



NEXT GENERATION STEWARDS

INTRODUCTORY LESSON

OVERVIEW:

The purpose of this Introductory Lesson is to introduce students to the intricate connections within an ecosystem, using the reintroduction of wolves to Yellowstone National Park as an example. After this Introductory Lesson, students should be able to define an ecosystem and describe some of its parts and how they interconnect. If students grasp these concepts already, please refer to the Extension Ideas (page 4).

OUTCOMES:

- 1) Students will gain awareness of systems.
- 2) Students will identify various parts of a system.
- 3) Students will define an ecosystem as a system of interconnected living and non-living parts.
- 4) Students will begin to understand the connections between parts of an ecosystem.

SUGGESTED GRADES: 4th - 5th

TIME: 60 minutes (or two 30-minute sessions)

NEXT GENERATION SCIENCE STANDARDS:

Please visit mtsgreenway.org/education/standards for a complete listing.

MATERIALS:

Items provided by Greenway Education Program:

- **Next Generation Stewards science journals**
- **“How Wolves Change Rivers” video (4:34 minutes), found here:**
blog.ted.com/2014/02/18/video-how-wolves-can-alter-the-course-of-rivers/
- **Crossword Puzzle and Answer Key**
- **Word Scramble and Answer Key**

SCIENCE JOURNAL:

Students use their Next Generation Stewards science journal in the classroom and in the field to record their observations and reflections. This Introductory Lesson is paired with Pages 1-4 in the science journal.

VIDEO BACKGROUND INFORMATION FOR TEACHER:

Although wolf packs once roamed from the Arctic to Mexico, the wolf populations in the United States were almost completely decimated by the early 1900s. As settlers built farms and homesteads, the wolves lost much of their habitat and prey. They began preying on the farmers' livestock, causing the humans to retaliate by shooting, trapping and poisoning the wolves. Wolves weren't even safe from humans in Yellowstone National Park. Biologists surveyed Yellowstone in the 1970s, finding no evidence of a wolf population.

In the 1960s and 1970s, people across the county were becoming more aware of environmental issues and the consequences of human actions on ecosystems. This led to the the creation of laws designed to identify and correct mistakes of the past, with the hope of not repeating particularly destructive actions. The Endangered Species Act, passed in 1973, was one of them. Almost immediately, all wolf subspecies in the lower 48 states (excluding Minnesota) were put on the endangered species list.

After many years of research, brainstorming and discussion, the reintroduction of gray wolves to Yellowstone National Park was approved. Between 1995 and 1997, 41 wolves from Canada and northwest Minnesota were released into the Yellowstone ecosystem.

The wolves are once again part of an intricate food chain. They prey mostly on hoofed animals, like elk, deer, and moose. In the winter months, their diet consists 90% of elk, while in the summertime they will eat more deer and small mammals (e.g. beavers, mice, birds, fish, etc.). If there is no fresh meat, they will even eat carrion.

Since their reintroduction to Yellowstone, the wolf population has grown rapidly and new packs continue to form and establish territories. Today, there are 400-450 wolves in Yellowstone, divided into packs.

Human actions caused the wolf population of Yellowstone National Park to disappear. Human actions also brought them back. The removal and reintroduction of a top predator to this ecosystem is one of the best examples of human-caused trophic cascade. It illuminates the interconnectedness of the ecosystem's living and non-living parts.

PROCEDURES:

The Introductory Lesson, which corresponds to pages 1-4 in the science journal, can be taught in two 30-minute sessions.

- "Picture This!" (pages 1-2)
- "Your Greenway Path to Stewardship!" (page 3)
- "How Wolves Change Rivers" (page 4)

The "Picture This!" activity should take about 30 minutes, and the other two activities should take about 15 minutes each.

1 Introduce the Next Generation Stewards science journal. Ask students to write their name, your name and their school on the front of the journal. Tell students that they will use this journal in the classroom and on their field study trip to record their observations, new knowledge, and reflections. At the end of the program, they will each take a pledge to become a Next Generation Steward of the Mountains to Sound Greenway. Being a steward of the Greenway means that they will do what they can to protect this beautiful landscape, continue to learn about and enjoy its many wonders, and share what they know with their friends and family.

2 Give students about 30 minutes to draw the healthiest forest ecosystem they can imagine on pages 1-2 of the science journal. This is not a test: we will use a rubric to score both drawings to measure the impact of our program.

Students will be asked to create a second drawing during the reflective lesson (on pages 15-16 in the science journal).

3 Ask students to turn to page 3 in their science journal and read each statement along the three 'pathways': Protect,

Learn and Share. They should indicate (i.e. circle, star, or color in) the statement that most resonates with them for each 'pathway.'

Students will be asked to repeat this exercise after the field study trip (on page 13 in the science journal).

4 Introduce the story of the reintroduction of wolves to Yellowstone National Park, referring to the Background Information for Teachers section. Tell the students that Yellowstone is a system within a larger system of the National Park Service. There are many systems within Yellowstone: roads, trails, streams, campsites, etc. Yellowstone itself is an ecosystem.

Optional. Ask the students to complete the Crossword Puzzle and Word Scramble independently. They should become familiar with these vocabulary words because they are used in the video "How Wolves Change Rivers." These activities can be assigned as homework.

Tell the students that they will watch a video about the wolves of Yellowstone once, review the questions (on page 4 in the science journal) as a group, then watch the video again. They should try to answer the questions as completely as possible.

Watch the video.

Review the questions on page 4.

Watch the video again.

Answer the questions as a group or independently.

VOCABULARY:

System: A combination of things or parts forming a complex whole.

Subsystem: A self-contained system within a larger system.

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

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

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.

Meander: To follow a winding course.

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.

Vegetation: Another words for plants.

Carrion: Dead, decaying animals.

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.

EXTENSION IDEAS:

1. Discuss other ecosystems: deserts, alpine, rainforests, oceans, your neighborhood, etc.
2. What are some problems that could occur if one part of an ecosystem were eliminated? For example, what problems occur in ecosystems when most of the trees are cut down? (E.g. erosion, loss of habitat, loss of beauty). Or, what would happen to your neighborhood park if it didn't rain for 6 months?
3. Does it make sense to protect forest ecosystems? Why? If so, what are some actions we can take to help protect forest ecosystems? (E.g. use less paper, turn off the water when not in use, shorter showers, carpool, pick up our dog's poop, etc.).
4. Use photos or drawings of animals and plants to create a food web, drawing arrows between animals that eat one another. Ask students to draw arrows pointing toward the animal receiving energy, for example:
grass --> deer --> wolf
5. Choose an animal that lives in the Greenway. What does it eat? Where does it live? What other animals eat that animal? Do any organisms depend on that animal for something other than food?
6. Read a book related to forest ecosystems.
Book suggestions ----->
7. Act out photosynthesis. Each student assumes a role: sun, plant(s), water, carbon dioxide, oxygen, sugar and a narrator. The sun shines in the middle of the room. Plant(s) are surrounded by water, carbon dioxide, and oxygen. The narrator describes the process as it happens. Animals can also be included to give off carbon dioxide and receive oxygen.
8. Learn about the seven Leave No Trace principals, which guide minimum-impact experience in nature, at www.LNT.org.

RECOMMENDED VIDEOS:

- "What Is a Greeway?"** (15:26 minutes)
Source: Mountains to Sound Greenway Trust
Link: mtsgreenway.org/education/for-kids.
- "Forest Fact Break: Photosynthesis Explained Simply"** (1:24 minutes)
Source: Oregon State Resources Institute
Link: www.oregonforests.org/content/photosynthesis
- "How Whales Change Climate"** (4:51 minutes)
Source: Sustainable Human
Link: www.sustainablehuman.me/how-whales-change-climate

RECOMMENDED BOOKS:

- The Ancient Tree in the Forest*
Author: Carol Reed-Jones
- A Log's Life*
Author: Wendy Pfeffer
- What If There Were No Gray Wolves?*
Author: Suzanne Slade
- The Wolves Are Back*
Author: Jean Craghead George



FOREST ECOSYSTEMS CROSSWORD PUZZLE

Name: _____

WORD BANK

- Ecosystem
- Habitat
- Niche
- Regeneration
- Erosion
- Meander
- Food chain
- Vegetation
- Carrion
- Trophic cascade

ACROSS

- 3 Dead, decaying animals.
- 4 A series of organisms interconnected by their feeding habits.
- 5 A system of interconnected parts that are living (biotic) and non-living (abiotic).
- 8 The natural home or environment of an animal, plant or other organism.
- 9 Growth after being lost or damaged.
- 10 Another word for plants.

DOWN

- 1 An ecological process, triggered by adding or removing a top predator, that starts at the top of the food chain and tumbles all the way to the bottom.
- 2 To follow a winding course.
- 6 The place or function (job) of an organism within its ecosystem. Different types of organisms might compete for the same place or function.
- 7 The movement of soil from one location to another by wind, water, ice, or gravity.



FOREST ECOSYSTEMS CROSSWORD PUZZLE

ANSWER KEY



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FOREST ECOSYSTEMS WORD SCRAMBLE

Name: _____

To reveal the **Secret Message**: Unscramble each of the clue words below. Rewrite the numbered letters in the box with the same number at the bottom of the page.

SOMESECTY

TAATHBI

CEINH

RNTAGNEEROIE

OINOSRE

OODF NIACH

GONVIETAET

DANMERE

RACNIOR

ROTHCPI CEDSACA

Word Bank: trophic cascade, ecosystem, carrion, vegetation, habitat, meander, regeneration, erosion, food chain, niche

Secret Message:

1 2 3 4 5 6 7
8 9 10 11 12 13 14



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SOMESECTY E C O S Y S T E M

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RNTAGNEEROIE R E G E N E R A T I O N

OINOSRE E R O S I O N

OODF NIACH F O O D C H A I N

GONVIETAET V E G E T A T I O N

DANMERE M E A N D E R

RACNIOR C A R R I O N

ROTHCPI CEDSACA T R O P H I C

C A S C A D E

Word Bank: trophic cascade, ecosystem, carrion, vegetation, habitat, meander, regeneration, erosion, food chain, niche

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1 2 3 4 5 6 7
P R O T E C T
8 9 10 11 12 13 14
F O R E S T S