



PROJECT OCEANOLOGY



Nearshore Fish Diversity Data Analysis Teaching Notes

This lesson is designed to complement Project Oceanology's "Nearshore Fish Study Study" shore program, although it can also be used as a stand-alone study. This lesson focuses on the abundance and diversity of all organisms caught during seining, and also the relationship between water quality and nearshore fish populations. If your students caught and measured Atlantic Silversides while they were seining, you may also want to consider the 'Silverside Data Analysis' lesson, which focuses specifically on the size structure of the Atlantic Silverside population.

Engage:

Nearshore Fish Populations Game (see separate activity)

Shorter Alternative: Brainstorm a list of factors that students think might affect nearshore fish populations, and discuss each as a group.

Explore:

1. Give the students a copy of the seining diversity example dataset and the Project Oceanology common seining locations map. This activity can be done on the computer, or on paper.
2. Students should make a new column of their own physical and biological data. If they sampled in two locations, each location should have its own column.
3. Working in pairs, students should make a graph comparing the data they collected to the sample dataset. Each pair should be assigned either an organism or a physical variable.

Explain: Group discussion of graphs. Suggested questions, with commentary:

Was the water chemistry at the two locations different? How?

This will be strongly dependent on weather, season, and time of tide, so hard to predict what they will find. Parking Lot Beach and Newtown beach are farther up the Poquonnock River, and may be warmer and less saline than Joe's Hole. Bushy Point and Pine Island are farther from the river, and thus may be cooler and saltier. Dissolved oxygen should vary with temperature (cold water holds more oxygen), and also with how well-mixed the water is. Locations with low water flow (the Salt Pond, for example) may have depleted oxygen relative to more well-mixed locations. See the water quality interpretation guide for more information.

Were the populations of animals at the two locations different? How?

Variable – depends on what you found.

Based on the map, how do you think the two locations are different?

Discussion may involve differences in geography, location along the estuary, exposure to wave energy, bottom type, proximity to marshes, etc.



PROJECT OCEANOLOGY



Propose an explanation for your results:

If they found differences, why were they different? If no difference, why not? Students should relate the biological differences they are seeing to the physical differences recently discussed.

If you gave students leeway in how they made graphs, also discuss: What ways of graphing the data were most effective? What made it easy to see the results? What was the most important comparison you wanted to highlight, and how is your graph designed to do it? Could you improve your design? Etc...

Elaborate:

Introduce the concept of biodiversity:

Biodiversity: The variety of life in the world or in a particular habitat or ecosystem

Ask students: *which sampling location was more biodiverse? Why do you say so?*

The simplest way to calculate biodiversity is simply to calculate **Species Richness**, the number of species present. Have students calculate species richness for each of the sampling locations.

Optional:

Species richness doesn't tell the whole story. There are several more sophisticated ways to measure biodiversity. These methods take the number of each species that is present into account, in addition to the total number of species. There are several good online calculators that you can use if you would like students to consider and compare different ways to calculate biodiversity.

https://www.alyoung.com/labs/biodiversity_calculator.html

<https://www.easycalculation.com/statistics/shannon-wiener-diversity.php>

Brief Discussion:

Which location had higher species richness? Why do you think this was the case?

Species biology of individual species – where do they prefer, etc

Different time of year?

Geography of the estuary?

Etc – many possible reasons.

Evaluate: Discussion questions (in class, or as homework)