# 2 FOOD WEBS IN THE CORRIDOR

**ESTIMATED TOTAL TIME**
**80 minutes**

- **Grades 9–Adult**
- **Life Sciences, General to Advanced**
- **Writing, Social Studies, Activism, Government, and Technology Connections**

In this activity, **high school students** and **adult learners** explore how ecological systems are interconnected and more complex than linear food chains. Students use research and wildlife images from the Florida Wildlife Corridor to distinguish between producers, consumers, and decomposers, build food webs, and identify trophic level interactions. They consider a variety of scenarios of human and environmental impacts on these interactions and use evidence to support a claim about impacts on their food webs. The activity culminates with discussion of the Florida panther as an apex predator with significant influence on the rest of the web.

**KEY TERMS**

- **apex predator**
- **decomposer**
- **food web**
- **keystone species**
- **predator**
- **primary consumer**
- **primary producer**
- **scavenger**
- **secondary consumer**
- **tertiary consumer**
- **trophic cascade**

## BACKGROUND

The Florida Wildlife Corridor sustains a complex network of interconnected **food webs** crucial for the survival of its diverse flora and fauna. At its heart lies the delicate balance between predators, prey, and plants, all intricately linked in a web of dependencies.

Starting with plants, the corridor hosts a rich array of species including saw palmetto, wildflowers, and various grasses. These **primary producers** form the foundation of the food web, providing sustenance for herbivores such as white-tailed deer, rabbits, and various species of insects. For instance, the white-tailed deer feeds on a variety of vegetation including palmetto leaves and grasses, while insects like butterflies rely on nectar from wildflowers for sustenance.

Moving up the food chain, **predators** like the Florida panther and black bear depend on these herbivores for their survival. The Florida panther preys on deer, controlling their population and ensuring the health of the ecosystem. Similarly, black bears feed on a range of vegetation and animals, playing a vital role in maintaining ecological balance.

**Scavengers** such as vultures and raccoons contribute to the food web by consuming carrion and recycling nutrients back into the ecosystem. Additionally, birds of prey like the bald eagle and osprey hunt small mammals and fish, further diversifying the trophic interactions within the corridor.

## FOOD WEBS IN THE CORRIDOR

In this interconnected web of life, each species plays a vital role in regulating populations and maintaining the health of the ecosystem. Here, the Florida panther is both an **apex predator** and **keystone species** with significant influence on the rest of the web. Protecting and preserving the Florida Wildlife Corridor is essential not only for the survival of its inhabitants but also for ensuring the resilience of the entire region.

A **trophic cascade** is a chain reaction within an ecosystem triggered by changes in the population of a particular species, leading to significant alterations in the abundance and behavior of other species within the food web. Typically, it starts with the alteration of the population density of a top predator, which then affects the population of its prey, subsequently influencing the population of lower trophic levels. This can result in complex and sometimes unexpected shifts in species composition, biodiversity, and ecosystem dynamics, ultimately impacting the structure and function of the entire ecosystem. For example, the decline of wolves in Yellowstone National Park led to an increase in elk populations, which then overgrazed vegetation, negatively impacting songbird populations and altering the flow of rivers due to destabilized riverbanks.

In the Yellowstone region and within the Florida Wildlife Corridor, biologists investigate trophic relationships by studying populations, interactions, and ecosystem dynamics, using methods like field observations and mathematical modeling. Their work builds understanding of the mechanisms driving trophic cascades and guides conservation efforts.

### STANDARDS

This activity addresses the following:

**NGSS: HS-LS2-6:** Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.

**Florida NGSS: SC.912.L.17.9:** Use a food web to identify and distinguish producers, consumers, and decomposers.

### OBJECTIVES

**Students will:**

- explore the impact of one keystone species on an entire ecosystem by investigating impacts of the reintroduction of the gray wolf in the Greater Yellowstone Ecosystem;
- use wildlife images from the Florida Wildlife Corridor to create food webs, distinguish between producers, consumers, and decomposers, and identify trophic level interactions; and
- consider human and environmental impacts, and use evidence to evaluate the claim that changes in an ecosystem can impact the number and kind of species in an ecosystem.

### PREPARATION

**Gather and/or print materials:**

- Video: "Wolves of Yellowstone" (5:19)
- Online resource: Wolves Keep Yellowstone in Balance (optional)
- Article: The Big Scientific Debate: Trophic Cascades (optional)
- Slides: Food Webs in the Corridor
- Video: "Wildlife by Camera Trap" (1:35)
- Sticky notes (5–7 per student)
- Handout: Trophic Level Interactions Data Table (1 per small group)
- Handout: Species Cards (1 per small group, color printed on cardstock if possible)
- Handout: Scenario Cards (1 per small group)
- Handout: Food Web Impacts (1 per small group)

**Set up technology:**

Determine whether students will use individual computers or small groups will share computers to conduct species research.

**Additional preparation:**

- Determine how students will view the Species Cards and Scenario Cards. For example, you can: provide cards to students digitally; display cards in a central location for students to view and choose from; or print and cut out one set of Species Cards and one set of Scenario Cards for each small group.
- Determine how students will model the flow of energy among organisms. For example, you can print out or draw and cut out arrows for students to place in between Species Cards; or provide student pairs with mini whiteboards, chalkboards, or paper to draw the arrows on in between Species Cards.

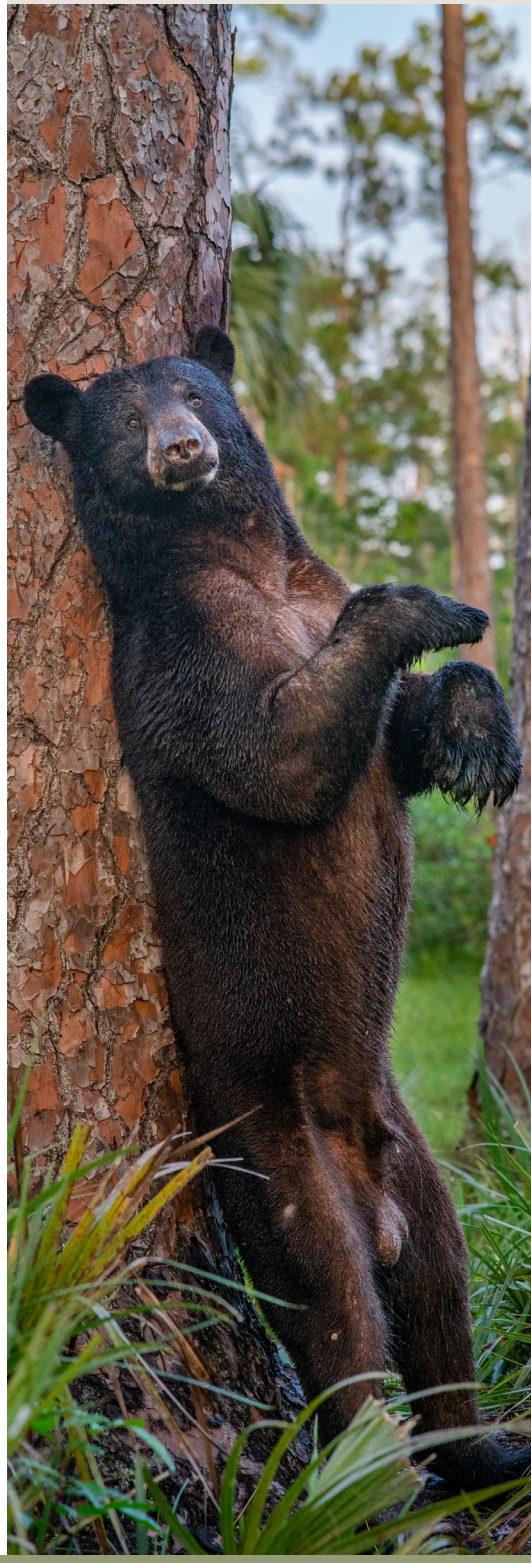
## 15 MIN INTRODUCE A COMPLEX FOOD WEB AND TROPHIC CASCADE

1. Begin by having students view a video of ecosystem dynamics: "Wolves of Yellowstone" (5:19). Have them take notes on the wildlife and plants in the video, the interactions among them, and also environmental impacts. Preview the questions below with students so they know what to listen for as they watch:
   - *What is a keystone species, and what is the example of one in the Yellowstone ecosystem?*
   - *What is one negative impact of the missing wolves in Yellowstone?*
   - *What is one positive impact of the reintroduction of wolves into Yellowstone?*
2. Facilitate a discussion using the previewed questions and the following questions, to engage students in a deeper conversation about the interconnected nature of food webs in an ecosystem, and also what they know about Florida ecosystems:
   - *How does the presence of a keystone species impact the food web within the ecosystem?*
   - *How does a trophic cascade influence other species in a complex system?*
   - *What are examples of keystone species in Florida?*
   - *What are examples of Florida ecosystems that may be susceptible to ecological change and trophic cascade?*

   To reinforce the concept of a trophic cascade, you can also provide the Wolves Keep Yellowstone in Balance infographic.

## 15 MIN INTRODUCE CAMERA TRAPS AND ECOLOGICAL INTERACTIONS

3. Project the slide with the camera trap image of a bobcat jumping over a log with a hare in its mouth.
   - Note on camera traps: Explain that many of Carlton Ward Jr.'s wildlife photos and videos are from camera traps placed in the wild. These cameras have sensors that take a photo or video when sensing movement. Because they "capture" only the photos of wildlife, use of camera traps can be a minimally invasive approach to species monitoring.
4. In pairs, have students discuss the trophic relationship represented in this photo. Students should identify that the sun provides energy for the plants, which then might be eaten by the hare, which then provides energy to the bobcat as its predator.
5. Show students the video clip "Wildlife by Camera Trap" (1:35). Ask students to identify **primary producers**, **primary consumers**, **secondary consumers**, and **tertiary consumers** as they watch the video, writing examples of each on sticky notes. Give small groups an opportunity to compile and compare their sticky notes to check understanding of producers and consumers. Discuss as a whole class as needed. Talk about how camera traps can provide useful research data on the presence and behavior of wildlife, including tertiary consumers, or **apex predators**, such as panthers and alligators.



## FOOD WEBS IN THE CORRIDOR

### 15 MIN RESEARCH SPECIES INTERACTIONS

6. Provide each small group with a printed copy of the Species Cards (can be cut into cards in advance) with Florida Wildlife Corridor species.
7. Have students choose 4–5 organisms from the cards and research their trophic level interactions. Students can use Wildlife Profiles for research, which has key information on most of the species within the camera trap images. Have students record their research in the Trophic Level Interactions Data Table handout. If they find a species not represented in the cards that involves a trophic level interaction, have them create a new card with the name and a sketch of the organism. Students may choose to add organisms in the photos, including the marsh rabbit, mole cricket, amphiuma, American beautyberry, etc.

### 10 MIN CONSTRUCT FOOD CHAINS AND FOOD WEBS

8. Students can now use their research to construct a food chain by arranging the Species Cards in order of energy transfer, using arrows to model the direction of energy flow. A model is provided in the slides.
9. Next, have each group partner with another small group to construct a food web by connecting multiple food chains. A model is provided in the slides.

### 10 MIN ADD SCENARIOS TO FOOD WEBS

10. Next, display the Scenario Cards in a central location, or provide each group with their own set of cards.
11. Instruct students to randomly choose and read two or three Scenario Cards, and then discuss how each impacts their food web. Have them record ideas in the Food Web Impacts handout.

### 5 MIN USE EVIDENCE TO SUPPORT A CLAIM

12. Provide students with the claim below. Have students use evidence from the Scenario Cards and their Food Web Impacts chart to evaluate the claim and provide reasoning, using the claim as a sentence stem:
*"Changes in the ecosystem can result in changes in the number and kinds of organisms in that ecosystem is supported by evidence because..."*

    - *Student sample:* ***I think the claim: Changes in ecosystems can result in changes in the number and kinds of organisms in that ecosystem is supported by evidence because...*** *vehicle collisions account for 59% of Florida panther deaths. If a major highway is built in a panther's range, then the number of panthers will decrease due to vehicle collisions. Or, if saw palmettos are protected, then the number of honey bees could increase since they pollinate saw palmettos. The number of black bears could also increase since black bears eat saw palmetto berries and honey.*

## MORE TO EXPLORE

**WILDLIFE RESEARCH WITH CAMERA TRAPS**

Have students learn more about the camera trap network that Carlton Ward's team uses to track Florida panthers and other wildlife. Discuss the potential for using low-cost camera traps on your school campus to determine wildlife species present beyond school hours. Your students can also help with actual camera trap research by identifying species in online projects included on InstantWild.zsl.org or the Zooniverse.org.

**COMMUNICATE AUTHENTICALLY**

Have students meet with or write to local lawmakers regarding whether or not additional lands should be preserved within the Florida Wildlife Corridor. Optionally, you could extend corridor connections to your local community. Have students use the claim they constructed during the activity to support their argument. Empower students to choose how to communicate, for example, by writing a letter, drafting an email, creating a social media post, and so on.

**10 MIN** **CONNECT TO THE FLORIDA PANTHER**

**13.** Use the slides to display a photo captured from a camera on the GPS collar of a white-tailed deer carcass being eaten by a panther.

**14.** Provide each student with one sticky note to use to respond to the following prompt: *Describe one trophic cascade effect that could result from extinction of the Florida panther in its ecosystem.*

**15.** Have students place their sticky notes on the board or in a central location when they are done, and have them read their peers' responses.

**16.** Discuss how a trophic cascade similar to the one that occurred in Yellowstone could occur in south Florida if the panther, or another apex predator, became fully extinct.

## MORE TO EXPLORE

**EVERGLADES GHOST ORCHIDS**
Have students watch Wildpath's "Chasing Ghosts" video, and then determine how this endangered orchid is part of the Everglades' food webs. (Explain that camera trap images in the film were the first-ever records of a pollination of the ghost orchid.) How does this species contribute to a biodiverse ecosystem?