PROJECT O*CEANOLOGY*

A Changing Sound: Oceanography Data Analysis
NGSS Alignment (Middle School)

Overview

This lesson is designed to complement Project Oceanology's "Introduction to Oceanography" boat trip, although it can also be used as a stand-alone lesson. It can take place in the Project Oceanology computer lab immediately before or after a trip, or in the classroom after students have returned home.

Performance Expectations

MS-LS2-4 Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

Students will use Project Oceanology's historical dataset to identify long-term trends in physical variables (temperature, salinity, dissolved oxygen, etc). They will look for correlations between these variables and population abundance of specific cold-water and warm-water organisms.

Science and Engineering Practices

Developing and using models

Students will construct and discuss graphical models that show the relationship between two variables.

Analyze and interpret data

Students will organize and interpret raw data by making graphs, and then presenting them to the group.

Using math/computational thinking

Students will use mathematical terminology and logic to explain the connection between the two variables.

Engaging in argument from evidence

Students will present and defend their graphical design choices and their interpretation of their datasets.

Crosscutting Concepts

Patterns

Students will use graphs to identify patterns in their data

Cause and Effect: Mechanism and Explanation

Students will use their class dataset to develop hypotheses about what might have caused the changes they see over time in the Long Island Sound ecosystem. Students may also use the Project Oceanology historical dataset to compare physical and biological differences between different parts of Long Island Sound and the Thames River estuary, and to propose explanations for any differences they may observe.

Scale, proportion, and quantity

Students will discuss the patterns they observe across both short and long timescales, using concepts of scale, proportion, and quantity to compare data between different organisms and different physical variables.

Stability and change

Students will analyze their data to identify what has remained stable and what has changed across the last 40 years in Long Island Sound.

Disciplinary Core Ideas

LS2.A: Interdependent relationships in ecosystems. Organisms and populations are dependent on their environmental interactions both with other living things and with nonliving factors.

Students will identify ways that populations of living organisms in Long Island Sound may have been affected by changes in the physical and biological environment.

LS2.C: Ecosystem dynamics, functioning, and resilience. Ecosystems are dynamic in nature; their characteristics vary over time. Disruptions to any physical or biological component of an ecosystem can lead to shifts in all its populations.

Students will make graphical models that show changes over time to physical and biological variables in Long Island Sound.

Nature of Science

Scientific knowledge is based on empirical evidence

This lesson focuses on the connection between scientific evidence (data) and explanations. As a group, the class will assemble multiple lines of evidence and then use those collectively to identify how Long Island Sound is changing.