SERC Field Trip Activities

Smithsonian Environmental Research Center

SERC field trips are customizable for your group. The activities that you can do are largely based on how much time you have to spend at our site. If you're unsure, or if you have a wide range of grades, then please contact Karen McDonald (McDonaldK@si.edu) for suggestions.

Amount of Time You Have For Your Trip	30 or fewer students (# stations)	31-49 students (# stations)	50-60 students (# stations)
4.5 Hours	4	4	4
4 Hours	4	4	4
3.5 Hours	4	3	X
3 Hours (no lunch)	4	3	X
2.5 Hours (no lunch)	3	3	X
3 Hours (with lunch)	3	X	X
2.5 Hours	3	X	X
2 Hours	2	X	X

Maximum Group Size- 60 students

Groups of 15-30 students requires **at least** 2 hours to allocate to the day's program.
Groups of 31-49 students requires **at least 2.5** hours to allocate to the day's programs
50-60 students requires that you have **at least 4** hours to allocate to the day's programs.

Canoe Excursions require at **least 3 hours** and may have no more than 22 participants total per trip.

Grade	"Connections" Program	Rotation Station Name (SERC Lab Represented in This Activity)
K-2nd	**Exploring Nature Connections ($18/student, $300 minimum)**	***Seining*** (Fish and Invertebrate Lab)
		Blue Crabs (Fish and Invertebrate Lab)
		Understanding Oysters (Marine and Estuarine Ecology Lab)
		Jellyfish (Marine and Estuarine Ecology Lab)
		Sharks (Fish and Invertebrate Lab)
3rd-12th	**Shoreline Connections (Formerly Estuary Chesapeake, ($18/student, $300 minimum)**	***Plankton*** (Plankton Ecology Lab)
		Oysters (Marine and Estuarine Ecology Lab)
		Seining (Fish and Invertebrate Lab)
		Watersheds(Nutrient Chemistry Lab)
5th-12th	**Engineering a Blue Crab ($18/student, $300 minimum)** Need a minimum of 3 hours for this program. Only for groups under 25 students, 2 stations required.	***Introduction to Blue Crab Anatomy, Hydraulics, and Pneumatics*** (Fish and Invertebrate Lab)
		Build a Blue Crab Hydraulic Arm

8th-Adult	**Remotely Operated Vehicle (ROV) Building and Prototype Testing on Water ($25/student, $350 minimum)** Only for groups of 25 students or under. Requires 4 hours min.	***Introduction to ROVS: Design and Planning***
		Phase 1: Building ROVs
		Phase 2: Testing on the Water
3rd-Adult	**Skill Building Canoe Excursion ($18/student, $300 minimum) (Canoe and Shorelines, $28/student)**	Covers basics of canoeing, working in teams, and how to paddle. This is a skill-building trip. 3 hours required
5th-Adult	**Habitat Survey Canoe Excursion ($20/student, $300 minimum) (Canoe and Shorelines, $30/student)**	Covers basic paddling but students conduct survey of shoreline habitats, soils, plant communities etc. 3.5 hours required.

SERC Field Trip Activities Descriptions

All of our "Connections" programs are designed to be hands-on and focused on the practices of science and how our SERC researchers conduct science. Each station will be led by a SERC staff person or trained volunteers.

Exploring Nature Connections (K-2nd Grades)

This field trip is based on children following the journey of Gary the Grass Shrimp. The number of stations you choose will depend on how much time you have. These stations are fine in any combination.

- **Seining-** Students will journey with Gary to explore the types of creatures that live in the nearshore zone of the Bay. They will then help gather fish and invertebrates from a seine net and sort them based on their adaptations for moving (swimming, hopping, crawling, floating, and sitting). Students will then count their organisms and discuss what they found. (K-ESS3-1)(K-LS1-1)(2-LS4-1)(2-LS4-1)

- **Blue Crabs-** We'll journey with Gary to meet another invertebrate that is similar but not exactly like Gary himself. They will learn the parts of a blue crab, relate our five sense to a blue crab's five senses, and learn the life cycle of a blue crab to see how baby crabs are alike but not exactly like their parents. They will then meet a live blue crab and compare it to mud crabs (smaller crabs) that live in the Bay. Students will get to handle the mud crabs and afterwards play a relay game. (K-ESS3-1)(K-ESS3-3)(K-LS1-1)(1-LS1-2)(1-LS3-1)

- **Understanding Oysters**- Here we'll travel with Gary to meet his relatives Ginny and Gus Grass Shrimp that live on an oyster reef. He will explore the different types of creatures that rely on oysters (live oysters as well as their shells). Students will sort through a basket of oyster shells looking for fish and invertebrates that colonize a model reef. Children will sort and count their creatures and then try to explain what they found. (K-ESS3-1)(K-LS1-1) (1-LS1-2)(1-LS3-1)(K-ESS3-3) (2-LS4-1)

- **Jellyfish-** We'll explore jellyfish with Gary while he learns the parts of jellyfish, measure the world's largest jellyfish, and learn the different types of jellyfish that live in the Chesapeake Bay. If the season permits we'll look at live jellyfish in containers and even touch the non-stinging variety. Children will then learn how jellyfish look very much like marine debris, or plastic floating bags, and how this can make sea turtles or terrapins sick (because sea turtles eat jellyfish for fresh water). We'll then play a recycling game, either a relay or an activity about sinking and floating plastics. (K-ESS3-1)(K-LS1-1) (1-LS1-2)(1-LS3-1)(K-ESS3-3) (2-LS4-1)(2-PS1-1)

- **Sharks**-Gary bravely visits with his shark friends to learn more about the types of sharks that live in the Bay. Students will help Gary figure out how big the sharks really are by measuring shark silhouettes, including a great white shark. We'll learn what sharks eat and if they are really a threat to humans. Everyone will get to

learn what shark skin feels like, see shark teeth and jaws, and even a preserved shark. Afterwards we'll play a shark radio tagging game to learn how our researchers find tagged sharks in the Bay. . (K-ESS3-1)(K-LS1-1) (1-LS1-2)(1-LS3-1)(K-ESS3-3) (2-LS4-1)

Shoreline Connections [formerly Estuary Chesapeake] (3rd-12th Grades)

This program can be adapted for a range of ages. It focuses on science as narrative, and a collection of facts, procedures, and observations that lead to understanding the world. The guiding question of the trip is, "How do scientists tell the story of clean water, and how do people fit into that story." We focus on science as fact based, though hands-on inquiry at each station.

- **Plankton (Plankton Ecology Lab)-** Students will begin with a short introduction about the difference between clean water, dirty water, and treated water. They will then discover how plankton plays a role in clean and dirty water, specifically related to humans. Students will be given a plankton sample and filamentous algae from the Bay, and then be asked to sort phytoplankton and zooplankton.
  (3-LS4-3)(3-LS4-4)(4-LS1-1)(5-LS2-1)(5-ESS3-1)(MS-LS1-6)(MS-LS2-4)(MS-ESS2-1) (MS-ESS3-4)

- **Oysters (Marine and Estuarine Ecology Lab)-** Students will begin by exploring the different types of bivalves that live in the Bay, and then learn about how oysters live together and their biological function. They will attempt to build a model oyster reef to determine its habitat structure and then sort through a model reef that has been colonized by fish and invertebrates from the Bay. They will sort the organisms and learn about the role that oysters play in clean water and Bay habitat.
  (3-LS4-3)(3-LS4-4) (4-LS1-1) (5-ESS3-1) (MS-LS2-4)

- **Seining (Fish and Invertebrate Lab)-** Students will begin by discussing how researchers might study nearshore organisms, and learn how SERC researchers use seining nets to catch fish and invertebrates. They will discuss the term "biodiversity" and how biodiversity might be an indicator of water's health. They will then collect data by donning waders and use seining nets to sample the populations. Students will conclude with a short discussion about their findings and what they might mean.
  (3-LS4-3)(3-LS2-2)(3-LS4-4)(4-LS1-1) (5-LS2-1) (5-ESS3-1) (MS-LS2-4)

- **Watersheds (Nutrient Chemistry Lab)-** Students will explore how a watershed works through narrative and a 3D watershed model. They will demonstrate how material gets into and is carried through a watershed. After this they will then discuss how the properties of water can be described, and then will demonstrate by using a secci disc and sounding lead as well as a hydrometer.
  (3-LS4-3)(3-LS4-4) (4-LS1-1) (5-ESS3-1) (MS-LS2-4)(MS-LS2-4) (MS-ESS3-4)

Engineering a Blue Crab (5th-12th Grades)

This program requires at least 3.5 hours, and no more than 25 students.

- **Introduction to Blue Crab Anatomy, Hydraulics, and Pneumatics-** Students will start by asking a question about the adaptations that allow blue crabs to live in the Chesapeake Bay. They will then study the life cycle of the blue crab and its molting process. Next they will be introduced to how the blue crab uses fluid movement (hydraulics) to move after molting, and how this relates to pneumatics (motion through compression of air). We will demonstrate these principles, and Newton's 3rd Law, using syringes of air and water.

- **Build a Blue Crab Hydraulic Arm-** In part two of this class students will be introduced to the field of biomimicry, or solving problems using solutions found in nature. They will then be challenged to engineer a model blue crab arm that moves up and down, mimicking the structure of a blue crab arm. After sketching schematics they will then using simple materials, and syringes filled with fluid, to build a hydraulic arm that can lift a light object.
  (3-5-ETS1-2)(5-ESS3-1)(MS-ETS1-4)

Remotely Operated Vehicle (ROV) Building and Prototype Testing On Water (8th-12th Grades)

This program requires at least 4 hours, and no more than 25 students.

- **Introduction to ROVS: Design and Planning- In** the introduction students will learn about ROVs and how scientists at the Smithsonian and around the world use them for research. Students will then be given a design challenge, including their criteria, materials, and constraints of the project. They will then work in teams (named after famous ROVs) to begin drawing schematics and plans.

- **Building ROVs-** ROV teams will begin building their ROVs using motors, PVC pipes, ballast, and floats. They will focus on scientific principles that will make their mission a success, including factors of the natural environment where they will be testing the ROVs in and on the Rhode River.

- **Testing on the Water-**The completed ROVs will be tested on the docks, allowing students to modify their original design and to participate in iterative testing of their ROV to achieve an optimal design for their challenge. All groups will present the final design to the entire class.
(MS-ETS1-1)(MS-ETS1-2)(MS-ETS1-3)(MS-ETS1-4)(HS-ETS1-2)

Skill Building Canoe Excursion (3rd Grade-Adult)

Canoe excursions are designed for beginner paddlers and will include basic paddling instruction, life jackets, and two canoe guides. Trips are 2.5 hours long and may take up to 22 participants (parents and students). All participants should be able to swim. Listed below are the minimum number of chaperones required by age group, and the possible student-chaperone combinations you may have in one canoe. Guides will discuss the basics of watersheds and estuaries with participants, as well as share current research conducted at SERC. They will also point out wetland features, native plants, and animals along the way. (3-LS4-3)(3-LS4-4)(5-ESS3-1)(MS-LS2-4)(MS-ESS3-4)

Canoe Excursion	Minimum # Chaperones	# People Per Canoe (combinations)
3-5th	1 adult per 2 students	2 students + 1 chaperone
6th-8th	1 adult per 4 students	2 students; 1 student & 1 chaperone; or 2 students & 1 chaperone

Habitat Survey Canoe Excursion (5th – Adult)

Students will begin with a short paddling introduction and explanation. After getting on the water they will then be challenged to answer the question, “Which Bay shoreline has the highest habitat value.” They will describe shoreline habitats based on soil types collected at different sites, plants that are present, erosion, human impacts, and signs of change. They will use data from what they find in a simple rubric that they can complete on the water. When they get back to shore they will then discuss what they found. Suggested for middle school students and older. Content can be adapted for grade and age of students.

Canoe Excursion	Minimum # Chaperones	# People Per Canoe (combinations)
3-5th	1 adult per 2 students	2 students + 1 chaperone
6th-8th	1 adult per 4 students	2 students; 1 student & 1 chaperone; or 2 students & 1 chaperone

(3-LS4-3)(3-LS4-4)(MS-LS2-4)

Questions? Need more information?

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