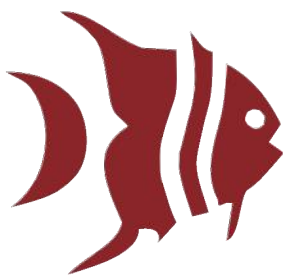


ANNUAL REPORT



**DAUPHIN ISLAND
SEA LAB 2019**

a year's overview

WHERE WE ARE NOW

Embarking on 2020 and a new year of discovery, we take a moment to look back at the groundwork laid and built upon in 2019. Each step taken follows the path of the Dauphin Island Sea Lab's vision to become a national center for transformative research and education for students of all ages.

This goal is of great importance to our state, as coastal Alabama is a contributor to the state's economy. It is our emerging understanding of the factors that control the health of our waters that ultimately determines the magnitude of this contribution.

To help continue the forward momentum of this vision, we began the process of developing a strategic plan in the fall of 2018, completed in the summer, and officially implemented on October 1, 2019. This strategic plan looks to where the DISL mission and related activities need to be over the next five years. DISL's mission is to serve the public, all levels of government, and the academic community by improving ocean literacy and providing the best available science for coastal policy, including: (1) producing and disseminating knowledge regarding world oceans, coastal zones, and watersheds; (2) training future generations of oceanic and coastal scientists; and (3) enhancing public understanding and stewardship of oceanic and coastal resources.

Leadership Alabama visited the DISL campus in January to gain deeper insight into the challenges facing Alabama's Ecosystem & Coastal Environment. DISL Executive Director Dr. John F. Valentine also traveled to Washington, D.C. in June to take part in the Capitol Hill Ocean Week.

Dr. Valentine also had the pleasure of hosting Rear Admiral Tim Gallaudet, Ph.D., USN Ret. during his visit to coastal Alabama in July. Gallaudet serves as the Assistant Secretary of Commerce for Oceans and Atmosphere and Deputy NOAA Administrator. He visited the DISL campus, took time to speak with DISL students, faculty, and staff, experienced the Alabama Deep Sea Fishing Rodeo, and facilitated a discussion with area leaders on challenges associated with living in coastal Alabama.

While DISL experienced remarkable growth in grantsmanship and enrollment in our classes in 2019, there is still a continued need to deepen the understanding of our oceans and our human impact on our waters.



CORE VALUES

Excellence

We are committed to the pursuit of excellence in all aspects of the academic enterprise, including education, research, innovation, and community engagement, that pertain to the world's ocean.

Ethics and Integrity

We are committed to the highest standards of academic integrity, intellectual freedom and the free exchange of ideas.

Financial Responsibility

We are committed to being wise stewards of taxpayers support via the pursuit of new technologies, innovations and training that facilitate the cost-effective delivery of education and our research to students and community.

Community Engagement

We are committed to promoting the value of marine science, research and education, in its many facets, to citizens of all ages in our state and nation.

Diversity

We are committed to the promotion of a community that embraces inclusivity, civil discourse, and consideration of ideas from all segments of society.

a year's overview

UNIVERSITY PROGRAMS

University Programs had another successful year in 2019. Stillman College joined the Marine Environmental Sciences Consortium, bringing the number of Alabama partners to 23.

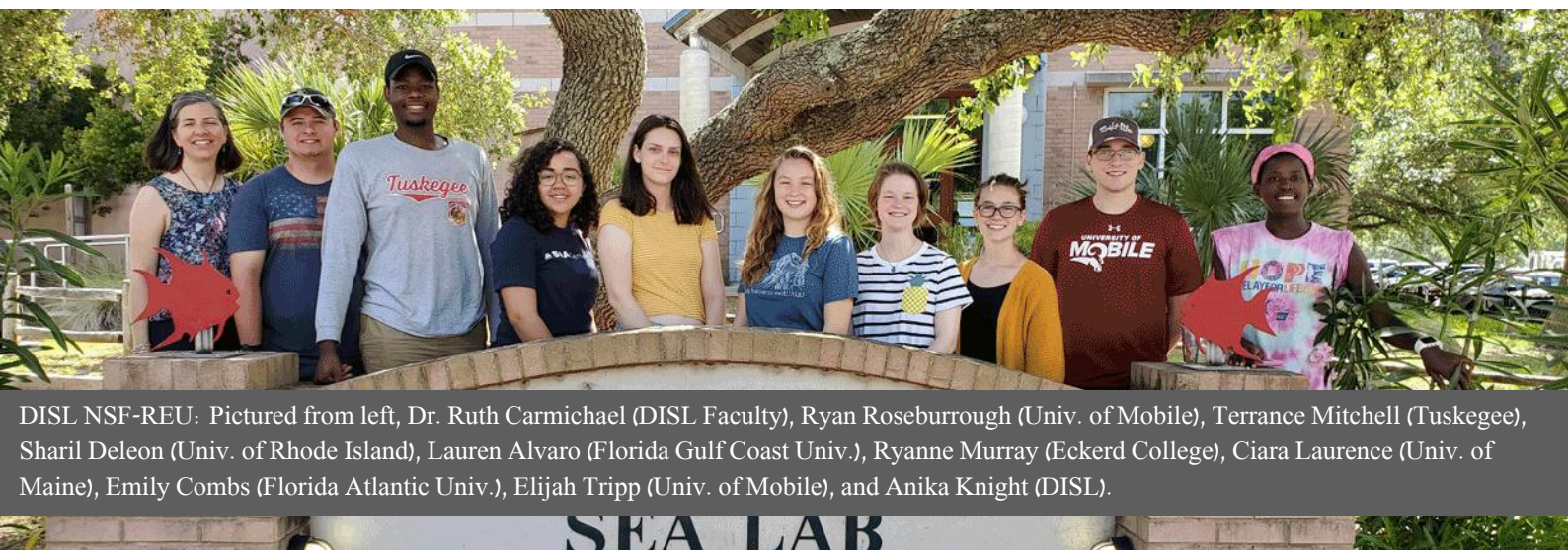


Enrollment for the UP Summer Program increased by 13 percent. Sixteen of the 23 MESC schools were represented by the 207 students on campus. Two students from Southern Arkansas University also enrolled in the summer courses.

There were 27 summer courses offered to undergraduate and graduate students with two new courses on the schedule. Chemical Ecology of Tropical Marine Systems was an international research experience led by Dr. Alison Robertson with an active hands-on learning opportunity on the coral reefs. The students spent two weeks during May term in the Abaco Islands, Bahamas. The month-long experience was funded by the National Science Foundation.

Marine Mammal Health taught by DISL Veterinarian Dr. Alissa Deming provided an overview of marine mammal stranding response, health assessments, and common diseases of bottlenose dolphins, manatees, and sea lions. Students also learned how marine mammals act as sentinels for ocean health, including the effects of oils spills, harmful algal blooms, and marine debris on marine mammals.

The DISL UP team welcomed a new University of Alabama faculty member, Dr. Kenneth Hoadley, to campus. Hoadley received his Ph.D. from the University of Delaware in 2016 and worked as a postdoctoral fellow at the Monterey Bay Aquarium Research Institute and at GEOMAR Helmholtz Centre for Ocean Research (Germany). His research has largely focused on how symbiotic algae living within coral tissues respond to changing environmental conditions.



DISL NSF-REU: Pictured from left, Dr. Ruth Carmichael (DISL Faculty), Ryan Roseburrough (Univ. of Mobile), Terrance Mitchell (Tuskegee), Sharil Deleon (Univ. of Rhode Island), Lauren Alvaro (Florida Gulf Coast Univ.), Rynne Murray (Eckerd College), Ciara Laurence (Univ. of Maine), Emily Combs (Florida Atlantic Univ.), Elijah Tripp (Univ. of Mobile), and Anika Knight (DISL).

The Research Experience for Undergraduates program funded by the National Science Foundation hosted eight students from across the country. The 10-week program gives students who are underserved and underrepresented in STEM fields an opportunity to learn more about scientific research and life as a marine scientist. Each student created a blog during their summer internship about their research. Watch them on our DISL YouTube Channel.

Forty-one graduate students, including 16 MS conservation, completed 618 graduate hours of study. DISL faculty produced 62 peer-reviewed publications and received more than \$9 million in extramural funding. UP faculty and students gave over 70 presentations and attended international scientific meetings. All UP faculty currently have federal funding, including the National Science Foundation (NSF) Grants. UP held 28 seminars over the course of the spring and fall with visiting faculty. Those seminars are archived on the DISL YouTube Channel.

Dr. Kelly Dorgan received a prestigious CAREER grant from the National Science Foundation. The Faculty Early Career Development Program created by NSF gives early-career faculty, such as Dr. Dorgan, the support to advance both their research and educational programs in their department or organization.

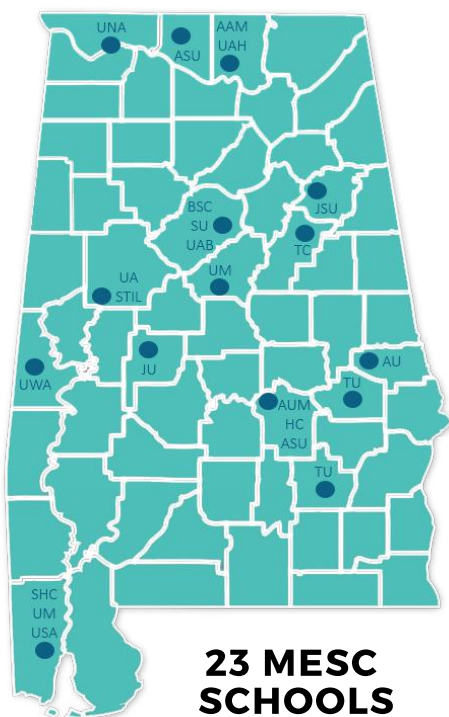


Dorgan’s focus is on marine sediments and the diverse community of marine organisms, mostly worms, that live within these sediments. These marine worms play a vital role in the health of our oceans.

The largest polar expedition in history set sail in October, and researchers at the Dauphin Island Sea Lab were tapped to play a part. The mission is known as the Multidisciplinary drifting Observatory for the Study of Arctic Climate, or MOSAiC. Germany’s Research Vessel Polarstern departed Tromsø, Norway for the Arctic in mid-September with a team of scientists on board, and dozens of more scientists standing by worldwide to lend a hand.

Dr. Jeffrey Krause and his team will help to close the gaps in the data. They will study samples collected through a MOSAiC subproject focusing on flora and fauna associated with sea ice ridges. This subproject, called HAVOC (Ridges - Safe HAVens for ice-associated Flora and Fauna in a Seasonally ice-covered Arctic Ocean), is based at the Norwegian Polar Institute and is funded by the Research Council of Norway.

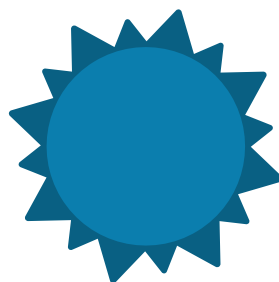
Dauphin Island Sea Lab researchers and students joined more than 1,000 attendees from around the world for the 25th Biennial Conference of the Coastal and Estuarine Research Federation (CERF) in Mobile, Alabama. The CERF 2019 theme of “Responsive | Relevant | Ready” provided an exciting opportunity to connect science and society in the collective goals of preserving coastal and estuarine habitats, resources, and heritage. The conference also gave past and present DISL faculty and students a chance to reconnect.



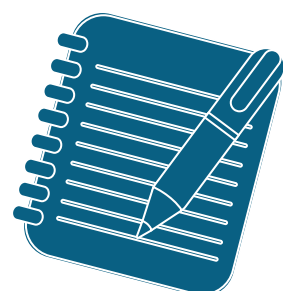
1511 SUMMER CREDIT HOURS



41 GRADUATE STUDENTS



207 SUMMER STUDENTS



62 PUBLICATIONS

DISCOVERY HALL PROGRAMS

Discovery Hall Programs drifted into 2019 with an addition to its STEM Programming. A Gulf of Mexico Alliance (GOMA) grant for Tracking Trash used drifters to connect an environmental problem (marine debris) to marine technology (drifters).

Dr. Tina Miller-Way and Outreach Coordinator Rachel McDonald shared the lesson plans and classroom activities during the Build-a-Drifter Workshop in January. Twenty-three teachers representing schools in Mobile County and Baldwin County attended the workshop. The activities and lesson plan was created to engage students in technology that find an interest in an environmental science topic and vice versa.

Drifters are devices that track water currents. They can be constructed from simple and inexpensive materials, launched in local waters, and followed through a phone app using GPS tracking. Drifters have been used to track oil from spills, lost vessels, and even trash in the ocean.

With seven educator workshops on the calendar for 2019, DHP hosted 157 classroom teachers and informal educators from 12 states and 20 counties in Alabama.

The Ocean Currents and Drifters lesson was one of 15 classes offered as an academic year field trip. DHP hosted 226 groups, reaching 9,765 students during the 2019 Spring and Fall academic year. The team of marine educators taught 903 classes which adds up to more than 66,000 contact hours.

Three young women gained insight into marine science and environmental education during a summer internship with DHP. Rosemary Meas, Selena Magallanes, and Samantha Young gained on the job experience by supporting the marine educators during summer camp activities.

Magallanes attends Humboldt State in California. She's majoring in biology with a concentration in marine science and minoring in scientific diving.

"My goal this summer was to help guide kids in pathways that were STEM-oriented," Magallanes shared. "What I was striving to do was aid the spark these kids had for the ocean and marine life. Showing them the infinite opportunities out there in biology that doesn't just mean research and or teaching."

Young majors in marine science at the University of South Carolina. Before interning with DHP, she spent a semester abroad in the Galapagos.

"This summer has been an opportunity for me to see the educational side of some of the research I have performed in my past," Young said. "I think the experience that these individuals are receiving is phenomenal. I would have LOVED to attend a camp like this when I was younger, and I think it's great that kids as young as five are beginning their education with marine science."

Meas didn't travel far as she attends Alma Bryant High School in Bayou la Batre, Alabama. For, her it was a first glimpse into what her career could look like in the future. She said it also helped her step outside her comfort zone.

DHP's day and overnight camps hosted 407 students in three months' time from 23 states.



The Sea Stars Camp hosted by Discovery Hall Programs created lasting memories for 15 campers with special needs. The campers from across the state of Alabama spent three days exploring Dauphin Island's habitats with DHP's Marine Educators.

"The weekend was wonderful," DHP Educator JoAnn Moody beamed as she shared. "It's just been really amazing to see them encourage each other to do things they maybe hadn't done before like touch a fish or hold a ghost crab and have these new kinds of experiences."

The campers did everything from an evening beach walk to a boat ride on R/V Alabama Discovery. This is the second time DHP hosted the Sea Stars Camp. The first camp occurred in 2011.

"You can't really put a price tag on it," McKinney said. "You're watching the wonder in your child's eyes as they experience nature in our state."

Generous donations from the Krewe of Kindness and the Rotary Club of Mobile helped to make the 2019 camp a reality.



While many came to campus for field trips, educator workshops, and summer camps, the BayMobile traveled to schools and community events across the state of Alabama. This traveling classroom brought the wonders of the ocean to 12,843 students at 49 schools in 17 different Alabama counties. That was a 77 percent increase in the number of students reached compared to 2018.

DHP also hosted the 7th annual Northern Gulf Coast Regional MATE ROV Competition with 27 teams competing with their custom-built remotely operated vehicles (ROVs). The teams

represented schools from Alabama, Mississippi, Florida, Arkansas, Georgia, and Louisiana. The competition is a part of the Marine Advanced Technology Education (MATE) network of 37 regional competitions held worldwide.

Aquatic Robotics of Design Vision from Lafayette, Louisiana performed strongly and placed first in the Ranger category to earn a chance to compete in the International MATE ROV Competition to be held at the Kingsport Aquatic Center in Kingsport, Tennessee in June.

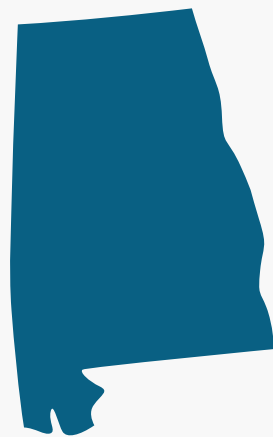
Overall, DHP programs reached students, teachers, and ocean lovers in 54 of Alabama's 67 counties.



226 SCHOOL GROUPS

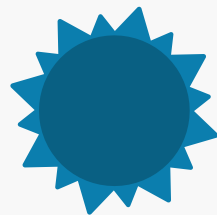


**49 SCHOOLS
12,843 STUDENTS**

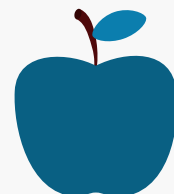


54 COUNTIES

**407 CAMPERS
23 STATES**



**157
K-12 EDUCATORS**



a year's overview

PUBLIC AQUARIUM

The public aquarium at the Dauphin Island Sea Lab welcomed a record number of visitors in 2019 with a total of 85,822. Through interactive and informative exhibits, the aquarium brings visitors on a journey through coastal Alabama from the Mobile-Tensaw Delta to the northern Gulf of Mexico.



New to the aquarium in 2019, the arrival of two nurse sharks in March. A day of celebration marked their arrival. The Nurse Shark Party was the first of several special 2019 celebrations for visitors. Discovery Day in April, World Oceans Day in June, and National Estuaries Week in September were also celebrated.

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For the second year in a row, the aquarium hosted the Forks and Corks Seafood and Science Gala. This unique seafood culinary art competition featured Mobile and Baldwin County high school hospitality and culinary arts programs' students transforming marine science education into delicious seafood dishes. The World Food Championship's Team Alabama provided a panel of judges and a golden ticket to the World Food Championship to the top team.



Citronelle Center for Advanced Technology earned the 2020 Golden Ticket to the World Food Championship with their first place dish of Shrimp Tapas with a Mango Shooter. This year the judges included Andree Burton, Ned Ferry, and Deborah Hodges. Mobile County Superintendent Chresal Threadgill and Baldwin County Superintendent Eddie Tyler served as honorary judges. The presentation of each team was judged by University of South Alabama's Hospitality and Tourism faculty Amanda Donaldson.

Clemson University rising senior Emmy Musial built her resume with a summer internship at the aquarium thanks to ExxonMobil's Community Summer Job Program. The Estuarium was the perfect spot for Musial to put her biological science courses to work.

"It's interesting to see the different personalities of the animals," Musial said. "The diamondback terrapin is my favorite. He'll follow me back and forth when I'm near the tank. I've also learned the tripletail like to hide."

Musial, who's from Coden, said she's learned a lot on the job. Her hope is to obtain a masters in biomedical engineering, and eventually, work with animal medicine.

ExxonMobil celebrates its 25th year of the Community Summer Job Program. The program supports not only the students as they pave their career path but also non-profit agencies. Sometimes that path leads students back to the DISL. This year, 2014 ExxonMobil intern and former University Programs student Logan Holfelder joined the Estuarium aquarist team after graduating from the University of Alabama, Birmingham.

Aquarium educator Mendel Graeber led dozens of visitors on excursions to the beach, dune, and maritime forest, along with the salt marsh. Groups, such as South Alabama's Upward Bound Program, also took advantage of Graeber's expertise for an adventure to the salt marsh.

For a number of years, Boardwalk Talks at the aquarium offered an informal conversation between visitors and DISL's faculty and students. This year, recordings of those talks began to be posted on the [DISL YouTube Channel](#) for those who were unable to attend. The talks are presented on the first and third Wednesday of each month.



DISCOVERY DAY



More than 2,000 people visited the DISL campus for the annual open house event, Discovery Day, on April 6.

The day is an opportunity for visitors to chat with our researchers about the ongoing projects and get a look inside a working laboratory. They also meet our students currently working on their graduate degrees. Our marine educators and community partners round out the day with critters, arts and crafts, and games.

Visitors also get the chance to step aboard our 65-foot Research Vessel Alabama Discovery.



MOBILE BAY NATIONAL ESTUARY PROGRAM

In 2019, the Mobile Bay National Estuary Program began implementing its updated Comprehensive Conservation and Management Plan (CCMP), including developing watershed management plans (WMPs) for all of coastal Alabama's tidally influenced watersheds and implementing measures recommended in completed WMPs.

Watershed Condition Framework With much of the original scope of stream restoration work recommended in the D'Olive WMP complete, the watershed served as a pilot for MBNEP's Science Advisory Committee (SAC) investigators to develop a watershed condition framework (WCF) to measure, analyze, and communicate changes in ecosystem conditions post-restoration. Incorporating a host of metrics from assessments of D'Olive stream restoration projects, the WCF indicated a need for accelerated canopy development and invasive species control at restoration sites. As originally envisioned, further WCF refinement will include assessments of parameters appropriate to specific project restoration goals (e.g., reduced downstream sediment loads) and to quantitatively incorporate socio-economic factors supporting ecosystem responses to restoration (e.g., regulatory requirements compelling use of low impact development measures or buffer setbacks) into WCF assessment protocols.



Completed rain barrel system.

Watershed Management Planning Millions of dollars in Deepwater Horizon-related funding has been used to develop WMPs for each of Alabama's estuarine watersheds to ensure restoration/protection efforts are based in science, fit into an overall management strategy, and focus on drainage areas, independent of geopolitical boundaries that might limit actions. Plans have been completed for the D'Olive, Three Mile Creek (TMC), Fowl River, the Dog River Complex, the Bon Secour River Complex, and Weeks Bay Complex. Plans for Wolf Bay, the Western Shore of Mobile Bay, and Little Lagoon watersheds are in progress, as planning for Fly Creek and the Mobile-Tensaw-Apalachee Complex is anticipated to begin soon. Hundreds of elected officials, community leaders, and coastal resource managers were critical to the development and implementation of these WMPs.

Implementation of completed WMPs has been extensive and included:

- Restoration of more than 11,000 linear feet of stormwater-degraded streams and 44 acres of flood plains in the D'Olive Watershed to reduce delivery sediment impacting downstream fishery habitats.
- Delivery of the TMC Invasive Species Control Plan, planning for 12 Mile Creek stream restoration, stormwater management efforts by MAWSS and the University of South Alabama, Greenway Trail planning and construction, and the Toulmins Spring Branch Rain Barrel Program in the Three Mile Creek Watershed.
- Acquisition of approximately 300 acres of the largest contiguous bottomland hardwood wetlands remaining in the Dog River Watershed Complex, as the Dog River Clearwater Revival used EPA funding to initiate similar trash abatement/removal efforts used by Osprey Initiative in TMC.
- A Fowl River Watershed study by SAC investigators on causes of degradation in marsh spits in the River's transitional zone between brackish and fresh waters to inform the ongoing Fowl River Watershed: Coastal Spits and Wetlands Project-Phase 1 to develop engineering and design plans to stabilize and protect these vulnerable features of ecological and community importance.

- The Bon Secour River Headwaters Restoration-Phase I in the Bon Secour River Watershed Complex which involves development of engineering and design plans for creating wetlands to treat urban runoff impacting downstream fishery habitats.
- The Lightning Point Restoration Project-Phase II in the Bayou La Batre Watershed. The Nature Conservancy is implementing construction of 28 acres of coastal marsh and 1.5 miles of wave attenuating breakwaters at the mouth of the Bayou La Batre River. The project will also protect 127 acres of coastal habitat newly acquired by the Alabama Forever Wild Trust Program and the City of Bayou La Batre.

Trash Abatement Activities With the CCMP identifying waterborne trash and litter as a ubiquitous issue impacting watersheds across coastal Alabama, the MBNEP has been actively addressing this problem.

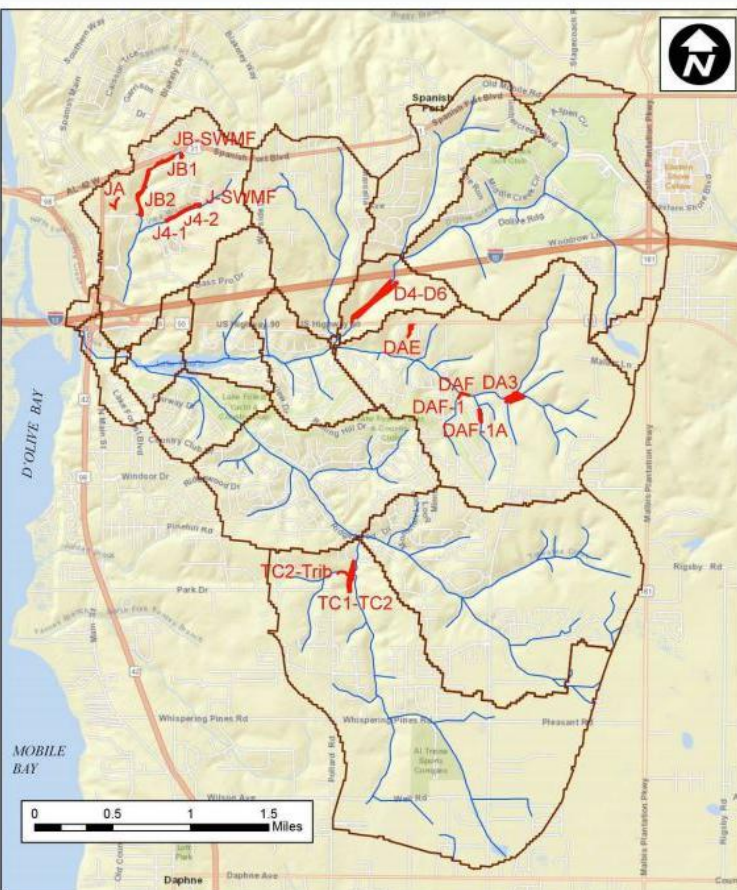
- Collaboration with the MBNEP on trash abatement in the TMC Watershed led to the establishment of Osprey Initiative LLC, a Mobile firm that has pioneered the use of “Litter Gitters,” highly portable, relatively inexpensive in-stream trash collection devices. Litter Gitters are currently being used effectively in four different watersheds in Mobile and Baldwin counties.

- MBNEP partnered in 2018 with the Town of Dauphin Island and the Alabama Deep Sea Fishing Rodeo to initiate the Trash Blows... Stow It! campaign to raise awareness about trash blowing onto roadways from the beds of pickup trucks or from towed recreational boats. This successful campaign was continued at the 2019 ADSFR and involved extensive use of signage and banners, t-shirts, drink koozies, and other promotional material along with social media to raise awareness about this issue.

- In 2019, State Representative Margie Wilcox, a member of MBNEP’s Government Networks Committee sponsored House Bill 500 to provide additional penalties for criminal littering, including increased fines and mandatory community service requirements when littering is committed from a motor vehicle. It passed overwhelmingly in the House and the Senate before it was signed by Governor Ivey on May 31, 2019.



Volunteers work to assemble a rain barrel stormwater harvest system at a Toulmins Spring Branch residence



D'OLIVE WATERSHED

The D'Olive Creek Subwatershed covers approximately 7,700 acres along the eastern shore of Baldwin County within the cities of Daphne, Spanish Fort, and unincorporated areas of Baldwin County.

This map of the D'Olive Watershed on Mobile Bay's Eastern Shore indicates stream restoration projects in red. These projects were monitored post-construction in the development of the Watershed Condition Framework.

These projects, representing more than 11,000 linear feet of restored streams and 44 acres of restored wetlands, were monitored post-construction in the pilot development of the Watershed Condition Framework.

The WCF indicated the need for accelerated canopy development and better management of invasive plant species.

a year's overview

DAUPHIN ISLAND SEA LAB FOUNDATION

The Dauphin Island Sea Lab Foundation (DISLF) supports the DISL in its mission to provide wise stewardship of the marine environment through education and research. The DISLF provides funds to sustain the activities and promote awareness of the DISL. Annual fundraisers include Cocktails with the Critters and the Marine Environmental Awards Luncheon. In 2019, the DISLF also hosted the Alabama premier of Diving Deep: The Life and Times of Mike deGruy.



Diving Deep Mobile native filmmaker and explorer Mike deGruy is remembered in the film Diving Deep: The Life and Times of Mike deGruy. His wife and filmmaking partner, Mimi Armstrong deGruy, wrote, directed and produced this award-winning feature length documentary about the irrepressible biologist turned filmmaker. Approximately 300 people attended the event. Entrance was \$35 for the movie and \$50 to attend the reception and movie. Proceeds from the film will be used to fund the Mike deGruy Scholarship.

Only days before the deGruy film premier, the DISLF hosted the sixth annual Cocktails with the Critters at the Blue Gill. More than 450 people attended. In-kind sponsors included WKRG, Gwin's, PMT Publishing, and Lagniappe. Eric Erdman provided the music for the evening and Stig Marcussen provided the artwork.

Award-winning bioluminescence scientist Dr. Edie Widder was the keynote speaker for the 8th Annual Marine Environmental Awards Luncheon on Wednesday, November 6 at the Battle House Renaissance Hotel. The DISLF also recognized an individual and an organization for their outstanding contributions to marine environmental sustainability in the Alabama Gulf Coast Region.

The Gulf Coast Marine Environmental Excellence Award was presented to Jimbo Meador. For years, Meador has shared his love of the Mobile-Tensaw Delta with visitors through his Delta Excursions. The Gulf Coast Marine Environmental Leadership Award recognized the Thompson Engineering Eco Team. This team is made up of volunteers from Thompson Engineering and Watermark. They participate in clean-up efforts each month, including the Alabama Coastal Cleanup and the Weeks Bay NERR Cleanup.



The DISL's fleet of vessels grew by three with boat donations to the DISLF from Mike Rogers, the estate of the late John Walter "Sto" Stowers, Jr., along with a matching grant from the Alabama Power Foundation.

Rogers 31 foot Bertram will be used on research and education ventures for University Programs and Discovery Hall Programs under the name the 'Jolly Rogers.' The new vessel with Alabama Power's support will be named the Alabama Power Claire B, and will set sail in the new year.

Marine Tech Support added a handheld CTD to its toolbox. The instrument is used by researchers to simultaneously measure depth, salinity, and temperature. The DISL's standard CTDs are about the size of a fire hydrant. This smaller version is about the size of a tablet which makes gathering data at the water's edge more accessible.

Estuarium aquarists upgraded their water quality testing equipment. The new Hach DR6000 not only measures harmful waste products like ammonia and nitrite, it also detects tiny concentrations of the medicines used to insure fish health.

