

Activity: Out of the Ordinary Oysters (revised '09)

Grade Level: 5

Major Emphasis: Aquatic Habitats/Invertebrates

Major Curriculum Area: Math and Science

Related Curriculum Areas:

Refer to Outdoor Education Curriculum Matrix 3-5:

Art

Language Arts

Social Studies



Program Indicator: The students will:

1. compare/contrast habitats and survival adaptations of animals in marine habitats.
2. compare various types of invertebrates in terms of their adaptations to the environment.
3. demonstrate their ability to collect, organize and display data and interpret information obtained from displays.

Student Outcomes: The students will:

1. identify and demonstrate appropriate safety procedures when experiencing a waterfront activity.
2. determine the average size of an oyster by measuring the size (length) of several oysters.
3. work within a group to collect and organize data into charts.
4. give examples of how the oyster has adapted to its environment through its body and behavior.
5. list two ways that human actions affect oyster populations.
6. observe and record how environmental conditions could affect an oyster population.

Readiness:

1. Introduce vocabulary:

community

fertilizers

mollusk

benthic

run-off

pesticides

marine

soil particles

pollutants

estuary

salinity

2. Identify and label a diagram of an oyster: (Refer to Supplement C) (DL2)

mantle

heart

gills

ligament hinge

stomach

mouth

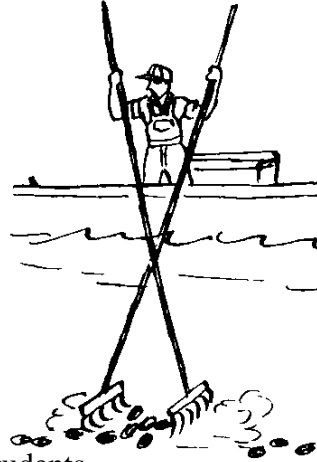
adductor muscle

3. Discuss the parts and functions of an oyster using the students' completed diagrams.
4. Discuss and draw the habitat of the oyster.
5. Brainstorm a list of human behaviors that affect the balance of the marine environment, such as:

- overuse of pesticides and fertilizers, urbanization and the effects of particle run-off.
6. Review procedures for finding mean, mode, median and range using sample data.
 7. Compare and contrast vertebrates and invertebrates using a Venn Diagram. **(DL3)**

Materials:

oysters for dissection
Oyster Life Cycle Chart
Oyster Diagram
Take-It-Apart Oyster
water thermometers
observation aquarium
oyster shucking knife
matching pairs of oyster shells
Creature Cards
measuring tools
secchi disk
tote tray



Procedures:

Activity A: Preparation (At Tables)

1. Discuss proper waterfront safety procedures with the students.
 - a. Always wear a Personal Flotation Device (PFD).
 - b. No horseplay on the pier.
 - c. Listen carefully to your instructor.
 - d. No running.
 - e. Have a buddy system.
2. Have each student and adult put on a PFD before beginning the waterfront activity.
3. Explain to the students that they will be observing oysters. Also explain that they will be collecting data in order to answer questions and develop a graph. **(DL2&3)**
4. Demonstrate the effect of erosion and sedimentation on an oyster community by doing the following experiment. Explain that oysters are filter feeders and filter water.
 - a. Place an oyster in an observation aquarium.
 - b. Take a sample of extremely muddy water (using a jar and pour it over the oysters).
 - c. Set up a second observation aquarium with just muddy water.

Activity C: The Oysters as a Community (DL2&3)

1. Put a plastic bin out on the pier to place the oyster crate in. Pull up the crate that is tied off at the end of the pier and place it inside the bin to capture any living things that might be in with the oysters. There are often other creatures in with the oysters and this is a great example of “Oysters as a community”.
2. Discover the neighbors of the oyster.
 - a. Have the students observe, identify and describe the different types of living things that exist in the oyster community. Use the oyster crate as your study center.
 - b. Have the students identify the types of critters that they observe by using the Creature Cards.
 - c. Remind the students that some of the things living in the community may not be visible by the naked eye. There may be microorganisms such as plankton living the oyster reef.
 - c. Count and record the various populations of living things using Supplement B.
 - d. Have the students draw or describe the different creatures using Supplement B.

Activity E: Oyster Observation (DL2&3)

1. Explain to the students that they will act as scientists who are studying oysters. They will need to measure and record data on the oysters.
2. Used the dried shells as ”practice” since there are not enough live oysters.
3. Have the students use rulers to measure the size (length) of each oyster in inches and/or centimeters. Record the size of the measurements on Supplement A. The "size" of the oyster refers to the measurement of the long part of the shell.
4. Observe the area of new growth around the edge of the shell.
5. Use the data that the students have collected to determine the following.
 - a. Have the students determine the average or **mean** size of an oyster population. Record on Supplement A. Refer to the example of adding ten oysters:
 $1 + 3 + 4 + 1 + 3 + 2 + 1 + 2 + 2 + 1 = 20$
20 (total height) divided by 10 (# of oysters) equals 2 (mean length)
 - b. Have the students determine the **mode** (the most common value in a set of data). In the example the measurement of 1 appears the most frequently, so the mode is 1. Record.
 - c. Have the students determine the **median** (the middle point of a set of data arranged in order). In the example the data would be arranged in order. Record. (1, 1, 1, 1, 2, 2, 2, 3, 3, 4 with #2 as the middle value)
 - d. Have students record and determine the **range**. Range is determined by subtracting the low number from the high number.
low number = 1 high number = 4
Range: $4 - 1 = 3$

Activity B: Oyster Anatomy (DL2&3) (At Tables)

1. Return to the picnic tables to discuss oyster anatomy.
2. Hold up an oyster and discuss how oysters (as invertebrates) are adapted to the environment.
 - a. **What** is the purpose of the shell? *The shell is the only support and protection for the oyster. Oysters do not have a backbone and are called invertebrates. The shell is also a mini-habitat for other living things to grow.*
 - b. **How** might temperature or salinity affect the oyster? *Oysters cannot survive if the water temperature is too warm. Oysters also prefer slightly salty to salty water and cannot survive in fresh water.*
 - c. **Can** an oyster move? *A mature oyster with a shell cannot move and is restricted to its location on the oyster bar. An oyster in its larval stage can move with the currents and tides hopefully finding a hard surface to attach itself.*
 - d. **How** does an oyster eat? *Oysters are filter feeders. As they pump water into their shells, the gills filter out microscopic food particles such as algae and some sediment.*
3. Use the Oyster Diagram and Ollie the Take-It-Apart Oyster to discuss the parts and functions of the oyster.
4. Open up an oyster using a shucking knife (*Adults are the only ones to handle the shucking knife*). Pass the oyster around to let the students experience what an oyster feels and looks like. Please do not eat the oyster.
5. Have students find matching pairs of oyster shells from sets of shells.
6. Using the Life Cycle Chart, discuss the oyster life cycle.
7. Take a measurement for the tide.

Oyster Diagram

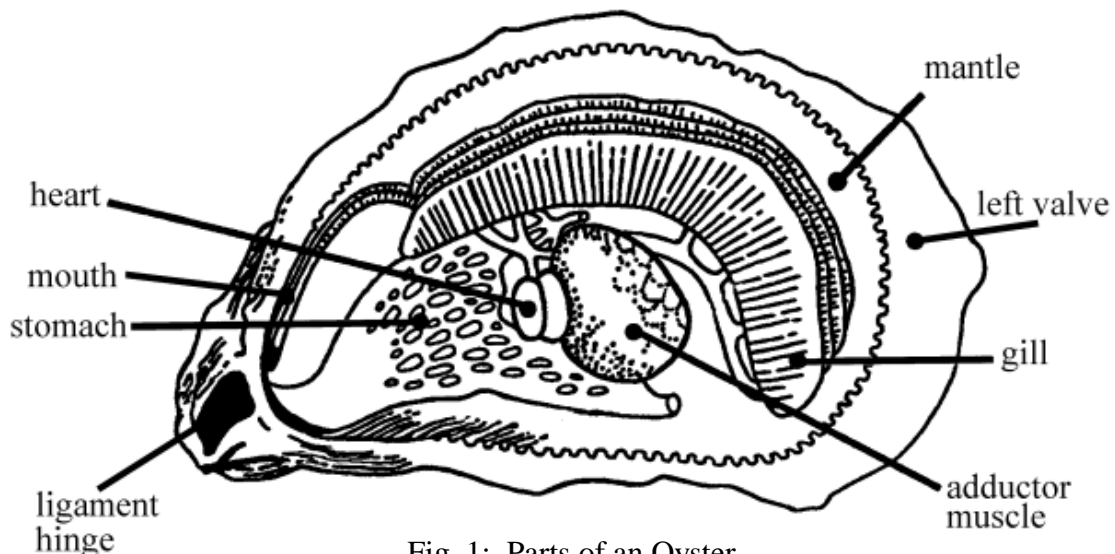


Fig. 1: Parts of an Oyster

Activity D: Oysters and Sedimentation:

1. Observe the aquariums and the oysters you had set up earlier.
2. Discuss the following questions with the students:

What effects might the sediment have on the life of the oyster? *The sediment could cover over an oyster or an oyster bar and actually smother the oyster by clogging its gills.*

Why is run-off a problem? *Run-off or water coming off the land usually carries sediment and pollution with it. Both sediment and pollution affect the living things in the water such as oysters.*

What are the leading contributors to the run-off problem? *The use or abuse of the land around a body of water is the major cause of run-off. This could include clearing away trees or paving an area.*

Has the water quality improved since the beginning of class? *The sediment probably has settled down on the oysters due to gravity resulting in a clearer aquarium. The oyster can also filter out sediment.*

How might the oyster, being a filter feeder, be able to assist in the filtration of the bay's waters? *Oysters are capable of filtering water as they remove algae and other living things as part of their diet as well as sediment particles.*

Activity G: The Oyster, The Environment and Human Activity (DL2&3)

1. Discuss the importance of the human population and activity on the oyster population. Ask the students how human behavior and activity could affect the oyster and its environment. Some of the following issues might be mentioned.
 - a. **Construction of homes/businesses/factories:** *Construction usually results in the clearing of forests. This could increase run-off and erosion affecting the oyster beds with sediment.*
 - b. **Overuse of fertilizers:** *Using too much fertilizer on farmlands or lawns usually washes into the Bay and causes algae to grow and then die. This lowers the oxygen levels to a point where the oysters could die.*
2. Ask the students why they think oysters are important for the environment. Some of the following reasons can be included:
 - a. Oysters are filter feeders. They help "clean out" the water by filtering plankton and algae for food.
 - b. Oysters can be harvested as food for humans.
 - c. Oyster bars provide habitats for other living things.
3. Challenge the students to think of behaviors or activities they can do to improve the environment for oysters. Suggestions can include:
 - a. Plant trees or other plants to help prevent erosion.
 - b. Take appropriate chemicals, oil or pollution to a center for proper disposal rather than pouring them down the house drain or storm drain.

Summary:

1. Why is the oyster important to the ecology of the Chesapeake Bay?
2. How do humans affect the oyster populations?
2. Follow up with the Chesapeake Steward Discussion question to ask students how they can help create better water quality for the oysters that live in the Chesapeake Bay watershed.

Follow-Up:

1. Complete the determinations from the mean, median, mode and range from the collected data.
2. Construct a graph of the results from the oyster community population activity.
3. Write a paragraph describing the environmental conditions that affect an oyster and state way human behavior could improve these conditions.

Extension Activities:

1. Create a habitat mural of an oyster bar showing the variety of animal life that uses it as their home.
2. Refer to "Classifying Habitats of the Chesapeake Bay" in The Changing Chesapeake, U. S. Fish and Wildlife Service, pp. 18-22 and do activity on oyster habitats.
3. Research the ways watermen of the Chesapeake Bay have harvested oysters over the years.
4. Research the ways oysters are used in other cultures such as Japan with aquaculture. (MC)
5. Compare the oyster's habitat and adaptations to other invertebrates.
6. Research ways that will improve an oyster's habitat.

Teacher Resources:

Books:

< *Bay Country, Horton, Johns Hopkins University Press.

< *The Chesapeake Bay in Maryland: An Atlas, Lippson and Lippson, Johns Hopkins University Press.

< *Life in the Chesapeake Bay, Lippson and Lippson, Johns Hopkins University Press.

< *Oysters, Fred N. Grayson, Julian Messner-publisher.

< *The Changing Chesapeake, U.S. Fish And Wildlife Service.

Supplementary Materials:

< *Aquapeake Project, "Oyster Community".

< *"The Maryland Oyster", Fred Sieling.