Salem Sound Coastwatch & Sea Station's *School to Sea*
Elementary School Programs
LIFE SCIENCE STANDARDS

Program	PK-2 1	PK-2 2	PK-2 3	PK-2 4	PK-2 5	PK-2 6	PK-2 7	PK-2 8	3-5 1	3-5 2	3-5 3	3-5 4	3-5 5	3-5 6	3-5 7	3-5 8	3-5 9	3-5 10	3-5 11
Coastal Plants & The Water Cycle	X	X	X	X			X	X	X	X	X		X	X	X	X	X	X	
Ocean Life Beginnings			X					X			X	X		X	X				X
Living and Breathing in the Ocean	X	X	X				X	X	X	X			X	X	X	X	X		
Marine Technology & Engineering	*This program addresses standards from the <u>technology strand</u>:* **PK-2**: 1.1, 1.2, 1.3 **3-5:** 1.1, 1.2, 2.2, 2.3, 2.4																		
Crabby Crustaceans	X	X	X	X			X	X	X		X	X	X	X	X	X		X	
The Misery Island Ecology Study						X	X	X	X	X	X	X	X	X	X	X	X	X	X

(Mass State Frameworks PreK-2)
Characteristics of Living Things
1. Animals and plants are living things that grow, reproduce, and need food, air, and water.
2. Characteristics of living and non-living things.
3. Plants and animals have life cycles that vary.

Heredity
4. Plants and animals closely resemble their parents in observed appearance.

Evolution & Biodiversity
5. Fossils provide us with information about living things that inhabited the earth years ago.

Living Things and Their Environments/Ecology
6. People and other animals interact with the environment through their senses.
7. Animals and plants go through changes in appearance as the seasons change.
8. An organism's habitat provides for its basic needs.

(Mass State Frameworks 3-5)
Characteristics of Living Things
1. Physical characteristics of plants and animals
3. Plants and animals go through predictable life cycles, including birth, growth, development, reproduction, and death.
4. Major life cycle stages of the frog and butterfly (and other organisms that go through metamorphosis).

Systems in Living Things
2. Structures in plants that are responsible for food production, support, water transport, reproduction, growth, and protection.

Heredity
5. Observed characteristics of plants and animals can be fully inherited or they can be affected by the climate or environment.

Evolution & Biodiversity
6. Inherited characteristics may change over time as adaptations to changes in the environment enable organisms to survive.
7. Changes in the environment have caused some plants and animals to die or move to new locations.

Living Things and Their Environments/Ecology
8. Organisms meet needs by using behaviors in response to information from the environment. Some behaviors are instinctive and others learned.
9. Plants have characteristic behaviors. Plants and animals can survive harsh environments via seasonal behaviors.
10. Organisms can cause changes in their environment to ensure survival, which may affect the ecosystem.
11. Energy derived from the sun is used by plants to produce sugars and is transferred within a food chain (web) from producers to consumers to decomposers

Salem Sound Coastwatch & Sea Station's *School to Sea*
Elementary School Programs
PROGRAMS

For these experiences, we provide materials that your students will need (except basics like pencil & paper), including field guides and other text resources, all hands-on equipment, etc. We require a 1:8 ratio of adult/teacher to student. Chaperones should be engaging in the activities with the students, especially in the field & on the boat.

Coastal Plants and the Water Cycle

Standards: **PK-2**: 1, 2, 3, 4, 7, 8 **3-5**: 1, 2, 3, 5, 6, 7, 8, 9, 10

Classroom: Using hands-on experiences and games, students will be introduced to the coastal habitat, focusing on plants and how they contribute to the greater ecosystem; we will explore rhizomes & seeds and plant rhizome sprouts & seeds of a variety of plants.

In the field: Children will explore a local shorefront area, discovering a variety of plants. We will focus on learning about coastal plants located in the intertidal zone and challenges they face, including the amount of water and sunlight they are exposed to each day, as well as differing amounts of salinity. Students will compare the life cycles, structure, adaptations, and habitats of several plants. We will also talk about groundwater as an important part of the water cycle, and how coastal plants contribute to healthy groundwater. Students will also be introduced to the concept of invasive species, as we examine plants that are having a negative effect on our coastal areas.

On the boat: Students will apply their knowledge of coastal habitats and identification of coastal plants from the water. We will use an underwater camera to explore eelgrass beds to see what's living in them. We will look at these organisms closely and students will create food chains/webs and learn about ways that these organisms are connected to the plants and other organisms in the intertidal zone and the ocean.

Ocean Web Beginnings

Standards **PK-2**: 3,8 **3-5**: 3, 4, 6, 7, 11

Classroom: Using hands-on experiences and games, students will explore ocean food chains and food webs and investigate the beginnings of the life cycles of ocean organisms that start out as plankton and/or grow and develop in an estuarine habitat.

In the field: Students will explore a local estuarine habitat and discover its function as a nursery for ocean creatures.

On the Boat: After doing a plankton tow, we will look at phytoplankton and zooplankton with onboard equipment and create food chains and food webs and learn about the complete life cycles of several organisms from our classroom and field experiences.

Salem Sound Coastwatch & Sea Station's *School to Sea*
Elementary School Programs
PROGRAM DESCRIPTIONS

Living and Breathing in the Ocean

Standards: **PK-2**: 1, 2, 3, 7, 8 **3-5**: 1, 2, 5, 6, 7, 8, 9

Classroom: Students will meet a variety of organisms that live in the water & investigate the body parts and behaviors that help them get oxygen from the water and survive in diverse habitats within the Salem Sound watershed.

In the field: Students will conduct water quality testing and analyze and interpret the data they collect to learn how dissolved oxygen, salinity, and pH affect the health of aquatic organisms.

On the Boat: Students will once again meet organisms and see them in their natural habitats using an underwater camera and by trawling along the sea floor. They will discover evidence that organisms survive in a variety of habitats because of their adaptations.

Marine Technology & Engineering

Standards (Technology & Engineering): **PK-2**: 1.1, 1.2, 1.3 **3-5:** 1.1, 1.2, 2.2, 2.3, 2.4

Classroom: Students will participate in activities that will give them experience with the history of marine and navigational technology, starting with Native Americans' use of Salem Sound and Salem Maritime leaders in navigation, such as Nathaniel Bowditch. They will also learn about current marine technology that allows organizations like Woods Hole Oceanographic Institute to explore the oceans in ways that have never been possible before

In the field: Students will use the engineering design process to make an age-appropriate design. Possibilities are windmills, sailboats, or remotely operated underwater vehicle, among others. (There may be an additional materials charge for this program.)

On the Boat: Students will take a boat ride on Endeavour/Sea Station to test out their designs from the field experience, as well as use on-board marine technology including a plankton tow & microscope, underwater camera & sled, and the Captain's navigation instruments.

Crabby Crustaceans

Standards: **PK-2**: 1, 2, 3, 4, 7, 8 **3-5**: 1, 3, 4, 5, 6, 7, 8, 10

Classroom: Are crustaceans really cranky? While students may not find out the answer to this question, they'll observe a variety of species of organisms that our educator will bring into the classroom. They'll learn the basic physiology, anatomy, and cool adaptations of some of our local crustaceans (crabs, lobsters, shrimp, krill, and barnacles).

In the field: We'll learn about crustaceans' unique life cycles and how they are connected to the larger ocean food web. Campers will also meet some invasive crustacean species that threaten the biodiversity of our coast and participate in a local citizen science data collection project. We'll take our study one step further and find out how scientists study these crusty creatures' adaptations and apply them to modern technology (biomimicry).

Salem Sound Coastwatch & Sea Station's *School to Sea*
Elementary School Programs
PROGRAM DESCRIPTIONS

On the Boat: Students will take a 2-hour boat excursion on Endeavour/Sea Station to see crustaceans in their natural habitat by using an underwater camera, pulling a lobster trap, and trawling for creatures on the ocean floor.

The Misery Island Ecology Study

Standards: **PK-2**: 6, 7, 8 **3-5**: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11

Classroom: Classroom activities include constructing the history of Misery Island through interpreting information found in photographs of remaining structures. Students will also be introduced to the Misery Island ecosystem and its function as a watershed.

In the field: Students will be introduced to the rocky shore, which is a prominent habitat on Misery Island. They will collect, identify, and get to know the creatures that live in this special location on the coast. They may also meet some invasive species that live here, such as the green crab and Asian shore crab and participate in a citizen science project by collecting data about them.

On the Boat: Students will take a short boat ride to Misery Island and conduct first-hand explorations of the artifacts and organisms they learned about through photographs and fieldwork.