

Oysters are a Keystone Species

Summary: In this reading investigation, students create an ecosystem web to model how oysters impact other organisms in a variety of ways. Using the model, students figure out that oysters are a keystone species, and jigsaw read a series of short texts that highlight their ecosystem functions more in depth.

Outline

- **Activate prior knowledge of species that live in New York Harbor (15 min)**
- **Create an ecosystem web (30 min)**
- **Jigsaw read about a keystone species (35 min)**
- **Discuss and reflect (10 min)**

LESSON OVERVIEW

Objective (Students will be able to...)

- Obtain information using an ecosystem web model and a jigsaw reading to construct an explanation about whether oysters are a keystone species.

Standards

- MS-LS2-2: Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

BOP Connections

- Standalone Lessons: Pairs well with “Oysters are Shoreline Protectors” which dive more deeply into this specific ecosystem function.
- ORS / ORT: This lesson is also the first in the ORS unit, and provides great foundational context for having oysters in your class ORT or visiting an ORS.

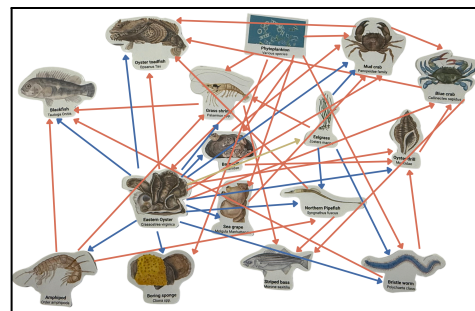
BEFORE YOU GET STARTED

Supplies

- [Grades 6-8: Slides](#)
- [Grades 6-8: "What Lives in New York Harbor" - Resource](#) (one for each group)
- Scissors
- Tape or glue sticks
- Large paper or board
- Red, Blue, and Yellow markers
- [Grades 6-8: Guided Readings](#) (even numbers of each distributed throughout the class):
 - [Source of Food](#)
 - [Water Clearers](#)
 - [Habitat Builders](#)
 - [Shoreline Protectors](#)

Tips for Teachers

- Review with students:
 - Norms (what it may look like and sound like) for teams to work together productively
- Decide:
 - When do you want to do Class 2? It doesn't have to be right after Class 1.
 - How will you split students into groups (e.g. by table, reading level, choice, etc)?
 - Where will students put paper scraps or leftover materials from the ecosystem web?
- Heads up:
 - We use the term "ecosystem functions" throughout this lesson, rather than "ecosystem services" because it centers nature's intrinsic value and ecological processes rather than how nature "serves" humans.
 - Ecosystem webs are similar to food webs because they show relationships between organisms. However, they show more types of interactions - not just how energy flows.
 - Check out the other grade band versions of this lesson for readings at higher and lower lexile levels!



Materials Preparation

- Identify a large paper or surface that students can attach images to and to draw on. Chart paper works well.

Vocabulary

- Ecosystem: All of the living and nonliving things interacting in their environment.
- Ecosystem web: A model that shows multiple types of relationships that occur in an ecosystem.
- Ecosystem function: A benefit to the ecosystem provided by an organism within it.
- Keystone species: A species that holds an entire ecosystem together.
- Functional extinction: A decline in population at which the species can no longer play a role in the ecosystem.

INSTRUCTION PLAN

OPENING:

Activate prior knowledge of species that live in New York Harbor. (15 min)

1. **Ask:** *What organisms do you think live in New York Harbor?* [slide 2]
 - On the board, or another central location, create a list of species that students think live in New York Harbor.
2. **Facilitate:** Distribute the “[What Lives in New York Harbor?](#)” [Resource](#). Invite students to compare the list they came up with to the resource. Provide time for students to read about the organisms and their habitats. [slide 3]
3. **Discuss as a whole group:** [slide 4]
 - *What is something new that you learned about an organism in New York Harbor?*
 - *What relationships did you notice between the organisms?*
 - *What are some ways we could show the relationships between organisms?*Potential responses: draw an arrow, draw a pyramid, write “eats” etc.

ACTIVITY:

Create an ecosystem web. (30 min)

1. **Frame:** There are many possible ways to show how species interact in an ecosystem. An ecosystem web is one way to model different types of relationships in an ecosystem. Today we’ll create our own ecosystem model of species that live in New York Harbor. [slide 5]
2. **Facilitate:** Share the following steps to create the ecosystem web, and give students time to do so [slide 6]
 - Cut out each species card from “What Lives in New York Harbor?”
 - Attach each card to a large sheet or board
 - Use the information on each card to draw arrows in specific colors to connect organisms [slide 7]
 - i. Red arrows start at one species and point to a species that eats it for food
 - ii. Blue arrows start at one species that provide safe habitat and points to a species that relies on it
 - iii. Yellow arrows start at one species that provides a different ecosystem function and points to a species that benefits from it

3. **Discuss as a whole group:** After students complete their ecosystem webs, consider: [slide 8]
 - *What do you notice about your ecosystem web?*
 - *Which species has the most arrows pointing from it? Why do you think that is?*
Potential responses: Eastern oysters - it seems to play lots of different roles for different organisms. Eelgrass also has several arrows pointing away from it.
4. **Define:** Some species have an especially significant impact on their environment due to - they are called keystone species. Keystone species support entire ecosystems and without the keystone species, the ecosystem would change drastically or even collapse. [slide 9]
 - **Ask:** *Based on the ecosystem web, which organism is considered a keystone species of New York Harbor?* Potential response: oysters, and in some contexts eelgrass [slide 10]

- Suggested end of Class 1 -

Jigsaw read about a keystone species. (35 min)

1. **Frame:** Oysters are considered a keystone species in New York Harbor. Let's read to find out more about the different ways they support other living things and the environment.
2. **Facilitate:** Distribute [1 Guided Reading](#) to each student, about even numbers of each throughout the class. Share the following steps with students, then give them time to complete their reading independently. [slide 11]
 - Write a definition of "keystone species" at the top of the reading [slide 12]
 - As they read, answer relevant "stop and jot" questions
3. **Discuss as a small group:** When students are done reading, meet with a small "expert" group that all completed the same reading to discuss key takeaways about the reading and identify at least 2 main points to share with their classmates. [slide 13]
4. **Discuss as a small group:** With a "home" group of one representative for each reading, each student shares 2 main points from their text. Students record each group member's takeaways at the bottom of their handout. [slide 14]
5. **Explain:** After students meet in their "home" groups, come together as a full class. Explain that oysters provide many ecosystem functions, and that each group read about a different one. [slide 15]
 - **Ask:** *Based on the readings, how would you define ecosystem function?* [slide 16]

- **Define:** An ecosystem function is a benefit to the ecosystem provided by an organism within it. [slide 17]
2. **Discuss as a whole group:** Review the 4 main ecosystem functions highlighted in the readings, referencing the slides as needed [slides 18-21]

CLOSING:

Discuss and reflect. (10 min)

1. **Explain:** Oysters once surrounded the shorelines of New York Harbor. Due to overharvesting and pollution, oysters became functionally extinct, meaning they were no longer able to provide their ecosystem functions. Billion Oyster Project is on a mission to restore one billion oysters to the New York Harbor through the engagement of one million people. [slide 22]
 - **Ask:** *Based on what you've learned, why do you think oysters are the species that Billion Oyster Project focuses on in New York Harbor?* Potential responses: Oysters provide so many ecosystem functions to the Harbor, and can help make it more clean and abundant with life! [slide 22]
2. **Reflect:** *What are you still wondering about oysters?* [slide 23]
3. **Extend** (optional): Explore examples of keystone species in other ecosystems (eg. beavers, eelgrass, wolves), and gather information about how they hold their ecosystem together. Compare and contrast these keystone species' roles with oysters.