PROJECT *OCEANOLOGY*

Animal Encounter: Horseshoe Crab

Overview

Meet an ancient creature up close! Students will have the opportunity to learn about the biology and adaptations of the Horseshoe Crab (*Limulus polyphemus)*, through watching, touching, and observing its behavior. Students will also discuss how scientists study horseshoe crabs, and about conservation efforts in the Atlantic. As a literature support, the class will read or hear *Crab Moon* by Ruth Horowitz and illustrated by Kate Kiesler and respond to the story.

Science and Engineering Practices

Asking Questions/Defining problems *Students will observe a benthic estuarine animal and identify structural and behavioral adaptations for survival.*
Constructing Explanations/Designing Solutions *Students will hypothesize about the function of various structures of the horseshoe crab.*

Cross-Cutting Concepts

Patterns *Students will recognize and identify shared phylogenetic traits.*
Cause and Effect: Mechanism and Explanation *Students will study form and function of various structures and behaviors in horseshoe crabs.*
Stability and Change *Students will identify adaptations that allow these animals to succeed in the dynamic estuary environment of Long Island Sound.*

Disciplinary Core Ideas

ESS3: Earth and Human Activity ESS3.A: Natural Resources • Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do. (K-ESS3-1)

LS1.A: Structure and Function •All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow. (1-LS1-1)
Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. (4-LS1-1)

Reproduction is essential to the continued existence of every kind of organism. Plants and animals have unique and diverse life cycles. (3-LS1- 1)

LS1.C: Organization for Matter and Energy Flow in Organisms •All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow. (K-LS1-1)
Food provides animals with the materials they need for body repair and growth and the energy they need to maintain body warmth and for motion. (secondary to 5-PS3-1)
Plants acquire their material for growth chiefly from air and water. (5- LS1-1)

LS2.A: Interdependent Relationships in Ecosystems • Plants depend on water and light to grow. (2-LS2-1) • Plants depend on animals for pollination or to move their seeds around. (2-LS2-2) • 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. (5-LS2-1)

LS4.C: Adaptation • For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all. (3-LS4-3)

LS4.D: Biodiversity and Humans • There are many different kinds of living things in any area, and they exist in different places on land and in water. (2-LS4-1) • Populations live in a variety of habitats, and change in those habitats affects the organisms living there. (3-LS4-4)

Literacy:

CCSS.ELA-LITERACY.RI.3.7
Use information gained from illustrations (e.g., maps, photographs) and the words in a text to demonstrate understanding of the text (e.g., where, when, why, and how key events occur).

Optional Post-Lab Assignment

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ELEMENTARY SCHOOL

NOAA Amazing Adaptations Extension Idea:
https://coast.noaa.gov/data/estuaries/pdf/amazing-adaptations-resources.pdf
Students use their worksheet and illustrations from their Critter Bin lab, as well as outside resources, to develop a report using a chosen media (PowerPoint, poster, costume, video) on a specific animal or relationship between two species.

Design a Creature Lab:

https://www.brighthubeducation.com/middle-school-science-lessons/6516-animal-adaptations-lesson-plan/
After students see real animals from Long Island Sound (LIS), they can be tasked with creating an imaginary or hybrid animal that is adapted to fill a niche in an ecosystem. There is a lot of adjustability in this activity--assign each group of students a different habitat found in the LIS watershed; different niches in the same habitat; etc. Students present detailed illustrations of their creations to the class, and lead a discussion about how the animal fits into the ecosystem.