



PROJECT OCEANOLOGY



Barrier Beach Field Study: NGSS Alignment

Overview

This 2.5-hour shore program is designed to give students the opportunity to explore some of the physical and biological characteristics of the barrier beach at Bluff Point Coastal Reserve in Groton. Your students will measure the elevation, percent cover of vegetation, and the sediment type and layering along transects running across the barrier beach from a protected salt pond to Long Island Sound. Students will also get the chance to go out on the bluff while looking across both Long Island and Fishers Island Sounds. Here, they will learn about the glacial history of Long Island Sound, local island formation, and deposition and erosion dynamics.

Alignment with NGSS (Middle School)

Performance Expectations

MS-ESS2-1: Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process. *Students will collect data on the structure of the barrier beach (formed by erosion and deposition) and construct a scaled model of the barrier beach based on the data collected by the class using the 'ColorMe Beach!' post-program activity.*

MS-ESS2-2: Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales. *After completing the transects, students will participate in a discussion regarding how the barrier beach was formed by erosion and deposition.*

Science and Engineering Practices

Developing and Using Models: Develop and use a model to describe a phenomenon. *Students will develop a scaled model of the barrier beach, discuss how it was formed, and how the different variables interact with each other.*



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Constructing Explanations and Designing Solutions: Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' own experiments) and the assumption that theories and laws that describe nature operate today as they did in the past and will continue to do so in the future. *Students will participate in a discussion about the glacial history of Long Island sound. After the discussion about erosion and deposition, students will make predictions about what will happen to this barrier beach over time. They will use what they have learned from the barrier beach transects to support their argument. This discussion could also be led following the 'ColorMe Beach!' activity.*

Crosscutting Concepts

Stability and Change: Explanations of stability and change in nature or designed systems can be constructed by examining the changes over time and processes at different scales, including the atomic scale. *Students will observe and identify the layers of sediment on the barrier beach. They will collect data on the thickness of each sediment layer and make observations about the potential sources of each layer of sediment (i.e. storms, seasonality, etc.).*

Scale, Proportion, and Quantity: Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small. *The barrier beach is a decent size and would take quite a while to collect multiple transects of data all along it. Students will take a few transects along the beginning of the barrier beach. They will be able to observe changes along this shorter portion of the beach after completing the 'ColorMe Beach' activity. Students should also be able to explain how their transects compare to each other.*

Disciplinary Core Ideas

ESS2.A - Earth's Materials and Systems: All Earth's processes are the result of energy flowing and matter cycling within and among the planet's systems. This energy is derived from the sun and Earth's hot interior. The energy that flows and matter that cycles produce chemical and physical changes in Earth's materials and living organisms (MS-ESS2-1). *Erosion and deposition (physical forces) are the guiding forces in the formation of the barrier beach (a physical change).*



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The planet's systems interact over scales that range from microscopic to global in size, and they operate over fractions of a second to billions of years. These interactions have shaped Earth's history and will determine its future (MS-ESS2-2). *On the trip, students will participate in a discussion about the dynamic nature and glacial history of Long Island Sound. The barrier beach is dynamic and can change shape and length over time. The students will use what they learned from the beach transects and modeling activity to predict what will and could happen to the barrier beach over time.*