MarineLab
Marine science education
in the Florida Keys
305.451.1139
www.marinelab.org

Advanced Programs

3-4 Hour Programs:

Seagrass Survey Program

Grade Level: High School or Above (APES)

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)

Mangrove Ecology Program with Sediment Analysis Lab

Grade Level: High School and Above (APES)

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

Reef Restoration Citizen Science Program

Grade Level: High School or Above (7th and 8th grade can do field trip without discussion)

Summary: The citizen science reef restoration program provides students the opportunity to directly participate in local reef restoration efforts. 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

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Key Largo. Before leaving the dock, MarineLab instructor will teach the students how to identify outplanted coral and record the necessary data. Students will be taken to one of the Coral Restoration Foundation's coral nurseries for the first site (snorkelers will observe; divers will "clean" coral trees. The students will then collect data on corals that have been outplanted by the Coral Restoration Foundation at a second site. Once back at the dock, data will be submitted via CRF's app.

Timing: Class discussion is 1 hour. Field trip is 3 hours for snorkelers

Rodriguez Key Field Trip with Diversity Indexing

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

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 compute the diversity index for the area.

Schedule: 3 hour field trip

Marine Debris Program

Grade Level: 7th or abovel

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

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

REEF Fish Survey Program

Grade Level: 7th 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

Coral Reef Ecology II: A Closer Look

Grade Level: 9th and above

Summary: This program was created for students that have already participated in MarineLab's coral reef ecology program; the concepts build on the concepts introduced during our core coral reef ecology program. After a powerpoint discussion, students have the opportunity to snorkel two different coral reef sites with a

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checklist of specific organisms, behaviors and items to look for. MarineLab staff will be in the water and on the boat to lifeguard, point out marine life, and discuss observations.

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

Keys Survey

Grade Level: 7th grade and Above (involves getting on and off the boat multiple times for several snorkel opportunities and if weather is not ideal, young snorkelers will not be safe—can be physically too much for many younger students and/or new snorkelers)

Summary: This field trip gives students a first-hand perspective of all of the habitats that make up Key Largo. The trip begins with a walk into the hardwood hammock off of Transylvania Ave. and includes snorkeling at multiple sites as we take the boat inshore to offshore. The changes in ecology the students observe at each habitat will be discussed.

Schedule: 3.5 hour field trip

Two Hour Programs:

Diversity Indexing Lab

Grade Level: High School and above (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)

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: 2 hour lab (conducted during the day)

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One Hour Programs:

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 ocean wide 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

Advanced Behavior Lab:

Grade Level: High School or Above (AP Bio)

Summary: Marine invertebrates exhibit a variety of behavioral and morphological adaptations which allow them to survive in various habitats within the marine environment. Students will observe some of these adaptations firsthand while conducting short experiments. The observations are meant to allow students to draw conclusions regarding the invertebrate's in situ behavior but also make the students begin to ask questions.

Schedule: one hour lab

Sponge Spicule

Grade Level: 8th grade and above

Summary: All animals, including sponges, have defense mechanisms for increasing life span. Students will discuss defense mechanisms of the most common marine phyla with a focus on the simplest marine invertebrates, sponges. 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: one hour lab

Advanced Water Quality Lab

Grade Level: 9th and above (APES)

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

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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: 8th 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

Other Opportunities for Advanced Students:

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