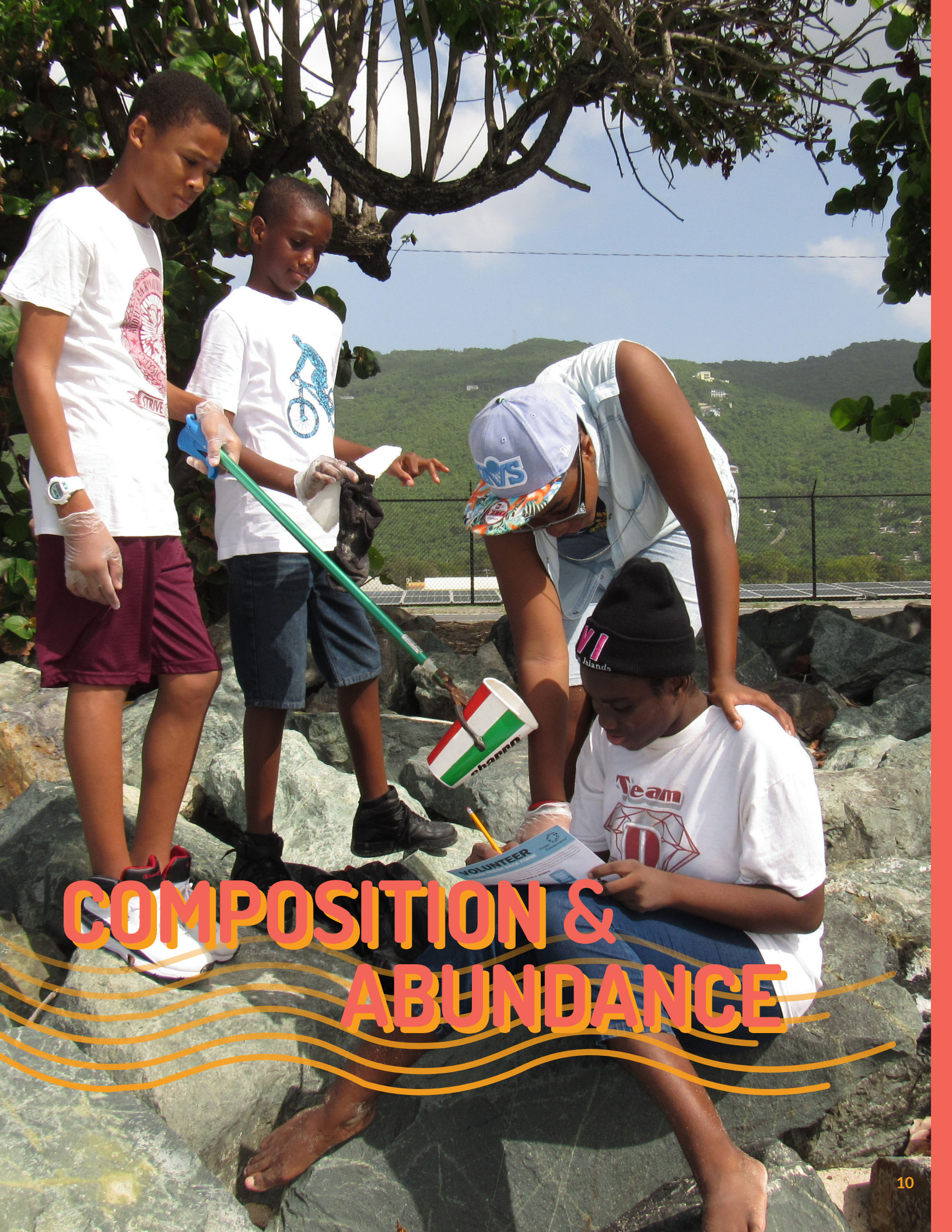


KEEPING OUR COASTLINES CLEAN

A U.S. Virgin Islands
Marine Debris Curriculum





COMPOSITION & ABUNDANCE

Links to the Next Generation Science Standards, Quick Reference Guide

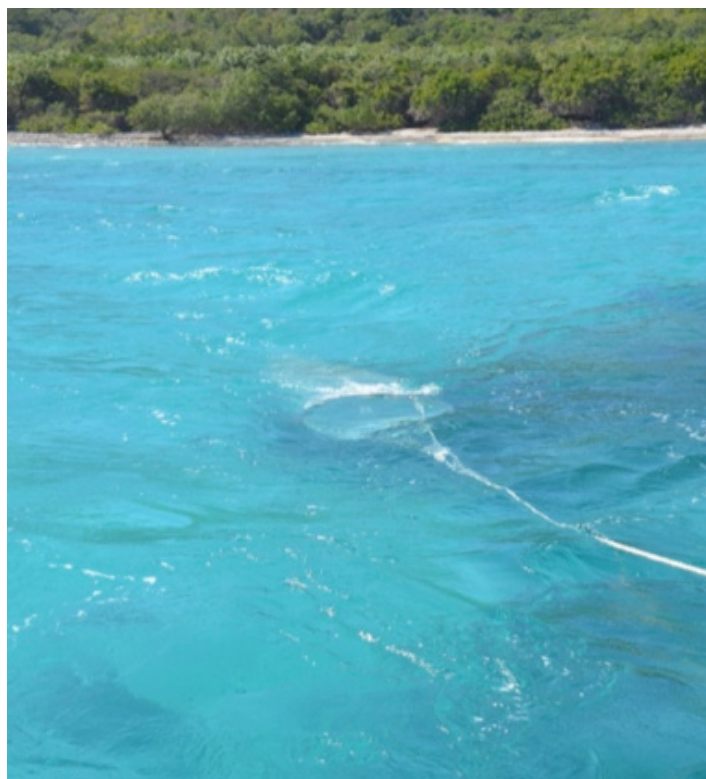
Curricula by Sub-Section		Middle School						High School					Sci & Engineering Practices
		ESS 3-1	ESS 3-2	ESS 3-3	ESS 3-4	ETS 1-1	ETS 1-2	ESS 3-1	ESS 3-3	ESS 3-4	ETS 1-1	ETS 1-2	
Composition & Abundance	Beach Box Exploration			✓									✓
	Investigating Oceanic Garbage Patches			✓					✓				✓
	A Degrading Experience			✓					✓				✓
Sources & Transportation	Watershed Walk	✓		✓				✓					✓
	Sources of Microplastics: Microbeads			✓									✓
Impacts	Entanglement Problems			✓	✓				✓	✓			✓
	Natural Disasters and Marine Debris		✓	✓	✓			✓					✓
Solutions	Linked Beach-Ghut Clean Ups	✓		✓					✓				✓
	Mitigating Microplastics			✓					✓				✓
	Upcycling Plastic Bags					✓	✓				✓	✓	
	Making Connections Through Art			✓					✓				✓

SPOTLIGHT

Plastics in the Water

Much of our efforts towards removing marine debris are focused on the areas where we can directly see their impacts - like the coastline and the ocean surface. However, as plastic is becoming ever more present in our society, it is also becoming ever more present in the parts of the ocean that we don't see. In places like the North Atlantic or North Pacific Gyres, there are large amounts of plastic debris, much of it located below the surface as small pieces that are often invisible to the naked eye. These small pieces of plastics are called microplastics and they pose a significant problem to the organisms that we also cannot often see with the naked eye. These are part of a group of organisms called plankton which are a mix of plants, crustaceans, and fish among others, that live throughout the upper part of the ocean, and drift with currents as they are not large enough or strong enough to swim against them. They form the base of the food chain in the ocean; everything that feeds in the ocean in some way ingests either these organisms or something that has eaten them. Zooplankton, or the animals that fit into this category, are at risk of consuming microplastics as they are often the same size and shapes as the phytoplankton they eat. Plastics eaten by these organisms can eventually end up in the fish we eat.

Some of the more common types of zooplankton collected during the Brewers Bay Mare Nostrum Ecosystem Analysis Project zooplankton sampling. Because microplastics are similar to the size of the food that these animals eat, they can be confused as food and reduce the ability of these organisms to feed (Photo credit: Mara Duke).



The Neuston net used to collect zooplankton during the Brewers Bay Mare Nostrum Ecosystem Analysis Project sampling. Along with zooplankton, we often found microplastics, particularly plastic rope fibers and plastic fragments (Photo credit: Mara Duke).

As part of a one-year survey to understand the different types of zooplankton found in the waters surrounding Brewers Bay, University of the Virgin Islands (UVI) Masters in Marine and Environmental Science graduate student, Mara Duke, collected, preserved, counted, and identified the zooplankton in the upper 10 meters of the water column at 22 locations in Brewers Bay, St. Thomas, using a net towed behind a UVI research vessel. In addition to discovering patterns in different types of zooplankton and how the abundance of individual species were driven by seasonal differences in environmental variables, like temperature and salinity, she also often found a variety of microplastics in her samples. The most common types of microplastics she found were small plastic fibers and fragmented pieces of plastic. These likely originated from coastal debris, like single-use plastic bottles or straws which can degrade on shore and become brittle and break into much smaller pieces; or from polypropylene ropes, the bright yellow ropes commonly used in recreational boating, commonly called "polypro", that over time slowly break down and form small fibers floating in the ocean. The fibers may also have been the result of the synthetic clothing most of us wear. All of these materials are now common sights in the marine environment and are representative of how small choices we make can lead to large issues in the marine environment. Remember, even if we cannot see it, marine debris can impact all organisms in the ocean, big or small. Making the right choices in the products we use can help limit the amount of marine debris, especially plastics entering into our marine environment.



View of U.S. Virgin Islands coastal waters around St. John from Ram's Head (Photo credit: Kristin Wilson Grimes).