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## There's Still Time to Get Your Feet Wet!

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Gabrielle Arons, Amity High School student with octopus.

# There's still time to get your feet wet!

by Valerie Cournoyer

**The Importance of Marine and Aquatic Field Studies for  
Students-An Essential Tool for Inquiry- based Instruction  
Designed around Standards.**

## Developing Environmental Stewardship

Marine and aquatic educators embrace field experiences. Many of us are drawn to the water like a high school student to their cell phone. You can't drag us away. How did we develop this affinity for water? Some say we are physiologically drawn to water since we are basically bodies of water ourselves. That may be part of it, but from my experience, I have observed that an appreciation for aquatic environments comes from familiarity with the place, whether it is a beach, rocky shore, open water, estuary, river or stream. Many of our students do not have the opportunity or inclination to visit Long Island Sound or their local body of water. Providing educational field study experiences through a school or non-profit educational program can make the difference between a conservation minded, science literate adult that takes action to remediate and preserve aquatic environments and one that skips the science news when they surf through their cell phone.

## The Current State of Science Education Standards

In Connecticut, we are in a transitional phase in education with uncertain but imminent change in science educational standards and practices. Will we adopt the Next Generation Science Standards (NGSS), modify the current Connecticut Framework for Science Education or embrace a regional version of the science standards? This decision will be made by the Connecticut Education Department and its constituents soon.

While there is uncertainty about the exact science standards we will have, there is consensus that science literacy and inquiry must be part of the instructional equation. Science literacy

means the student has developed skills to acquire scientific knowledge and apply it to a larger context in everyday life. This embodies not only core science knowledge but also the skills needed to obtain that knowledge which have been described in the Common Core State Standards (CCSS) for reading, writing and math.

Science inquiry is viewed in two ways. Traditionally, we think of inquiry as a set of science process skills used by scientists using experimentation around a testable question. Additionally, however, science educators are now integrating inquiry into instruction. In an inquiry based classroom, student questions drive instruction. Students are directing their learning with peers and community partners. The instructor facilitates and supports students in gathering information, analyzing data and understanding key science concepts.

Field study experiences not only support students in their goals to meet both common core and science standards through inquiry, but also increase student engagement. Let's look at a few examples.

## The Coastal Connecticut Connections Program

Long Island Sound and its rivers were the focus for this field study combining students from High School in the Community in New Haven and Amity Regional High School students from the towns of Woodbridge, Orange and Bethany. Designed and implemented by Project Oceanology in Groton, Connecticut and funded by the Connecticut State Department of Education, urban and suburban students visited each other's schools and worked in mixed teams for classroom, laboratory

and field investigations. Students used sophisticated oceanographic technology onboard the research vessel *R/V Envirolab* to collect, identify, and measure marine life and water conditions of Long Island Sound at three sites. The comparison of three locations at the culmination of the project allowed students to compare and contrast the biotic and abiotic characteristics and overall health of three major river systems that empty into the Sound including the Thames River (Groton, New London), the Connecticut River (Old Saybrook, Old Lyme) and the Quinnipiac River (East Haven, New Haven). This program was simultaneously conducted with many urban/suburban school pairings throughout the state. Students were able to work with peers and community partners, ask and investigate their own questions, collect and analyze data and use the knowledge gained to make sense of the overall health of Long Island Sound in the study areas. These field experiences support current Connecticut state science standards in the conceptual themes of inquiry, matter and energy in ecosystems and structure and function. Using the proposed NGSS standards they fall under the Core Ideas in Life Science, specifically LS2: Ecosystems: interactions, energy and dynamics.

## Inquiry at Bermuda Institute for Ocean Science (BIOS)

Imagine this scene: students are huddled around a bonfire at midnight on the shore of Whalebone Bay in Bermuda. One pair of students is returning from the water, hands their underwater clipboard with octopus sighting data to another student and excitedly turns to their partner and says, "Did you see the color of the octopus when we swam close to it?" "It was bright red with white spots".

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“Yes” says the other student, “I saw two more just before I got out.” Another pair of students prepare to enter the water, clipboards in hand, to snorkel a transect that was set up earlier in the day by students with support from James Wood, a cephalopod expert, studying squid and octopus at the BIOS facility. Fueled by student interest and curiosity, the 24-hour octopus study was born through collaboration with the scientist, support from Amity teachers and a desire to contribute data to an authentic question being pursued by Wood.

Amity High School has been partnered with the Bermuda Institute for Ocean Sciences for 25 years, providing students the opportunity to explore and ask questions about subtropical environments in Bermuda. For example, other student projects include an investigation of the distribution of the endangered snail known as the West Indian Top Snail in the intertidal zone, and collection and analysis of coral reef fish type and abundance on Bermuda reefs in conjunction with the international data base *Reef.org*. Another includes conservation efforts to restore Cooper’s Island, former locations for the US Navy and most recently a NASA outpost, to its endemic state by planting buttonwood trees and collecting floatable debris data to add to an ongoing BIOS research project. In addition to life science standards, these projects support earth science standards including NGSS standard ESS3: Earth and Human Activity.



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Kirsten Tomlinson and Allyce Irwin, Project Oceanology instructors, prepare otter trawl catch for students.

## Community Partners

An important part of designing relevant field study is the development of community partners. These partners provide support, tools and materials and authentic scientific investigations that are connected to real world issues. While developing a marine biology and oceanography course for Amity High School, I relied heavily on partnerships developed through past employment, professional development opportunities and professional organizations.

In addition to Project Oceanology and BIOS, Connecticut Sea Grant supplied classroom materials and professional development opportunities including support for our Hammonasset Intertidal Zone field study.

The Long Island Sound Mentor Program (LISMT) was developed by Connecticut Sea Grant in 2002 and is funded by the Environmental Protection Agency (EPA) through the Long Island Sound Study (LISS). Facilitated by Diana Payne in Connecticut, certified teachers become mentors for their peers by creating professional development workshops focused on the Long Island Sound watershed. Donna Rand, a teacher from the Glastonbury-East Hartford Elementary Magnet School has mentored teachers through her workshops “Seine the Sound” and “Teach at the Beach.” At one

workshop at Hammonasset State Park in Madison, Connecticut. Donna modeled the questioning techniques she employs at each interdisciplinary station. Students were given context for the task that had been provided, such as collecting and sorting Japanese shore crabs or using a seine net to collect intertidal organisms. Student questions were elicited, recorded on a flipchart and used to guide the investigations about population growth and interdependent relationships in ecosystems.

Other community partners providing support for my marine biology course include The Maritime Aquarium at Norwalk. Students gave jellyfish culturing a try with two different jellyfish species provided by the aquarium. Classroom investigations prepared them for a visit with the aquarists in the jellyfish culturing area where they asked questions to guide their study. Individual scientists are also interested in working with students. Sheila Stiles from the NOAA National Marine Fisheries Service (NMFS) in Milford, Connecticut mentored my students in the art of scallop culture and restoration in Long Island Sound providing background resources and scallops. An open house is available to teachers and students at NMFS every October.

The field experiences I have just described have added so much to my classes, providing rich context for learning, opportunity to engage with community partners and model authentic inquiry. The excitement of visiting a new place and meeting new people allows students to engage and develop compelling questions. Each experience explicitly used as a method to reach understanding of disciplinary core ideas in science is relevant and valuable. Do we have time to be out of the classroom and get our feet wet? I’d say it’s a waste of time not to!

