PROJECT *OCEANOLOGY*

Seal Watch Program

Overview

Long Island Sound is a dynamic, seasonally-driven estuary and is the temporary home of many migratory species. In the colder months of the year, Harbor Seals (*phoca vitulina*) make their way to a Long Island Sound to enjoy the benefits of the milder winter, limited predation and abundant food supply. Several clusters of rocks near the northern shore of Fishers Island make ideal observation locales for scientists. During this program, students will identify mammalian physical and behavioral adaptations in seals, discuss population dynamics, and collect data on seal numbers at 4 sites in Fishers Island Sound. Students will also gain an understanding of human impact and management, including a focus on the Marine Mammal Protection Act.

Alignment with NGSS

Performance Expectations (High School)

HS-LS2-2 Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales. *Students will analyze data they collect through various mathematical representations. Students can compare their data to historical data to look compare multiple sets of data, and to identify trends.*

HS-LS2-7 Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity. *Students will discuss human uses for Long Island Sound, and historic management of the food web and seal populations. Students will be able to discuss pros and cons of conservation through the Marine Mammal Protection Act, and design their own solutions.*

HS-LS4-5 Evaluate the evidence supporting claims that changes in the environmental conditions may result in (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species. *Students will recognize that the Long Island Sound ecosystem is complex and dynamic, and that changes in the environment over time have changed diversity and populations.*

Science and Engineering Practices

Using mathematics and computational thinking: Students will calculate mean, median, and mode for seal data collected by their class, and discuss the pros and cons of different ways to summarize the information.

Analyzing and interpreting data: Students will use mathematical representations and graphical to view their data. They will draw conclusions based on comparisons of multiple data sets.

Constructing Explanations/Designing Solutions: Students will be able to explain their data and work with teammates to design management plans.

Crosscutting Concepts

Patterns Students will identify patterns of seal behavior, and relate them to patterns of environmental variation in Fishers Island Sound.

Scale, proportion, and quantity Students are able to compare their data to historical data to identify trends and make predictions on a larger scale.

Structure and Function Students will relate physical adaptations in seals to survival needs and reproductive success.

Stability and change Students will analyze historical data to draw conclusions about the shifts and changes in Long Island Sound.

Disciplinary Core Ideas

HS-LS1.A Structure and Function Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on in the living system. *Students will identify feedback mechanisms that allow seals to survive in dynamic environments.*