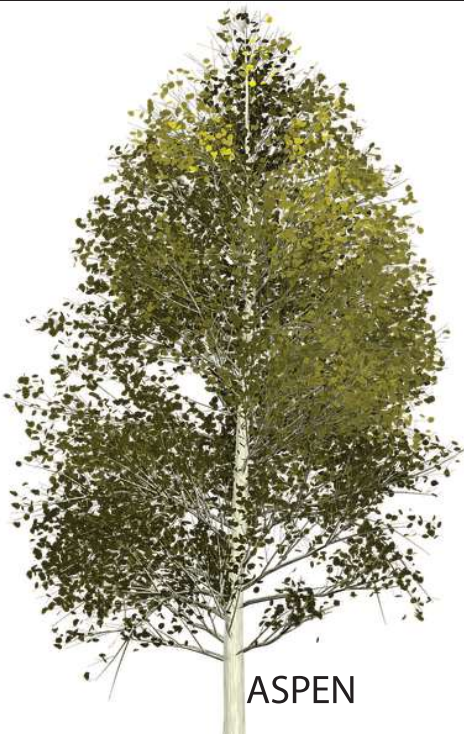
ELK



COYOTE



BLACK BEAR



ASPEN

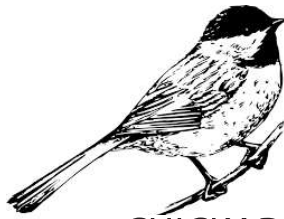


COTTONWOOD

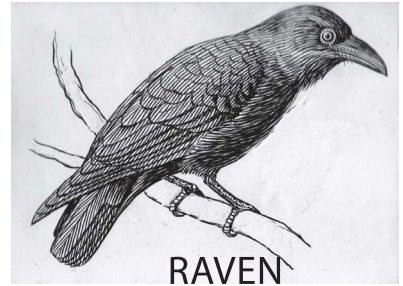
ECOSYSTEM CONNECTIONS IMAGES (TO BE CUT OUT AND GLUED ON BLANK SHEET)



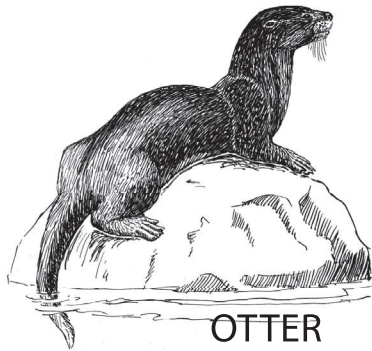
BALD EAGLE



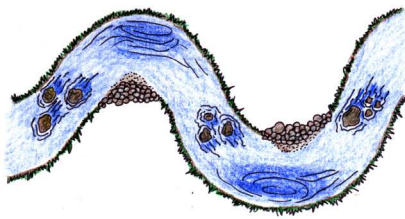
CHICKADEE



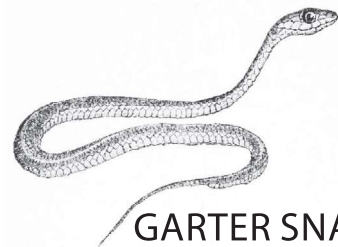
RAVEN



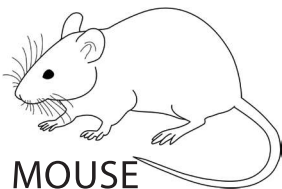
OTTER



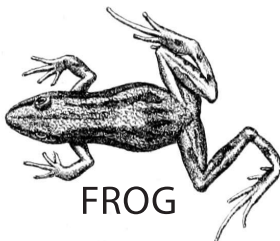
STREAM



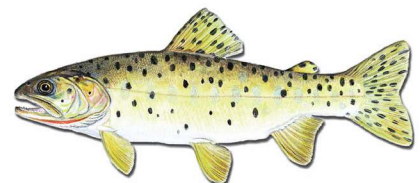
GARTER SNAKE



MOUSE



FROG



CUTTHROAT TROUT



GRASS



RABBIT



BEAVER