

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

Program	MA 1	MA 2	MA 3	MA 4	MA 5	MA 6	MA 7	MA 8	MA 9	MA 10	MA 11	MA 12	MA 13	MA 14	MA 15	MA 16	MA 17	MA 18
Ocean Food Web												X	X	X	X	X	X	
Coastal Plants Habitats	X											X	X	X	X	X		
Hitchhikers at Sea	X											X	X	X	X	X	X	X
Ocean Life Beginnings	X	X			X	X			X				X	X	X	X		

(Mass State Frameworks)

Characteristics of Living Things

1. Organisms are classified into kingdoms.

Structure and Function of Cells

2. Organisms are composed of cells, and many are single-celled, where one cell must carry out all basic functions of life.
3. Plant and animal cells have similarities and differences in their major organelles.
4. Basic functions of living organisms are carried out in cells.

Systems in Living Things

5. Multicellular organisms can be hierarchically organized from cells to tissues to organs to systems to organisms.
6. General functions of the major systems of the human body, and the interactions of these systems.

Heredity

7. Every organism requires a set of instructions that specifies its traits.
8. Hereditary information is contained in genes located in the chromosomes of each cell.
9. Sexual and asexual reproduction.

Evolution and Biodiversity

10. Genetic variation and environmental factors are causes of evolution and the diversity of organisms.
11. Evidence drawn from multiple sources provides the basis for the theory of evolution.
12. Extinction of species is related to a mismatch of adaptation and environment.
17. Ecosystems have changed through geologic time in response to various influences.
18. Biological evolution accounts for species diversity developed over generations.

Living Things and Their Environments

13. Organisms interact and have different functions within an ecosystem that enable the ecosystem to survive.
14. Roles and relationships among producers, consumers, and decomposers in the process of energy transfer in a food web.
15. Dead plants and animals are broken down by other living organisms, which contribute to the system as a whole.
16. Producers use energy from sunlight to make sugars through photosynthesis, which can be used immediately, stored for later use, or used by other organisms.

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

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 prepared to engage in the activities with the students, especially in the field & on the boat.

Ocean Food Web

Standards: 12, 13, 14, 15, 16, 17

Classroom: Students will acquire background knowledge about organisms they will find in their field study & boat trip. Students will create questions about their relationships to each other and to their ecosystem as a whole.

In the field: In an estuarine habitat, students will collect organisms, identify their predators & food sources, and begin to understand how these habitats are part of the larger ocean food web.

On the boat: Students will observe what's living under water using an underwater camera. They will haul a trawl and plankton net and examine the contents. Students will then turn their focus to an organism that is common to Salem Sound (eel grass, phytoplankton, blue mussel, lobster, specific crab species, or other species of interest), its relationship with other organisms in its ecosystem, and where it fits in the larger food web.

Coastal Plant Habitats

Standards: 1, 12, 13, 14, 15, 16

Classroom: Using hands-on experiences, students will be introduced to several coastal habitats, 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 coastal habitat, 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. We will explore how these plants provide climatic differences from inland areas, important wildlife habitats, and improvements in water quality. Students will compare the life cycles, structure, adaptations, and habitats of several plants. Students will 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 inside. We will look at these organisms closely and students will create food webs and learn about ways that these organisms are connected to the plants and other organisms in the intertidal zone and the ocean. There will be a chance for students to evaluate what is currently being done to control invasive plant species (and promote biodiversity) and create their own solutions.

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

Ocean Life Beginnings

Standards: 1, 2, 5, 6, 9, 13, 14, 15, 16

Classroom: Using hands-on experiences and activities, students will explore ocean food webs and investigate the life cycles & reproduction of ocean organisms, from different kingdoms and phyla, 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 importance as a nursery for ocean creatures by surveying and recording the different types of organisms they find.

On the Boat: After doing a plankton tow and trawl, we will look at the organisms we find with onboard equipment. Students will be able to observe the reproductive organs (and others), as well as the complete life cycles of several organisms from our classroom and field experiences and create webs to discover how they are all interconnected in a complex system.

Hitchhikers At Sea

Standards: 1, 12, 13, 14, 15, 16, 17, 18

Classroom: Students will explore what native, non-native, and invasive species are. They will observe several non-native species up close, observing their physical features and learning about traits and behaviors that enabled them to arrive here and thrive.

In the field: Students will observe non-native and invasive species in a local coastal habitat and observe first-hand the impact that some of them have had on native species and their ecosystem. Students will collect data by participating in a survey of non-native species that are common to this area. The data collected will be contributed to Salem Sound Coastwatch's ongoing studies of these organisms.

On the boat: Students will have a chance to explore other coastal habitats using onboard equipment including an underwater camera and traveling to destinations such as Misery Island. They will further their understandings of non-natives and explore the ways that invasive species have affected the Salem Sound ecosystem by exploring food webs and other relationships (symbiosis, predator-prey). There will be a chance for students to evaluate what is currently being done to control invasive animal species (and promote biodiversity) and create their own solutions.