The Wolves of Yellowstone
Teacher Guide

Grade Range: 6-8

In this exploration, students will learn about how the removal or addition of a top predator can have a large impact on an entire ecosystem. After building background information about Yellowstone National Park, they will watch a video that discusses the unexpected effects of reintroducing wolves to the park after almost 70 years. Finally, they will apply this understanding to a marine food web to infer the importance of protecting endangered predators.

Materials

- Technology to show Youtube video: "How Wolves Change Rivers."
- Student copies of Yellowstone National Park
- Student copies of Wolves in Yellowstone
- Student copies of Apply It!

Key Vocabulary

- Producer
- Predator
- Food Web
- Trophic Cascade
- Ecosystem

Driving Question:

- How does the removal or addition of a top predator affect an ecosystem?

Suggested Procedure:

1) Distribute the worksheets entitled "Yellowstone National Park" and "Wolves in Yellowstone." If time permits, show this video to highlight some of the attractions and natural beauty within Yellowstone: https://www.youtube.com/watch?v=Zj5PWyDkRsA

2) Review the fact sheet as a class, and allow students to answer the "Observe" questions independently or with partners. They should recognize that in this food web, the wolf is the top predator, and the grass is the primary producer. Students may predict that if the wolves were removed, the number of elk would skyrocket. Encourage them to explain why this would happen, and perhaps evaluate if this would be a positive or negative impact on the ecosystem overall.

3) Explain to students that decades ago, wolves were removed from Yellowstone National Park. They were hunted by humans, and the government generally supported the destruction of these predators because it viewed the wolves as dangerous. After almost 70 years, they were reintroduced to the park!

4) Play the video, “How Wolves Change Rivers.” https://www.youtube.com/watch?v=ysa5OBhXz-Q. Students will learn about the removal and reintroduction of wolves to Yellowstone National Park. They should jot down the many expected and unexpected impacts of reintroducing the wolf to Yellowstone. You may wish to play the video twice.

5) Review answers with students. Important takeaways:

   - ***Trophic cascade*** *is when the addition or removal of a large predator alters an entire ecosystem.*
   - *When the wolves were removed, the increase in elk caused Yellowstone’s plant life to deteriorate dramatically. This could have spelled extinction for the many species that relied upon these plants! When the wolves were returned to the park and the elk species decreased in number, the plant life began to flourish again. Other species like beavers, deer, and squirrels increased as well.*

6) Pass out the “Apply It!” worksheet to students. Allow them to review the food web and answer the questions independently. This will demonstrate their ability to generalize the ideas discussed in the video. Important takeaways:

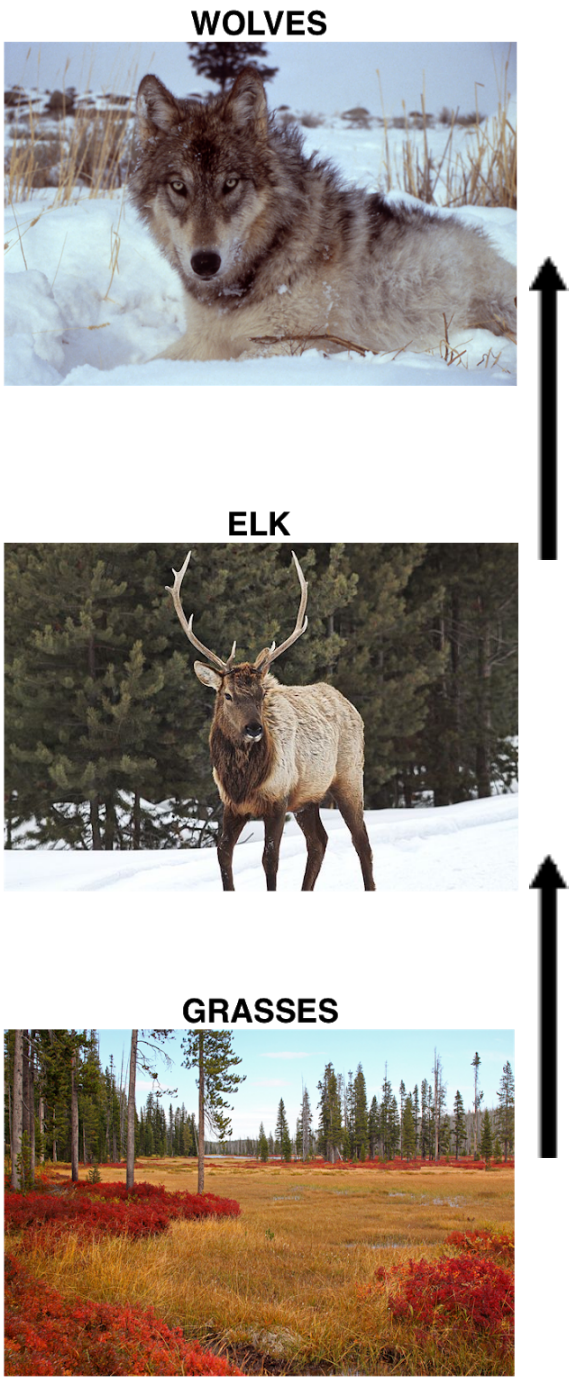
   - *The removal of the killer whale (one of the top predators) could cause dramatic negative impacts in the marine ecosystem, including an ultimate reduction in seaweed. Because many species depend on this producer. The whole ecosystem could collapse.*

Yellowstone National Park

Yellowstone National Park is an almost 3,500 sq. mile wilderness recreation area in Wyoming. Yellowstone is filled with wildlife! Some examples of the animal species found in Yellowstone:

- Grizzly Bears
- Wolves
- Badgers
- Bobcats
- Cougars
- Coyotes
- Weasels
- Otters
- Bison
- Elk
- Moose
- Chipmunks
- Squirrels
- Pronghorns
- Marmots

The graphic to the right shows one small part of the food web in the Yellowstone National Park. Elk consume the grasses, and are eaten by the wolves.



Wolves in Yellowstone

OBSERVE:

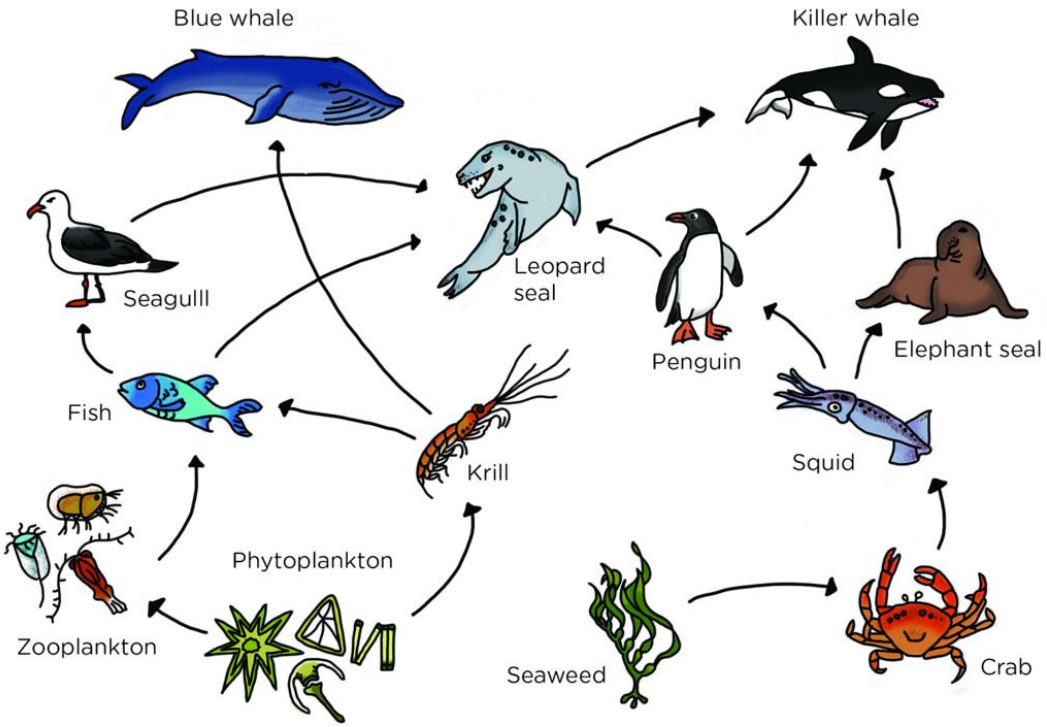
1. Which species is the top predator? _____
2. Which species is the primary consumer? _____
3. What do you think would happen if you removed the wolves from Yellowstone? Why?
4. What animals other than elk probably get their energy from Yellowstone plant life?

WATCH: “How Wolves Change Rivers”

1. What is **trophic cascade?**
2. What were the effects of reintroducing the wolves to Yellowstone National Park?
3. Why did the reintroduction of wolves have such a large impact on Yellowstone?

Apply It!

Directions: Analyze a sample marine food web in order to answer the questions below.



1. Who are the top predators in this ecosystem? Who are the producers?

_____

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2. Humans once commercially hunted "killer" orca whales, endangering the species. Based on the food web and your knowledge of wolves in Yellowstone, why is it important to preserve high numbers of orca whales? What specific changes might occur to this marine ecosystem if orca whales became extinct?

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