

Activity: Healthy Habitat (Revised February 2011)
Grade Level: Grade 3



Major Curriculum Area: Math and Science

Indicator(s):

Math: Outcome 7: Statistics

- 7.1 Collect, organize, and display data using appropriate displays such as bar graphs, pictographs, and glyphs.
- 7.2 Interpret and describe information obtained from a display such as bar graphs, pictographs, and glyphs.

Science: Outcome 1: Skills and Processes:

- 1.3.3 Use observations and scientific information when forming predictions (MLO 1.13).
- 1.3.23 Demonstrate and explain that tools are used to observe and measure when collecting information (MLO 1.4.2).

Student Outcome:

The student will determine if oysters can survive at this site by taking and recording temperature, clarity, depth, and salinity at several locations on the pier.

Readiness:

- 1. Complete Science Unit V: Natural Resources.
- 2. Introduce and explain the following tools of measurement: Secchi disc, depth line, water thermometer, and hydrometer.

Materials:

PFD's	Depth line	Clipboards
Yardstick	Student data charts (supp A)	Water thermometer
Wipe-off pens	Large data chart	Hydrometer
Oyster Fact Cards	Site markers	Secchi disc
Oyster float	Trundle wheel	Background Information (Supp B)
Red Stain	Eye dropper/pipette	Live oyster
Oyster shucking knife	Oyster anatomy diagram	Small tray

Lesson overview:

Students will first identify parts of a live oyster's anatomy (teacher or parent will need to bring in at least six live oysters). Demonstrate how the oyster uses its gills to move particles up to its mouth with a few drops of red stain provided. Students will learn how to use the testing instruments, and then work in groups to test each of the 3 sites. Bring all students together to discuss results. Allow time for students to debrief and come to a conclusion about where is the healthiest habitat for oysters to live.

Lesson Description:

Activity A:

1. Explain the importance of oysters to the overall health of the Chesapeake Bay using the information found on the Volunteer Background Information Sheet (Supplement B). Discuss concepts such as the oysters' ability to filter pollutants from the water and help clean our bay.
2. **ENGAGE** the students by demonstrating the way particles move through an oyster's body. Carefully insert the oyster shucking knife just beside the oyster's hinge. Make a carving motion around the entire circumference of the oyster, being careful to stay around the outer edge of the shell. If you cut in too deep, you will damage the oyster. As you cut around the oyster, you will cut through the adductor muscle and the muscles of the hinge. This will feel like cutting through a piece of steak. Lay the opened oyster into the tray and cover it with water from the river (shallow water, just enough to cover the oyster). Use the Oyster Anatomy Diagram to point out parts of the oyster's anatomy. Add two to three drops of the red dye to the water. The students can observe the oyster use the cilia on its gills to move the dye particles to its mouth. If the particles aren't edible, it will wrap them up into "spitballs" and spit them out. Check on the oyster throughout the lesson to observe this process.
3. Explain that the Chesapeake Bay Foundation had a program to encourage people to become oyster gardeners. The Foundation offers workshops that teach how to raise oysters in specially designed baskets called oyster floats. Show the students an example oyster float if available.

Read the following to the students:

We are investigating raising oysters here at Arlington Echo. In order for oysters to survive, certain conditions must exist. You are going to be taking measurements on this pier and determining the best location to make an oyster float (after gathering your data, you may find this site is not a good place to grow oysters).

4. Pairs of students are to choose and read together an Oyster Fact Card. After the pair finishes reading the card together, they are to share the information with the group. Oyster Fact Cards will be used at the end of the lesson to help students draw conclusions about the site (MLO-R).

Activity B:

The students will **EXPLORE** the proper way to take measurements using a Secchi disk, water thermometer, depth line, and hydrometer.

1. Review and discuss waterfront safety rules
 - a. Make sure personal floatation devices (PFDs) are worn at all times.
 - b. No running, pushing, or other horseplay.
 - c. Follow activity leader's instructions at all times.
2. Have each student put on a PFD.
3. Demonstrate how to use the measurement tools.

4. Separate the group into 3 teams (ideally having 4 students in each team). Explain that each team will use all four instruments to take measurements at the pier. Have the whole group of students select 3 sites at various points along the pier and mark them with the site markers.
5. Before beginning, each team of students will **EXPLAIN** by naming and demonstrating how to use each measuring instrument.

Activity C:

The students will **EXTEND** their use of the measuring equipment by taking and recording measurements along the pier.

1. Have one Secchi disk, one water thermometer, one hydrometer, one depth line, and one yard stick set up at each of the three testing sites. Distribute a student data collection sheet, clipboard, and wipe-off marker to each team.
2. Have each team go to a site and begin their measurements. Try to have one chaperone or instructor present at each site for supervision.
3. Allow about 5 minutes for each team to finish their measurements and then have them rotate to a new site. Repeat one more time so each team has measurements from each site.
4. After **all** teams have completed **all** tests at **all** sites, have teams return to the shore for a discussion. Transfer all data to the large group data collection chart. If there are discrepancies in the measurements, students should discuss possible reasons for these differences. Demonstrate how to determine the average for each test at each site to replace the individual findings. Record the averages on the group data collection chart.

Summary

As a total group, students will **EVALUATE** the data to determine the best location for the oyster float or if oysters could even survive here at all. Have students refer to the Oyster Fact Cards that were introduced in **Activity A** to make their decision.

Which areas are salty enough? (Students can circle areas that are in range)

Which areas are deep enough? (Students can circle areas that are in range)

Which areas are clear enough? (Students can circle areas that are in range)

Which areas are in the right temperature range? (Students can circle areas)

What are some new tools you used today?

How did using tools of science help you make decision today?

Students should then look at the circled areas and choose the site that meets all the criteria, which would be the best location for the oyster float. Once the site is determined, students will use the trundle wheel to measure the distance between the shore and the site for the oyster float and record the data on their charts.

The students' data may indicate that none of the sites are suitable for an oyster float. Discuss the possible causes of this using the information on the Volunteer Background Information Sheet (Supplement B). Review the Chesapeake Stewards Discussion Question and have the students discuss ways they could help the oysters in the Chesapeake Bay.

Follow-up: Classroom

1. Have the students write a letter using the collected data to convince Arlington Echo staff to start an oyster float at the site. Alternatively, write a letter explaining why none of the sites were suitable and what could be done to help fix the problem. Be sure to identify TAP-F pieces before beginning.

Water Quality Data Recording Sheet

Site 1

Water Clarity: _____

Water Depth: _____

Water Temperature: _____

Salinity: _____



Site 2

Water Clarity: _____

Water Depth: _____

Water Temperature: _____

Salinity: _____

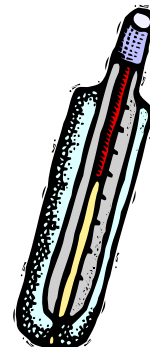
Site 3

Water Clarity: _____

Water Depth: _____

Water Temperature: _____

Salinity: _____



Volunteer Background Information

What are oysters?

- The oysters in the Chesapeake Bay are eastern oysters (*Crassostrea virginica*). Eastern oysters can be found as far north as Canada and as far south as Argentina.
- Oysters are filter feeders. This means they feed on small microorganisms called plankton by filtering water through specialized organs called siphons and gills.

Why are oysters important?

- Oysters latch onto rocks, other hard surfaces, and each other to create large oyster reefs. Oyster reefs provide valuable habitat for a number of other animals, including many species of fish and invertebrates.
- In the process of filter feeding, oysters remove harmful pollutants, such as nutrients like Nitrogen, from the water. An adult oyster can filter as much as 50 gallons of water per day.
- Oysters also have significant economic importance. Until the mid-1980's, oyster harvesting was the single most important fishery in our bay.

What's going on with oysters in the bay now?

- Our oyster population has been harmed by overharvesting, pollution that creates unsuitable habitat, and diseases such as MSX and Dermo.
- Sedimentation, caused by erosion, makes it difficult for juvenile oysters (called spats) to latch onto hard surfaces.
- There once was a time when the oysters in the Chesapeake Bay could filter the entire bay (19 trillion gallons of water) in a week. It would take a year for the present day oyster population to perform the same task.

What can we do to help?

- Where and when possible, raise oysters to increase their population.
- Fix the problem at the source by improving water quality. You can do this by making changes in your everyday life, such as avoiding the use of chemical fertilizers and pesticides and properly disposing of household chemicals rather than pouring them down the drain. You can also plant trees, design a rain garden for your yard, set up a rain barrel, or invest in other eco-friendly landscaping methods to reduce the impact of runoff and erosion. Remember that living in the Chesapeake Bay watershed means everything you do can potentially impact the bay.

References:

http://www.chesapeakebay.net/bfg_eastern_oyster.aspx?menuitem=14419 (Accessed 2/1/11)

<http://www.assateague.com/nt-bival.html> (Accessed 2/1/11)

<http://www.cbf.org/Page.aspx?pid=511> (Accessed 2/1/11)