PROJECT *OCEANOLOGY*

Introduction to Oceanology: NGSS Alignment
5th Grade

Overview

This 2.5 hour boat program is one of our most popular and versatile offerings. Students will literally and figuratively get their hands wet as they investigate the living and nonliving components of Long Island Sound! Your students will study living organisms in the stern of the boat by hauling a trawl net, doing a plankton tow, pulling a lobster pot, and (on some trips) sorting through a mud grab. In the bow of the boat, they'll learn how to use a wide range of oceanographic equipment as they investigate physical and chemical aspects of the water column and the bottom. We'll save their data as part of our flagship environmental monitoring program. Project Oceanology students have been collecting data on the living and nonliving components of ecosystems in Long Island Sound and Fishers Island Sound for more than thirty years, and our data are used by scientists at the University of Connecticut and elsewhere to understand long-term environmental trends.

Alignment with NGSS

Performance Expectations

5-ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

Students will collect empirical data on the physical and biological aspects of Long Island Sound and make an assessment of whether the ecosystem is healthy. Students will then discuss the human activities in the area and their possible effects on the environment as well as possible mitigation strategies to aid in the protection of Long Island Sound and its resources.

5-LS1-1. Support an argument that plants get the materials they need for growth chiefly from air and water.

Students will observe a variety of both algae and plankton species and discuss their role in the larger ecosystem. Emphasis will be placed on primary production and the process of obtaining matter on a molecular level.

5-LS2-1. Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

Students will observe organisms in the trawl in order to understand species interactions within the benthic community as well as the transfer of matter and energy between trophic levels. Emphasis will be placed on the importance of interdependent relationships within a healthy ecosystem.

Science and Engineering Practices

Developing and Using Models

Students will collect empirical data and then work collaboratively to use those data to construct a vertical profile of the water column, showing how each variable changes with depth.

Analyze and Interpret Data

Students will share their findings with the group, and then work together to analyze the results and make an assessment of whether the ecosystem is healthy.

Using Math/Computational Thinking

Students will use simple geometry and algebraic thinking to calculate the depth of seafloor based on the amount of line they let out for trawling. They will also read scientific instruments and then perform calculations to characterize the physical environment.

Engaging in Argument From Evidence

Students will gather empirical data on the physical and biological aspects of Long Island Sound, use this information to make an assessment about the health of the ecosystem, and then defend their assessment using the evidence that they gathered.

Crosscutting Concepts

Systems and System Models

Students will identify and describe the relationships among various living and nonliving components within the Long Island Sound ecosystem.

Energy and Matter

Students will discuss the transfer of matter and energy into, out of and within marine ecosystems.

Disciplinary Core Ideas

ESS3.C: Human Impacts on Earth Systems. Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments.

Students will address the impacts of human activities on Long Island Sound and discuss mitigation strategies to limit those impacts as well as direct impacts of global climate

change. Project Oceanology's long term data set may be used as evidence to support this phenomena.

LS2.A: Interdependent Relationships in Ecosystems. The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plants parts and animals) and therefore operate as "decomposers." Decomposition eventually restores (recycles) some materials back to the soil. Organisms can survive only in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. Newly introduced species can damage the balance of an ecosystem.

Students will use various techniques to observe a variety of organisms found within the Long Island Sound Ecosystem including primary producers, consumers and decomposers. Discussion will be had on the importance of these interdependent relationships as well as the impacts of invasives on native species.

LS2.B: Cycles of Matter and Energy Transfer in Ecosystems. Matter cycles between the air and soil and among plants, animals, and microbes as these organisms live and die. Organisms obtain gases, and water, from the environment, and release waste matter (gas, liquid, or solid) back into the environment.

Students will discuss the cycles of matter and energy transfer amongst marine species as well as analyze the effects of living organisms on non living components of the Long Island Sound ecosystem.

Nature of Science

Science Addresses Questions About the Natural and Material World

Students will gather empirical data on the living and nonliving components of Long Island Sound to address the impact of human activities.