Activity 3.6

- Grade Level
  1-8
- Subject Areas
  Science
- Duration
  Two day activity requiring at least one 40-minute class session
- Setting
  Classroom
- Skills
  Observing, hypothesizing, explaining
- Vocabulary
  Filter feeding, phytoplankton, consumer, food chain, scientific method
- Correlation with Next Generation Science Standards
  K-LS1-1, 3-LS2-1, 5-PS3-1, MS-LS1-8, MS-LS2-5

Materials:

- ☐ Two 2.5 gallon tanks
- ☐ One tank aerator
- ☐ Seawater (~15 ppt)
- ☐ 5-6 live oysters
- ☐ Algae (phytoplankton)*
- ☐ Pipette or eye dropper
- ☐ Student Worksheet-Activity 3.6
- ☐ * Algae, Shellfish Diet can be purchased from Reed Mariculture (www.reed-mariculture.com)

I Can See Clearly Now—A Demonstration of Filter-Feeding

Charting the Course
Students will conduct an experiment to observe the feeding abilities of an oyster and better understand its biological role in an ecosystem as they observe the oysters clearing the water.

Background
Oysters feed on microscopic plants known as phytoplankton through a process called filter-feeding. Phytoplankton obtain energy from the sun through the process of photosynthesis. Oysters are known for their great capacity to filter food from the water. It has been estimated that an average adult oyster can filter 50 gallons of water a day. The removal of large quantities of plankton from the water column improves water quality. The ability to gain their energy needs from these tiny plants makes the oyster a dominant primary consumer in estuarine systems.

Objectives / Students will be able to:
1. Describe how oysters eat
2. Practice implementing the scientific method
3. Demonstrate an understanding of the oyster's food and its ecological significance
4. Describe that energy in animal's food was once energy from the sun
5. Construct a scientific explanation based on evidence for how environmental factors influence the growth of organisms (upper grade levels)

Procedure / Warm Up
Discuss how oysters feed and what they eat. Have a class discussion about large scale implications of the filter feeding method and food chain interactions. Explain how this process can improve water quality. Explain that this will be tested via a laboratory experiment. Work together to develop the scientific method. Have the class establish a hypothesis for this experiment. Engage them in designing the experiment, defining the need for a control and treatment tank. Set up an observation sheet with the students to monitor the tanks over a week.

The Activity

1. Set up the 2 aquaria in a visible location in the classroom.
2. Student volunteers will pour approximately 2 gallons of seawater into each tank and turn the aerator on in the oyster tank
3. Add approximately 2 mL of phytoplankton, usually in the form of algal paste, to both of the tanks.
4. Place 5-6 live oysters in a tank and label it “treatment”
5. Label the tank without oysters “control”
6. Explain the meaning of the tank labels and have the students hypothesize what the tanks will look like the next morning
7. Observe tanks after 20-24 hours and document differences in the clarity of the water in each tank. See Extensions for a quantitative assessment.
8. Have students write up a laboratory report on the experiment.
9. Discuss the implications of filter feeding by millions of bivalves in a bay.

Extensions / A. To add a quantitative assessment to the exercise, Substitute the following steps for step 7. Label two microscope slides, one for the control tank sample and one for the treatment tank sample. At the start of the experiment, immediately after mixing the algae in the tanks, remove a 0.5 ml sample of water from each tank, place on the pre-labeled microscope slides and cover each sample with a coverslip. On each slide count the number of algae cells in 5 fields of view. This is the initial or time 0 sample. Each team can collect samples. They should carefully record the counts for each sample. The counts from the five fields represent replicates. Because of the error associated with sampling and counting it is important to include replication when you run an experiment. The mean value of the replicates will provide a more accurate estimate of the algae abundance than any individual count. Repeat sampling through time as permitted. The oysters should clear the water in about 2 hours, but depending on conditions it could take up to 24 hours. Try to have at least three time points (such as 0, 30 minutes, 2 or 24 hours). Graph the mean counts through time for each tank and contrast and discuss the results orally or through a written lab report.

B. Design other methods to assess the change in water quality through time. Compare oysters to clams, or small oysters to large oysters, or oysters maintained at different temperatures. Have students write up formal scientific papers on the topic. Relate to lessons on the scientific method.

C. Maintain an aquarium with oysters in your classroom. Feed oysters about 1 mL of algae diet every day (they will be fine over the weekend without food).