PROJECT *OCEANOLOGY*

Salt Marsh Transect Study: Middle School NGSS Alignment

Overview

This 2.5-hour shore program is designed to give students the opportunity to explore the chemical, physical, and biological characteristics of the marshes of Bluff Point State Park or Barn Island Wildlife Management Area. Your students will lay transect lines along various points of the marsh and work in teams to quantify the abundances of animals and vegetation, peat depth, elevation, and water chemistry. At the end, the student teams will come back together with us to discuss what they have learned about the physical and biological structure of the marsh. We will also lead a discussion of the ecosystem services provided by the marsh.

Alignment with NGSS

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 salt marsh and will construct a scaled model of the salt marsh using the data that they collected using the 'ColorMe Marsh!' 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 marshes serve an important ecosystem service to shorelines based on the data they have collected.*

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 salt marsh and discuss their importance and what would happen if we were to build over salt marshes and remove them from the environment.*

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 importance of salt marshes in the resilience of coastal communities. We can use the data collected from the peat team to provide evidence of the salt marsh's ability to protect the coastline during storms and severe weather. We can use peat, and its depth to age our marsh and make the assumption that this marsh has been around for quite some time and, barring human intervention (destruction), will continue to act as a buffer for the coast.*

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 take measurements of the peat depth in the salt marsh. A large layer of peat would indicate the presence of historical vegetation and greater age. Scientists can actually age the peat at different layers to determine the age.*

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 salt marsh is a decent size, so there will be at least two groups to collect two sets of data for two different transects. They will be able to visualize and observe changes along this smaller portion of the marsh after completing the 'ColorMe Marsh' activity. Students should also be able to compare their transects 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). *Decomposition and deposition (biological and physical forces) are the guiding forces in salt marsh formation (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 discuss the dynamic nature of Long Island Sound and the importance that salt marshes hold in protecting the coastline by acting as a buffer from storms. The students will use what they learned from the salt marsh transects and modeling activity to make predictions about what will and could happen to the salt marsh over time naturally and/or with human intervention (destruction).*