

Program: Seagrass Survey Program**Grade Level:** High School or Above

Summary: The seagrass ecology program is a part of MarineLab's core curriculum. The seagrass survey program was created for more advanced students and for groups interested in service learning opportunities. Students will learn about the importance of this vital habitat, snorkel the seagrass beds, and conduct seagrass surveys following SeagrassWatch protocols using transects and quadrats. As disturbances to the habitat are prevalent, it is important that long term changes in the seagrass habitat are measured, documented and monitored. Student data will be entered into MarineLab's database, analyzed and discussed. Experimental design and the importance of baseline data is discussed. Students will be encouraged to further pursue citizen science opportunities outside MarineLab.

Schedule: one hour discussion, 2-3 hours in the field (includes practice survey component in parking lot) and a 30 minute data analysis discussion

Diversity Indexing Lab**Grade Level:** High School (correlates with APES standards)

Summary: Biodiversity can be calculated using Simpson's Diversity Index to give a measurement of the overall health of an ecosystem. This lab is an extension of our basic invertebrate diversity lab. The diversity indexing lab takes our "rock shake" lab a step further by having the students not only identify and count invertebrates on live rock to determine health of Largo Sound, but to also calculate a diversity index. The purpose of diversity indexing is discussed and data is submitted into MarineLab's in house database.

Schedule: 2 hour lab (usually conducted as an evening program)

Mangrove Ecology Program with Sediment Analysis Lab**Grade Level:** High School and Above

Summary: The mangrove ecology is a component of our core program and allows the staff to truly use the outdoors as a classroom. Mangroves provide an important habitat and play a vital role in the ecological functioning of other associated habitats in the keys. Students will learn about mangrove ecology during a discussion on the boat en route to the mangrove snorkel site. Boat will stop at various locations so instructors can point out any animals to identify (birds!), examples of mangrove adaptations, the identifying characteristics of the three species of mangroves and unique habitats created by the mangroves. Students will collect a sediment core from two different mangrove zones and analyze with instructor. Students will then snorkel and get a hands on lesson with marine invertebrates collected by the instructor.

Schedule: 3 hour field trip

Coral Reef Bleachwatch Program

Grade Level: High School or above

Summary: The coral reef ecology program is a part of MarineLab's core curriculum. MarineLab's coral reef bleachwatch program was created for more advanced students and for groups interested in service learning/citizen science opportunities. Students will learn about the importance of this diverse habitat, snorkel multiple reefs, and collect coral bleaching data. Coral bleaching is a common disturbance to coral reefs and a local organization, Mote Marine Lab, has created a program for snorkelers to survey the corals while snorkeling. MarineLab staff will be in the water and on the boat to lifeguard, point out marine life, and discuss observations. Students will discuss data once on the boat and data will be entered into an online database used by scientists at Mote Marine Lab.

Schedule: one hour discussion and 2-3 hour field trip

Fish ID with Parrotfish Feeding Surveys

Grade Level: High School or Above

Summary: The fish identification program is a part of MarineLab's core curriculum. A service learning/citizen science option for our Fish ID program is to include parrotfish feeding surveys. As with our core program, students will learn the best field marks to use to identify a fish, behavioral characteristics of fish families, and how to identify fish species that we commonly see on Key Largo's reefs. For this particular program, students will also be taught in the classroom on the proper protocols for data collection for the study they will be participating in and the reasoning behind the study. The students are then taken out to a reef to put what they learned into practice! During the snorkel, each pair of students will spend 6 minutes recording parrotfish feeding data. All data is submitted to Dr. Deron Burkepile and entered into MarineLab's database.

Schedule: one hour discussion and 2-3 hour field trip

Marine Debris Program

Grade Level: All

Summary: Marine debris is one of the most widespread pollution problems facing the world's oceans and waterways. This is a half day program that encompasses a classroom discussion, boat trip and mangrove cleanup and data analysis. In the classroom, marine debris is defined and impacts and solutions to the issue are discussed. Students will go out on the water for a cleanup and return to MarineLab to collect and analyze data. All data will be submitted to Mote Marine Lab and entered into MarineLab's in house database. **Extensions:** We can provide a "coastal cleanup" opportunity on most of our field trips where students can take time to pick up trash in the area. All data entered into MarineLab's database can be made accessible to teachers to use in the classroom.

Schedule: 3 hour program includes discussion and boat trip

REEF Fish Survey Program

Grade Level: High School or above

Summary: The REEF Fish Survey Program is an extension of our Fish ID program, using the citizen science opportunity created by Reef Environmental Education Foundation. Students will learn the best field marks to use to identify a fish, behavioral characteristics of specific family, and learn how to identify fish species that we commonly see on Key Largo's reefs. Additionally, students will learn the "roving diver" technique employed by REEF survey volunteers. Once in the water, the students will be equipped with underwater slates and REEF fish survey sheets in order to record all fish they can identify and count. Students can take his/her data sheet home, register at reef.org and enter his/her data. An additional option is to have students take a REEF fish ID quiz during their stay at MarineLab. As MarineLab is an official REEF base, if students pass the quiz they can enter data into the REEF database as Level 2 surveyors.

Schedule: one hour discussion and 2-3 hour field trip

Reef Check SCUBA Program

Grade Level: High School or Above (Must be certified SCUBA divers)

Summary: With an understanding of the need for more baseline data on the current health status of our coral reefs, student divers are trained to use Reef Check scientific survey protocols to conduct reef surveys. With the assistance of marine biologist divemasters, students will conduct multiple underwater reef surveys and once completed, be certified as Reef Check EcoDivers.

Schedule: multi day program

Reef Restoration Program

Grade Level: All

Summary: Students spend an hour in the classroom discussing the need for reef restoration and various restoration efforts, including efforts MarineLab instructors assist with in waters of Key Largo. Students will be taken to one of the Coral Restoration Foundation's coral nurseries to observe CRF's efforts while snorkeling. The students will then snorkel a restoration site to see corals MarineLab instructors have assisted to take from the nursery and outplant on the reef. **Extensions:** Service Learning/Citizen science options are available for students to directly work with the Coral Restoration Foundation. Snorkelers can assist CRF with various land based activities and SCUBA divers can participate with coral outplanting and/or nursery maintenance.

Schedule: Depends on chosen program. Basic program involves one hour discussion and 2-3 hour field trip (the basic program does not involve hands on research techniques)

Rodriguez Key Field Trip with Diversity Indexing

Grade Level: High School or Above (**Must have participated in our Diversity Indexing Lab**)

Summary: The transitional ecotone habitats within the Florida Keys often harbor diverse communities. *Neogoniolithon strictum* (“Gonio”) is a branching crustose coralline algae that creates a microhabitat for a diverse array of invertebrates. Students will snorkel the unique Gonio ecotone habitat and participate in a lab on the boat to observe the invertebrate community that lives within the Gonio. Students will then use the tools and knowledge gained during Diversity Indexing Lab to computer the diversity index for the area.

Schedule: 3 hour field trip

Microplastics Lab

Grade Level: 7th and above

Summary: While not necessarily visible, microplastics are a global marine debris issue with documented impacts on animals from plankton to whales. Continued research and public education is necessary to create the best solution to this oceanwide problem. Students will have the opportunity to not only learn about the impacts of microplastics but they will see the problem firsthand. Students will have the opportunity to be a part of the solution by collecting data for the Florida Microplastic Awareness Program.

Schedule: one hour lab

Phytoplankton Monitoring Lab

Grade Level: High School and Above

Summary: Phytoplankton play a vital role in the marine ecosystem; changes in diversity and abundance can affect the entire food chain, including humans. Students will observe and analyze phytoplankton in water samples collected off of Key Largo. Students will work in groups to identify phytoplankton species, determine if toxic and participate in NOAA’s Phytoplankton Monitoring Network.

Schedule: 3 hour lab

Sponge Spicule:

Grade Level: 8th grade and above

Summary: Students will discuss the basic anatomy of a sponge, feeding, reproductive and defense mechanisms that these simple organisms possess. Sponge spicule composition and function will be discussed before students dissolve various species of sponges in order to locate and identify spicules with the use of a compound microscope.

Schedule: 1 hour lab (split into two 30 minute intervals to allow time for sponge dissolution)

Water Quality Lab**Grade Level:** 7th and above

Summary: Abiotic water parameters determine the health and the community of any fresh or salt water system. Primary water quality parameters will be discussed as well as the best tools and methods to measure each parameter. Students will have hands on opportunity to use all of the tools in preparation for water quality field collection and analysis. Advanced option is available for high school or above.

Schedule: One hour lab (water quality data is also collected during scheduled snorkel trips).

Cassiopeia Culturing Lab**Grade Level:** 9th Grade and Above

Summary: Due to growing world populations and the corresponding decline of natural resources the rise of mariculture is a proven method of artificially supplementing diminishing marine stocks. The benefits and environmental threats will be discussed. The lab is focused on culturing *Cassiopeia*. The life cycle of the jellyfish will be explained before students use microscopes to create vials with embryos and settlement substrate. During their time at MarineLab, students will monitor his/her vial and record polyps and planula. Results will be discussed during “summary” class.

Schedule: one hour lab, follow up data is collected during entire stay and results are discussed during one hour summary class

Shark Research and Conservation Activity:**Grade Level:** 10th grade and above

Summary: Scientists worldwide use the scientific method to conduct research on sharks; the data collected is analyzed, presented to peers, and used to create the best means of preserving the keystone predator. After learning the importance of apex predators, the impacts the loss of sharks has on an ecosystem, and current tagging methods used in scientific research, students will play the role of shark researchers. Each group of students will analyze published data and will draw conclusions on how the data can best be applied to shark conservation.

Schedule: one hour lab

Florida Bay Survey Program:**Grade Level:** All

Summary: The Florida Bay survey program is a citizen science program that builds on the snorkeling expertise gained during the seagrass/mangrove ecology core programs. This is a 3 hour program where students will collect water quality data and work in buddy pairs to conduct underwater surveys. Students will record the abundance of seagrass, macroalgae and Florida Bay animals they learned to identify during the seagrass/mangrove ecology programs. All data is entered into MarineLab's database

Schedule: three hour field trip***Other Research Opportunities*****LAKEWATCH****Grade Level:** All

Summary: Florida LAKEWATCH is a citizen science lake and coastal monitoring program coordinated through the University of Florida. MarineLab is a member of UF's program and once/month collects water samples and simple water quality data in FL Bay. Generally, school groups are chosen at random to participate during the core mangrove ecology program but, if interested, ensure your school group collects the samples and data.

Schedule: Data is collected during mangrove ecology program**FWC Red Tide Offshore Monitoring Program****Grade Level:** All

Summary: The FWC's Fish and Wildlife Research Institute (FWRI) established the Red Tide Offshore Monitoring Program in 2000 to assist the researchers who study *Karenia brevis*, the organism that causes Florida's red tide. Citizen volunteers expand the spatial coverage of FWRI's monitoring program by collecting water samples from routine collection points and sites reported for suspected harmful algal blooms (HABs). MarineLab collects water samples for this program once/month during student coral reef trips.

Schedule: Data is collected during coral reef field trip