

**BOP Lesson Plan**  
**Dawn Shum**

**Lesson Title:** Oyster Reef Ecology / Oyster Reef Associates and Relationships

**Grade Level:** 6-8

**Subject Areas:** Science

**Duration:** 1 to 2 class periods

**Setting:** Classroom and/or oyster garden site

**Skills:** Research, making connections, and activating prior knowledge

**Correlation with NY Core Curriculum Standards/Next Generation Science Standards:**

**MS. Interdependent Relationships in Ecosystems**

Students who demonstrate understanding can:

**MS-LS2-2. Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.** [Clarification Statement: Emphasis is on predicting consistent patterns of interactions in different ecosystems in terms of the relationships among and between organisms and abiotic components of ecosystems. Examples of types of interactions could include competitive, predatory, and mutually beneficial.]

**MS-LS2-5. Evaluate competing design solutions for maintaining biodiversity and ecosystem services.\*** [Clarification Statement: Examples of ecosystem services could include water purification, nutrient recycling, and prevention of soil erosion. Examples of design solution constraints could include scientific, economic, and social considerations.]

**Vocabulary:**

- Estuaries- bodies of water along our coasts that are formed when freshwater from rivers flows into and mixes with saltwater from the ocean
- [Parasitism](#)- two organisms of different species exist in a relationship in which one species benefits and the other one is harmed
- Mutualism- two organisms of different species exist in a relationship in which both species benefit
- Communalism - two organisms of different species exist in a relationship in which one species benefits and the other not harmed
- Predator/Prey Relationships - A predator is an organism that eats another organism. The prey is the organism which the predator eats.
- Phytoplankton - microscopic organisms that live in watery environments, both salty and fresh. Some are bacteria, some are protists like algae, and most are single-celled plants.
- Producers - organisms, like green plants, that produce organic compounds from inorganic compounds.

- Consumers - organisms that obtain nutrients from other organisms
- A decomposer is an organism of decay. They break down the remains of dead animals and plants, releasing the substances that can be used by other members of the ecosystem.

**Charting the Course:**

Students will identify and research the characteristics of the living organisms of an oyster reef or gardening site in order to determine the interrelationships therein.

**BOP Connection:**

This lesson’s connection is to demonstrate how oysters are an ecosystem engineer and keystone species; providing tangible examples of the organisms and relationships created by an oyster reef.

**Learning Target / “I can” statement:**

I can identify and describe the species most commonly associated with the oyster reef habitat. I can identify and describe the relationships between these species and their habitat.

**Materials Preparation:**

SmartBoard and/or projector and student handouts including [Oyster Reef Organism Identification sheet](#).

**Background:**

[Estuaries](#)

- are partially enclosed bodies of water where fresh water from rivers or streams meet the salty water from the sea or the ocean
- are rich, productive, and diverse ecosystems where many plants and animals live
- exhibit different physical landforms and features such as delta, harbor, sound, lagoon, salt marsh, and etc.
- are comprised of different habitats like wetland, oyster reef, waterbird island, coastal and marine forest, and etc.
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[The NY-NJ Harbor Estuary](#)

- positioned at the confluence of the Hudson River and many smaller rivers such as the East, Hackensack, and Raritan
- opens into the New York Bight and Long Island Sound.
- includes a diversity of landforms, bedrock types, and plant and animal communities
- is home to humans since the Native Americans

- has faced many adverse human impacts such as overfishing, dredging, disease, and water pollution

### **Oyster Reefs**

- were eliminated by the early 20th Century due to mentioned human actions
- perform an essential filtering function of our waterways and providing important habitat
- Five small pilot reefs were launched in 2010 to identify best practices for reef restoration and begin the long term process of oyster restoration and rebuilding the most important keystone species of the estuary

*Note: When the BOP site is up running, the teacher would also show it in reference to the pilot reef effort.*

### **Warm-up/do-now:**

Besides predator and prey relationship, think-pair-shares and brainstorms other possible types of relationships among organisms in different habitat.

Use the following guiding questions to help students come up with at least two to three other types of relationship.

1. Parasite/host: What happens if a child has worms in his body?
2. Competitive species: If two different species of animals hunt for the same prey, how do you call this type of relationship?
3. Mutualistic species: If both types of species provide benefits to each other in their existence, what type of relationship do they possess?

Save the introduction of commensalistic relationship later by telling them there is one more and will be shown during the slide show.

### **Procedure/Learning Activity:**

1. Teacher shows [NY-NJ Harbor Estuary Oyster Reef Habitat PowerPoint slides](#).
2. Teacher explains and gives examples of predator/prey and commensalistic relationships following the notes on the slides.
3. Teacher reviews concepts of producer, consumer, and decomposer and asks students to identify any of those in the oyster reef habitat while showing the last 3 slides.
4. Teacher gives writing assignment for students to do in class (See details in Writing Assignment)
5. The Organism Interactions in an Oyster Reef Habitat (Student handout) can be used as homework or modification assignment for those who finish writing assignment early.

### **Assessment/work product/exit ticket:**

Exit ticket will ask students to pair-think-orally share all the relationship types learned during class; give a brief description and an example of each.

**Writing assignment:** Imagine you are a sea robin or one of the reef associates trying to find a home, describe and explain your journey and which habitat you will settle in (Teacher helps students research on the suitable habitat for their chosen species).

**Wrap up:**

[Briefly summarize or provide closure to the activity through a check for understanding and/or completion of the assessment or product]

Besides having the regular prey and predator relationship, an oyster reef habitat has a unique relationship called commensalism in which the reef associates benefit from the presence of oyster but pose no benefit back to the oyster.

**Modifications:**

[Briefly explain how the lesson could be modified to support a range of abilities/interests and so that all learners are thinking and participating]

In addition to the relationship types listed on the Oyster Reef Identification sheet, students can use the food web system to illustrate the relationships. The organism interaction assignment will help student explore different levels of relationships existed in an oyster reef habitat while they can also portray them using a food web system. Higher order thinking skills are demonstrated when the students are able to show the abstract relationship types especially the commensalistic one in a concrete and understandable manner.

**Extension:**

[A continuation of the lesson or additional work products that have direct connection to BOP and oyster restoration research]

Engage students in doing additional research on the abiotic elements of a natural oyster reef.

**Graphics + resources:**

[Supplementary resources, graphics, or images that support the learning activities]

[Mini lesson PowerPoint slides](#), [Oyster Reef Organism Identification sheet](#), students' handouts with referenced websites, [oyster garden pictures](#), and [Great Wicomico Restored Oyster Reefs video](#)

## Organism Interactions in the Oyster Reef Habitat

**Plants and animals need energy to survive. Animals eat plants and other animals for food; plants use energy from light to make sugars and oxygen from carbon dioxide and water.**

Instructions:

- Using the [Oyster Reef Organism Identification sheet](#) or your own research to look for evidence in the Oyster Reef habitat to support the above claim by identifying the species and determining each organism's trophic level/role in terms of producer, consumer, and decomposer in the oyster reef habitat.
- You may subdivide the consumers into primary, secondary, and tertiary if you are sure about its hierarchy in the food chain.
- If any organism does not belong to the 3 trophic levels/roles, identify, elaborate, and give an example of the relationship.
- After filling out the table, construct a food web with arrows from one organism to the next and how energy passes in what direction. (Guiding Questions: How many trophic levels? How many species in each level? )

<b>Producers</b>	<b>Consumers</b>	<b>Decomposers</b>	<b>Other Relationships</b>



