



Lesson Title: New York Estuarine Habitat Creators

Chapter: Estuarine Restoration in NYC

Unit: Where Should Future Oyster Restoration Take Place?

Curriculum: Standalone Units

LESSON OVERVIEW

Grade: 7-12 **Class Periods:** 3 **Setting:** Classroom

Subject Area(s): Science, ELA

Summary: Students learn about three habitat-creating species in NY estuaries and think about the pros and cons of a restoration project involving one of the three species.

Outline

In this lesson, students...

1. *discuss what the word “restoration” might mean in the context of ecology.*
2. *read about various habitat-creating species in NY estuaries.*
3. *determine the various pros and cons of restoring habitat and consider which species is most important to restore.*

Description: In this lesson students learn about various habitat-creating species in NY’s marine environment: eastern oysters, eelgrass, and cordgrass. Students consider the various impacts of restoring each of these species and whether one species is most important to restore in NY compared to the others.

Objectives

- Critically read scientific literature adapted for classroom use to determine the central ideas and to obtain scientific information.
- Summarize complex evidence, concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.

MATERIALS & RESOURCES

Supplies

- Computer and internet access
- Scissors

Student Resources

- [NY Estuarine Habitat Creators - Handout](#)

- [New York Estuarine Habitat Creators - Story Map](#)
- [Sort: Restoration Benefits and Drawbacks - Handout](#)
- [Sort Cards for Restoration Benefits and Drawbacks](#)

Additional Resources

- [Habitat Restoration Examples - Slideshow](#)
- [Interactions Between Habitats - Teacher Resource](#)
- [Steps to Use GIS to Investigate a Question - Resource](#)
- [Intro to GIS Webinar](#)

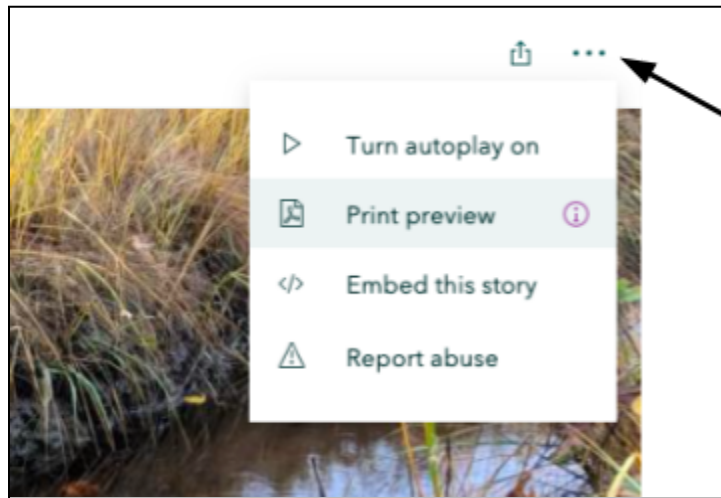
Vocabulary

- Estuarine - describes things that are found in or characteristic of an estuary
- Estuary - A body of water that is a mix of inputs from both fresh and saltwater sources. NY Harbor is an estuarine environment since it has freshwater input from the Hudson River and saltwater input from the Atlantic Ocean.
- Habitat - the place(s) where an organism lives and is frequently found.
- Species - a group of organism that are all similar and of the same type (humans are a species, blue crabs are a species, the eastern oyster is a species)
- Restoration - the process of humans assisting the recovery or stabilization of an ecosystem that has been damaged, destroyed, or disturbed in some way by humans

BEFORE YOU GET STARTED

Tips for Teachers

- The [New York Estuarine Habitat Creators - Story Map](#) is an interactive digital resource with maps, pictures, and videos. But, the resource can also be printed and used as a handout. To print the Story Map, click the “...” in the top right hand corner and select “Print Preview” (see picture below). The Story Map will be reformatted for printing and you can print from the preview page.



- This unit is written in a way where students first determine what sites are suitable for the oysters and then they determine which of those sites offers the most preferred benefits to the local community. At some point, **your students might wonder why they aren't looking into community impacts first and then choosing which of those sites are best for oyster survival.** At Billion Oyster Project, we face the same questions and challenges when considering where to place our own restoration projects and sometimes the oysters are considered first, other times the community, and other times both simultaneously. Both the scientific considerations for reef placement and the community impacts of that reef are important, which is why you see both in this unit. We chose to write it with the oysters first and community impacts second in order to maintain a linear path throughout the unit and to keep students on a more similar path early on (when looking at oysters) before they diverge from one another later in the unit when they look at reef impacts and have more options and directions to go with their project.
- Throughout this unit students will be taking various steps in order to use GIS to find future restoration sites. You might use this [Steps to Use GIS to Investigate a Question - Resource](#) to remind students which step they are at in the process.
- During the lesson, students take notes on their own worksheet and they share what they've read with their classmates. You might choose to have students take notes in a more communal manner so that they can see each other's responses (like using padlet, jamboard, or another mechanism).
- This lesson utilizes class [discussion](#), a commonly used teaching tool in BOP curricula. Use the link provided to read more about how you might implement a class discussion.

Preparation

- In the “New York Estuarine Habitat Creators - story map”, the three species and habitats are discussed separately, in isolation from one another. However, the three species can occupy areas bordering, and in some cases, overlapping one another. Your students may have questions about how two habitats might interact with one another or when they are in the field next class, they may decide that a location is suitable for a restoration project involving multiple species. This [Interactions Between Habitats - Teacher Resource](#) provides some background information on some of the synergistic and antagonistic interactions between multiple habitat types, though it is not an exhaustive list as these interactions are actively being researched.
- The [Sort: Restoration Benefits and Drawbacks - Handout](#) and the [sort cards](#) have a LOT of cards to consider. Decide beforehand if you plan to have your students work with all of the cards or a portion of the cards or if you would like to allow your students to choose how many cards they’d like to work with.
- Upcoming lessons in this unit use ArcGIS. If you are new to ArcGIS, this 45-minute [Intro to GIS Webinar](#) goes through some ArcGIS Basics including:
 - What is GIS?
 - How GIS can benefit your classroom
 - How to access ArcGIS online for your classroom
 - Basics of ArcGIS Online
 - How to use GIS to investigate a specific question

INSTRUCTION PLAN

Students discuss what the word “restoration” might mean in the context of ecology.

1. As a class view [Habitat Restoration Examples](#). Explain that you are going to walk through a few visual examples of habitat restoration projects in New York.
2. After going through all of the examples, discuss:
 - What do you think a habitat restoration is? Why do you think so?
 - Restore is the root word of restoration. What do you think it means to restore?
 - What are people trying to restore in a habitat restoration project?
 - Why do you think people are trying to restore habitat?
 - Have you heard of or seen any other habitat restoration projects in New York or in other parts of the world? If you have, can you tell us about them?

Students read about various habitat-creating species in NY estuaries.

1. Explain: “Today we are starting a project about habitat restoration in New York Harbor. Our goal throughout this project is to think about *where* to do future restoration in the area. Since we are focusing on the question *where*, one of the main tools we will use throughout this project is mapping. In time, you are going to be building your own map to figure out and explain where future restoration should take place. Before we create our map, we need some background knowledge about restoration projects in NY. **We will start by reading a story map about three different species being restored in NY estuaries.** Story maps are one tool to communicate information (like a slideshow or word document). At the end of the unit, you will create a story map explaining your project that looks similar to the one you will see today with pictures, words, maps, and videos.”
2. Put students in groups of 3. Each student has a copy of [NY Estuarine Habitat Creators - Handout](#) and has access to the story map reading, [New York Estuarine Habitat Creators - Story Map](#). The handout is a place for students to take notes, write down questions they have, draw pictures as they learn about three habitat-creating species in NY, the eastern oyster, cordgrass, and eelgrass. Assign each student a species to read about and then give students time to read and interact with the story map as it pertains to their assigned species.
 - Note: There is a glossary containing science vocabulary linked in the story map for students reference.
3. After students are finished reading and taking notes on the [New York Estuarine Habitat Creators - Story Map](#), have students share what they learned with their fellow group mates. Students should explain what they learned about their species, showing students the most important information on the story map. By the end of this sharing session, all students should have notes on and be familiar with all 3 species.
4. Debrief and discuss together as a class. You might ask:
 - Which of these species or habitats are you most familiar with? Which do you think you may have seen in person before? Can you recall where?
 - Has anyone ever been to the shoreline near here? Do you think you may have seen any of these species there?
 - What are some similarities between the habitat creating species?
 - What are some differences between the habitat creating species?
 - What are people's goals for restoring eelgrass beds, salt marshes, and oyster reefs in the NY-area? Are the goals for each the same? Or do they differ in some instances?

Students determine the various benefits and drawbacks of restoring habitat and consider which species is most important to restore.

1. Each student has a copy of [Sort: Restoration Benefits and Drawbacks - Handout](#) and the [sort cards](#).
2. Independently, students complete Part 1 of the handout where they choose one of the three species they read about in the story map and determine the benefits and drawbacks of a restoration project involving that species.
 - Note: In Part 3 of the handout students are asked to get in a group with people who chose the other 2 species. As students are choosing their species in Part 1, make sure there is enough variety for students to get in small groups later. If you find student choices unevenly distributed, you might consider assigning certain students to become experts in the underrepresented species.
3. Once students have finished Part 1, they should find a partner (or group of 3 if odd numbers) that has chosen the same species as them and complete Part 2 of the handout. In Part 2, students compare and contrast what they've each selected as the most important things to consider when doing a restoration of their species.
 - As students are working, prepare small groups with at least 1 person who has chosen each of the three species (one person who made a pro/con list for oysters, one for eelgrass, one for cordgrass).
4. Put students into the small groups you've prepared. In Part 3 of the handout, students share and discuss the potential impacts of a restoration involving their species of choice. Together, students consider if one of these species is more important to restore than others or if they are all equally important.
5. Debrief and discuss:
 - What are some things that all three habitat-creating species have in common?
 - What are some other habitat creating species (either in the water or on the land)?
 - Do you think these commonalities apply to all habitat-creating species? Why or why not?
 - Can you think of some reasons not to restore one of these species in a particular spot? Can you imagine why some people might be opposed to this kind of restoration?
6. Tell students: In an upcoming class you will venture out into the field to explore the nearby shoreline. While you are there you will evaluate the shoreline and attempt to determine if it is suitable for a restoration project involving one or more of the species you've learned about.