



Smithsonian Environmental
Research Center

Shoreline Connections

Thank you for signing up for the *Shoreline Connections* educational program. The idea is that everything in science and nature is connected in one way or another, and that humans play an important role in those connections. In the future we hope to add more “Connections” field trips that you can sign up for, ranging from *Forest Connections* to *Climate Connections*.

We’ve changed the name of our previous program from *Estuary Chesapeake* to *Shoreline Connections*. This highlights the interface between where the land and water meet and how they interact. You will still have the stations you love, *Seining*, *Plankton*, *Oysters*, and *Watersheds* but we’ve changed the guiding question:

“What is clean water and how do humans affect it?”

We’re approaching science as narrative, making science accessible to students but also focusing on the fact that science isn’t made up stories. We will cover how science tells the stories of nature by collecting data, being outside in the field and finding out facts through hands-on investigations. Students will be challenged to answer the guiding question by the end of the field trip, by gathering facts and information through the hands-on stations.

The answer to this question is:

“Clean water means that the water is OK for plants and animals to live in, and it doesn’t have anything added to it by people that would make animals or plants sick. People are the driving factor of water being clean, dirty, or even treated for drinking.” We want students to understand that water can be cloudy or have plants and animals in it and still be healthy. If water is too cloudy or polluted it’s dirty. Drinking water is “treated water,” and there’s a big difference between treated water and clean water that animals and plants live in.

To help you prepare for your field trip we have composed the following brief description of each station and some key vocabulary that you can use to prepare your students before the trip (a complete list follows the end of this document):

The following are the stations that the students will be visiting: the SERC lab that the station is associated with; how the station relates to the overarching question; the activity(ies) they will conduct; and the key-word associated with the station

Station/Short name	SERC lab	Key word	How it relates to the station question	What they’ll be doing
Watersheds	Nutrient Lab	Watershed	A land that surrounds a body of water and drains into that water.	Using a watershed model, conducting turbidity measurements using a secchi disc, and taking a sounding measurement. If time allows also salinity readings using hydrometers.
Oyster Bar	Marine and Estuarine Ecology Lab	Habitat	Oysters clean water but they also provide habitat. Even if water is clean animals still need habitat.	Learning how oysters filter water, building a model oyster reef, sifting through oyster reef baskets to handle benthic fish and invertebrates.
Seining	Fish and Invertebrate Ecology Lab	Biodiversity	If water is healthy biodiversity should be high.	Using seining nets to compare the types of fish caught in different habitats.

Plankton	Plankton Ecology Lab	Clean Water	Clean water is important for plants and animals to live in; plankton affects the clarity of water.	Learning how to use dissecting microscopes, exploring what clean water is, and using microscopes to count and identify different types of plankton found in nearshore water.
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Next Generation Science Standards (met through this field trip)

Domain	Life Science										Earth & Space	
Topic	Interdependent Relationships in Ecosystems			Structure and Function	Inheritance and Variation	Matter and Energy in Organisms and Ecosystems				Earth's Systems		
PE	3-LS4-3	3-LS4-4	MS-LS2-2	4-LS1-1	3-LS3-2	5-LS1-1	5-LS2-1	MS-LS1-6	MS-LS2-4	5-ESS2-1	MS-ESS2-1	MS-ESS3-4
Estuary Chesapeake												
Water Quality	●	●	●	●				●	●	●	●	●
Seining	●	●	●	●	●				●			
Oyster Bar	●	●	●	●	●				●	●		
Plankton	●	●	●	●	●	●	●	●	●	●	●	●

Vocabulary for Students (24 words)

Algae	Invertebrate	Salinity
Benthic	Model	Secchi disc
Biodiversity	Nearshore Zone	Seining
Brackish	Photosynthesis	Sounding lead
Clean water	Phytoplankton	Treated water
Estuary	Pollution	Turbidity
Filter feeder	Recycle	Vertebrate
Habitat	Runoff	Zooplankton

Pre-Field Trip Resources

We will be creating pre-field trip materials and lessons for you soon, but for now here are some links and resources you can use to prepare your students:

PLANKTON

- **VIDEO:** The Plankton Chronicles (all ages): <http://planktonchronicles.org/en/>
- **VIDEO:** SpongeBob Plankton video (3rd-6th): https://www.youtube.com/watch?v=ZEP_PJXnnNs
- **VIDEO:** Chesapeake Bay Program, "Bay 101: Algal Blooms" (all ages) http://www.chesapeakebay.net/videos/clip/bay_101_algae_blooms
- **VIDEO:** Chesapeake Bay Program, "Bay 101: Water Clarity" (all ages, includes secchi disc demo) http://www.chesapeakebay.net/videos/clip/bay_101_water_clarity

- **LESSON PLAN(S):** NOAA Ocean Explorer, lesson plans about plankton (for teachers) Grades 5-12) <http://oceanexplorer.noaa.gov/explorations/07philippines/background/edu/lessonplans.html>

WATERSHEDS

- **VIDEO:** SERC *Ecosystems on the Edge* video by one of our scientists (all ages), called “Nutrient Odyssey”: <https://ecosystemsontheedge.org/nutrient-odyssey/>
- **VIDEO:** SERC *Ecosystems on the Edge* video by one of our scientists (all ages), called “Underwater Light and Seagrasses”: <https://ecosystemsontheedge.org/underwater-light-and-seagrass/>
- **LESSON PLAN(S):** “In Your Watershed” National Geographic lesson plan (6th-8th grade) <http://www.nationalgeographic.org/activity/in-your-watershed/>
- **LESSON PLAN(S):** Northwest Expedition, “Crumple a Watershed” Lesson Plan (3rd-7th) <http://www.oms.edu/sites/all/FTP/files/expeditionnw/4.E.1.Crumple.pdf>

SEINING

- **VIDEO:** SERC *Ecosystems on the Edge* video by one of our scientists (all ages), called “Blue Crabs: Top Predator in Peril”: <https://ecosystemsontheedge.org/top-predator/>
- **VIDEO:** SERC Scientists Video from the Smithsonian Science Education Center (all ages), “How do Scientists use Electricity to Study Fish Populations?” <https://ssec.si.edu/explore-smithsonian-how-do-scientists-use-electricity-study-fish-populations>
- **VIDEO:** SERC Scientists Video from the Smithsonian Science Education Center (all ages), “How do Scientists Track and Monitor blue Crab Populations in the Chesapeake Bay?” <https://ssec.si.edu/explore-smithsonian-how-do-scientists-track-and-monitor-blue-crab-populations-chesapeake-bay>
- **READING:** SERC’s *Shorelines* Blog, (5th-7th grade) “Jawshank Redemption: Understanding Shark Behavior Through Science.” <http://sercblog.si.edu/?p=7692>
- **VIDEO:** Chesapeake Bay Program, “Chesapeake Bay 101: Striped Bass” (all ages) http://www.chesapeakebay.net/videos/clip/bay_101_striped_bass

OYSTERS

- **LESSON PLAN(S):** Chesapeake Bay Maritime Museum Teacher Lessons and Student Worksheets, “Exploring the Biology and Ecology of the Eastern Oyster” (all ages) http://development.cbmm.org/wp-content/uploads/2015/08/CBMMLessonPlan_EasternOyster.pdf
- **VIDEO:** Time-lapse video Of oysters filtering water (all ages) <https://www.youtube.com/watch?v=6p5VnFjV4q0>
- **VIDEO:** Time-lapse video of oysters filtering water (all ages) <https://www.youtube.com/watch?v=1Zm-yMpHsaQ>
- **READING:** SERC’s *Shorelines* Blog, (5th-7th grade) “A Diverse Portfolio is Good for Oysters Too” <http://sercblog.si.edu/?p=7708>
- **READING:** SERC’s *Shorelines* Blog, (5th-7th grade) “When the Going Gets Tough, Baby Oysters Get Growing” <http://sercblog.si.edu/?p=7615>
- **VIDEO:** Chesapeake Bay Program, “Bay 101: Oysters” (all ages) http://www.chesapeakebay.net/videos/clip/bay_101_oysters

For more information about your trip contact: Karen McDonald (McDonaldK@si.edu) or 443.482.2216.