2020 Annual Report
Dauphin Island Sea Lab

Faced with uncertainty in 2020, the Dauphin Island Sea lab found new waterways to connect with supporters, students, schools, and educators. The challenges presented by COVID-19 brought new growth to each area of programming. University Programs reached non-traditional students during the virtual summer courses. Discovery Hall Programs visited schools across the United States without leaving campus. Research teams continued work in the field and lab with new guidelines. The public aquarium answered questions of curious animal lovers over social media platforms.

With precautions in place during the summer and fall, new programs were developed, giving more visitors a chance to discover the biodiversity of Mobile Bay, the northern Gulf of Mexico, and estuaries.

A busy hurricane season added to the challenges of the year. Hurricane Sally crossed over campus in September, leaving buildings without roofs and damaging office space and campus housing.

While the year ended with fewer visitors than in years past, the growth on campus laid a new foundation for the years to come.

UNIVERSITY PROGRAMS

University Programs made the best of 2020. As the COVID-19 pandemic threatened to shut down the summer session courses, the faculty and program committee worked together to create a virtual plan to keep the courses on schedule.

Field trips, labs, and classes all went online for the more than two dozen courses offered in late May, June, and July. Two microscopes with cameras purchased with the support of Regions Bank provided the technology needed to bring the smaller things to the virtual world for students. The cameras made virtual viewing and virtual teaching more dynamic.

Dr. Paul Gier, Huntingdon College, was joined by his wife and son on campus to help virtually teach Marine Behavioral Ecology in the first session of University Programs summer session.

"Faculty are balancing the mechanics of how to adapt the courses and how to use the technology alongside the challenges of the different personal interactions," Dr. Ruth Carmichael, DISL Senior Marine Scientist and University of South Alabama Department of Marine Sciences Professor shared. "I really think there is a lot of capability and opportunity within the virtual setting, we just have to discover and master those possibilities."

One example of adaptation was the Marine Turtles May Term course. Normally the students would be involved in helping with conservation projects in local habitats near the DISL campus along with experiencing sea turtle conservation programs across Florida and meeting world-class sea turtle scientists. Visiting faculty Dr. Thane Wibbles, UAB, and Jennifer Layton, Samford University, incorporated state of the art video media, high-tech drones and wildlife cameras to teach the course. They also virtually connected with world-class sea turtle scientists.

Through this unique and multidisciplinary approach, the students were provided with a rich research and conservation experience that included a broad spectrum of topics and included interaction with a full series of well-known sea turtle scientists and conservationists.

Despite the challenges, University Programs delivered 1,185 summer course credits with 16 of the 23 MESC schools represented. Fall and spring graduate students earned 457 course credits. While the majority of graduate students hailed from the University of South Alabama, Auburn University was also represented.

Summer Course Highlights:

Marine Behavioral Ecology

Marine Ecology

Marine Invertebrate Zoology

New microscopes used to teach summer courses offered up close views like this of green algae.

Summer Credit Hours	1128
Fall/Spring Graduate Credit Hours	457
MESC Schools Represented	16
Faculty Publications	54

While the University Programs summer session was virtual, the National Science Foundation Research Experience for Undergraduates Program (NSF-REU) did bring eight students to campus for the 12-week program. COVID-19 recommendations by the CDC were followed while the students were on campus. The REUs completed worked with faculty mentors to complete research projects in a number of areas including ciguatoxins in queen triggerfish, polychaete burrowing efficiency, carbon stable isotopes, oysters as bioindicators, primary productions in Mobile Bay, and oyster strength.

2020 NSF-REU: PI Ruth H. Carmichael, Joseph Brennan, Melanie Ponce, Trinity Curry, Ti-Ara Turner, Stephen Akin, Marco Pastrana, TA Anika Knight;
Not pictured: Sydney Markham, Rylee Malone

The stranding of a 33-foot long sperm whale put DISL's Marine Mammal Research Program in the spotlight of local and national media in the latter months of 2020. The sperm whale was first reported to ALMMSN on November 19, 2020, near Weeks Bay, Alabama, and stranded multiple times within Mobile Bay over the next several days. Veterinarians on the scene in coordination with NOAA's National Marine Fisheries Service determined that euthanasia was the best and most humane outcome for this whale.

Alabama Marine Mammal Stranding Network and DISL Marine Mammal Research Programs staff monitor a stranded sperm whale in Mobile Bay in November 2020. (Photo Credit: DISL/ALMMSN)

During the necropsy, ALMMSN collected more than 450 samples to better understand this stranding and learn more about Gulf of Mexico sperm whales. The findings from the necropsy suggested the whale likely had not eaten during the weeks or even months before stranding. Information collected by ALMMSN from this stranding will be important to better understand sperm whale populations in the Gulf of Mexico and what can be done to further protect this endangered species. If you find a stranded marine mammal in Alabama, please call ALMMSN at 1-877-WHALE-HELP (942-5343) as soon as possible.

University Programs welcomed one new faculty member, Dr. Brandi Kiel Reese. She is an associate professor of Marine Sciences at the University of South Alabama. Dr. Reese is a microbial ecologist and biogeochemist who uses advanced molecular techniques such as single-cell genomics, metatranscriptomics, and metagenomics to interrogate cellular life in the sediment and in extreme environments such as the marine deep subsurface and underwater mud volcanoes.

DISCOVERY HALL PROGRAMS

Discovery Hall Programs met the challenges of 2020 head-on by adjusting current programs to be offered virtually, creating a safe environment for in-person activities, and developing new programs.

The Safer at Home Order put in place by Alabama Governor Kay Ivey in March and the shift to virtual classrooms quieted the DHP classrooms for the final months of the 2019-2020 school year. DHP marine educators navigated the COVID-19 challenges with a new virtual approach to their well-known lessons and summer camps. Several new programs also grew from the challenges of 2020.

The Alabama Regional SeaPerch Challenge took place on February 8, 2020. Biloxi Upper Elementary School in Mississippi placed first.

Before the challenges of 2020 began, the year started with the addition of a new ROV (remotely operated vehicle) competition. The Alabama Regional SeaPerch Challenge took place on February 8 with five teams competing. The single-day competition was open to middle and high school teams. UMS-Wright co-hosted the competition with activities being held on their Mobile, Alabama campus.

"I really felt this was a great opportunity to introduce more robotics and technology to the students," UMS-Wright Upper School Science teacher Nancy Hilbun said. "What's happening in the industry and the world, this is going to be a growing field and industry. We can really let them know how this would work and what they can do. I also think it improves their problem-solving skills and critical thinking skills."

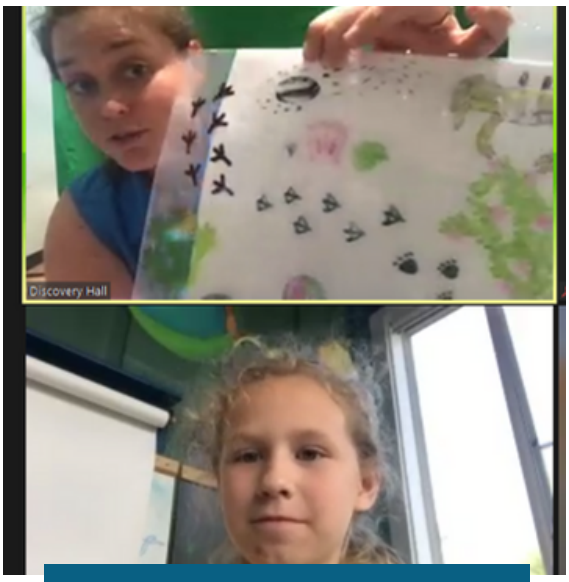
The Braves from Biloxi Upper Elementary School in Mississippi were the overall regional champion in the competition and qualified to attend the International SeaPerch Challenge in May. Unfortunately, the international competition was canceled due to COVID-19.

The SeaPerch Regional Competition can be an opportunity for teams to prepare for the Northern Gulf Coast Regional MATE ROV Competition hosted each year by DHP. However, the 2020 competition schedule for April was canceled. The annual competition would have marked eight years and brought nearly two dozen teams from the southeast United States to compete. While the teams didn't make a trip to campus, a highlight was created for the previous year's competition.

Despite the shift in programing midway through 2020, DHP educators still reached 11,577 students in person, virtually, and through DISL's traveling classroom, the BayMobile. The BayMobile was a helping hand when schools reopened, but students were not able to travel to the Sea Lab for a field trip. The traveling classroom visited 23 of Alabama's counties marking a moment with 9,883 students in 31 visits.

On-site progams saw a reduction in groups throughout the year due to the changing protocol for schools. Fifty-two groups with 2,103 students took part in programs on the Sea Lab campus. Eighty percent of those groups were Alabama students with other students visiting from Florida, Louisiana, Tennessee, and Missouri.

Summer programs were adjusted as needed to meet the new COVID protocol and safety measures. Eight camps were held in person, and two camps were held virtually. Eighteen states were represented during the summer programs with 170 campers in attendance. In a time of a great deal of adjustments and change, parents were grateful for the efforts of DISL to hold in-person programs during the summer months.



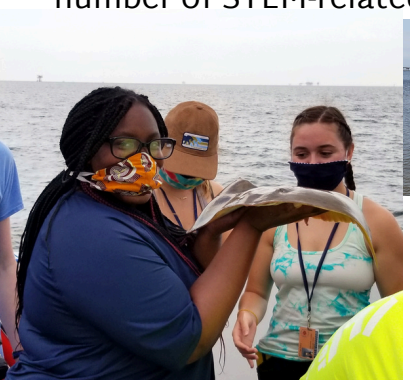
Virtual classes became a common connection for DHP and classrooms as schools limited field trips due to COVID-19.

Teachers across the state of Alabama faced new challenges in preparation for the 2020-2021 school year. DHP educators polled their database of educators to see how they could lend a hand with virtual lessons. These requests helped to build a number of virtual lessons offered by DHP educators throughout the fall months. Two teacher workshops, NOAA OER Underwater Robots and Plankton in 3D, were also held virtually with 45 teachers attending.

DHP created three new programs in 2020 including Family Camp weekends. The weekend events included a kayak trip.

DHP created three new programs in 2020 to expand the reach to non-traditional participants. Science Friday, Ocean Explorer Saturday, and Family Camp welcomed 119 participants. Science Friday and Ocean Explorer Saturday offered a variety of activities throughout the day related to STEM, ocean animal biology, and biodiversity. The three-day Family Camp offered a variety of activities including the chance to explore Mobile Bay on the R/V Alabama Discovery, visit the salt marsh, and go kayaking.

Discovery Hall Programs chair Dr. Tina Miller-Way was appointed by Alabama Governor Kay Ivey to hold a seat on the newly developed STEM council. Miller-Way understands the importance of STEM-related education. Over the last decade, her team of marine educators has implemented a number of STEM-related classes, professional development workshops, and summer camps.

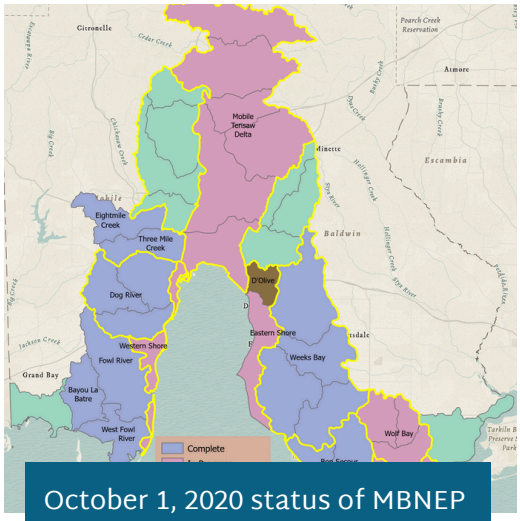


Classes taught in person and virtual	274
BayMobile Visits, 23 counties represented	31
Participants attending new programs beginning September 1, 2020	119
Students reached including onsite, BayMobile, and summer programs	11,577

MOBILE BAY NATIONAL ESTUARY PROGRAM

This reporting period represented the second year of the Mobile Bay National Estuary Program's five-year Comprehensive Conservation and Management Plan. Program highlights include continued development of watershed management plans, addressing shoreline erosion through engineering and design of major restoration projects, and tool development to guide implementation of trash abatement activities.

Watershed Management Planning



October 1, 2020 status of MBNEP Watershed Management Planning including completed plans, plans under development, and plans being updated.

The MBNEP continues to develop and publish comprehensive management plans for all of Alabama's tidally influenced watersheds. The MBNEP's CCMP has garnered national attention for a watershed approach to resource management focusing on drainage areas rather than jurisdictional boundaries, which can limit available actions. Watershed management plans (WMPs) focus on data related to governance, demographics, socioeconomics, geography/geology, biology/ecology, and hydrology/climate to identify problems threatening receiving waters, recommend prioritized solutions to them, and identify potential funding sources to pay for those solutions. WMPs can be developed for single watersheds or complexes of watersheds with geographies similar enough to realize economies of scale for planning.

By October 1, 2020, MBNEP had published WMPs for Eight Mile Creek, D'Olive Creek, Three Mile Creek, Dog River (Upper and Lower Dog River and Halls Mill Creek), Fowl River, Weeks Bay (Upper, Middle, and Lower Fish River and Magnolia River), Bon Secour River, (Bon Secour River, Oyster Bay, and Skunk Bayou), Bayou La Batre River, and West Fowl River. Five WMPs were under development for the Gulf Frontal (Little Lagoon and Perdido Pass), Wolf Bay (Graham Bayou, Sandy/Wolf Creek, and Mifflin Creek), Fly Creek, Mobile-Tensaw-Apalachee (Farris Creek/Barrow Creek, Big Chippewa Lake, The Basin, Grand Bay, and Tensaw Apalachee), and Western Shore (Garrow's Bend, Deer River, and Delchamps Bayou) watersheds. The 2010 D'Olive Creek WMP is currently being updated.

Engineering and Design of Shoreline Restoration Projects

Erosion of beaches and shorelines and degradation of fish/shellfish habitat have been identified as major concerns of stakeholders in WMPs published and under development. The MBNEP secured funding from the National Fish and Wildlife Foundation's Gulf Environmental Benefit Fund (NFWF's GEBF) to develop engineering and design plans for three major shoreline restoration projects in Mobile County.

NFWF-funded shoreline restoration projects under development. From right to left: Fowl River Coastal Spits and Wetlands, Deer River Shoreline Stabilization, and Dauphin Island Causeway Shoreline Restoration (with inset).

The projects include the Fowl River Watershed Restoration: Coastal Spits and Wetlands Project (Phase I), Deer River Shoreline Stabilization (Phase I), and the Dauphin Island Causeway Shoreline Restoration (Phase I and Phase II).

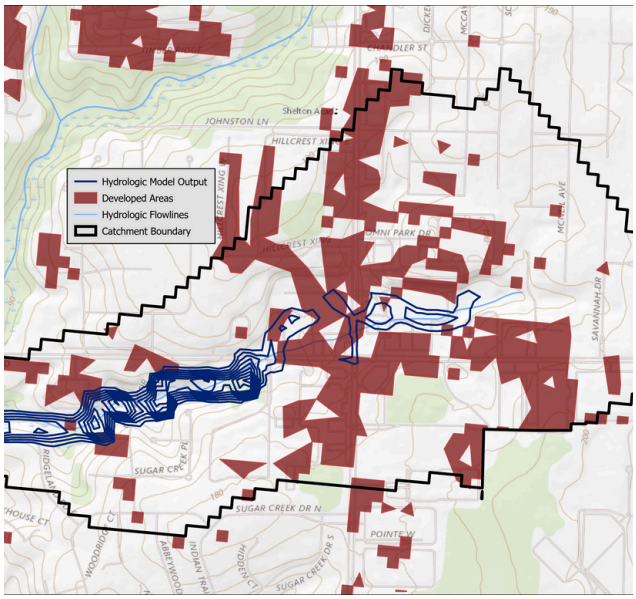
Informed by the Fowl River Marsh Study completed by MBNEP Science Advisory Committee investigators, engineers are developing plans to stabilize and protect four priority marsh spits and wetlands in the transitional zone between fresh and brackish water in intertidal portions of lower Fowl River. Plans will be developed to restore marsh habitat, including 7,600 linear feet of shoreline, protect priority fishery habitat, and improve water quality in this pristine coastal river.

Engineering and design are underway to stabilize and restore the 5,600-foot Deer River shoreline and its 275-acre salt marsh system, adjacent to the Theodore Industrial Canal and Mobile Bay. Extensive erosion from storms, tides, and ship wakes have resulted in a breached shoreline, loss of nine acres of productive intertidal marsh, and excessive sediments impairing the system's tidal creeks. Plans include innovative shoreline protection measures, tidal creek restoration, and potential creation of new salt marsh habitat.

MBNEP secured funding for Mobile County to undertake engineering and design of breakwaters and other restoration measures on the Bay side of the 10,090-linear foot Dauphin Island Causeway between Heron Bay Cutoff and the Dauphin Island Bridge. Objectives include stabilizing the shoreline along State Road 193, the single vehicular access route to or from Dauphin Island, and improving marsh function and fisheries habitat resilience in Alabama's most active wild oyster harvest area. Funding was secured in 2020 for Phase II to implement construction of measures, including installation of breakwaters and marsh creation, prescribed in this design.

Scientific Support of Trash Abatement Initiatives

In support of a Dog River Clearwater Revival's Comprehensive Trash Abatement Program, the MBNEP used hydrologic model outputs; data from the EPA's Escaped Trash Assessment Protocol; and GIS analyses of drainage catchments, impervious cover, land uses, and demographics to develop an inexpensive tool useful to resource managers in identifying upland litter "hotspots" and pathways of runoff-conveyed litter into urban receiving waters. Photo highlights the Dog River Watershed catchment showing hydrologic flowlines, developed areas, and hydrologic model outputs showing areas of pooling.



ESTUARIUM

The year started with high expectations for the Dauphin Island Sea Lab's public aquarium, the Estuarium. Estuarium manager Robert Dixon attended the Snowbird Expo at The Wharf in Orange Beach in February, training for new and returning docents was held in March, and an AmeriCorps team spent time on campus to clean up the marsh that lines the boardwalk at the aquarium.

As plans began for the spring and summer events, concerns of COVID-19 led Alabama Governor Kay Ivey to issue a Safer at Home order. This order closed the aquarium to the public on Wednesday, March 18.

While the public wasn't able to peer into the tanks in person, live stream events kept supporters and friends connected. The first 'Ask the Aquarist' went live on Facebook on Friday, March 20. Aquarist Logan Holfelder brought people near and far virtually to the Rays of the Bay Exhibit at the aquarium. He shared details of the rays that call the Estuarium home and answered questions posed by Facebook Live viewers.

Aquarist Logan Holfelder holds up the barb of a stingray during the first 'Ask the Aquarist' Facebook Live segment.

The success of that first live event spawned a new virtual series highlighting the aquarists, marine educators, and researchers at the Dauphin Island Sea Lab. Aquarist topics included lionfish, octopus, corals, the diamondback terrapin, alligators, and more. The Boardwalk Talk program returned on April 1 virtually with a look at the variety of things you can find on the beach.

The aquarium reopened on June 2 with mask policies in place.

The aquarium reopened on June 2 with new policies in place to adhere to CDC and Alabama Department of Health guidelines. An online ticketing system was put in place through Yapsody with tickets being sold in 10-minute increments to help maintain social distancing. Policies also included masks for all visitors.

While the aquarium was open, public events that would have been held in person were virtually adapted. The World Oceans Day virtual event on June 8 streamed to YouTube live with presenters from University Programs, Discovery Hall Programs, Grand Bay National Estuarine Research Reserve, and the Lightning Point Restoration Project.

For National Estuaries Week in September, plans for a week of pre-recorded and live events were cut short by Hurricane Sally. Instead, two pre-recorded talks were released: Salt Marsh Habitat with DHP Marine Educator Chris Flight and Oysters by Aquarium Educator Mendel Graeber. Additional virtual outreach events included World Horseshoe Crab Day in collaboration with Dr. Ruth Carmichael, World Octopus Day, and World Jellyfish Day.

As the pandemic adjusted programs on DISL's campus, the aquarium excursion program expanded beyond the summer months to help those families and non-traditional groups get outdoors in an educational adventure. The excursion program, which included the salt marsh, beach, dunes, and maritime forest, expanded to offer an opportunity to explore Mobile Bay on the Research Vessel Alabama Discovery.

Aquarium educator Mendel Graeber leads an excursion on the R/V Alabama Discovery

The inaugural R/V Alabama Discovery excursion brought along 32 visitors for a two hour trip into Mobile Bay. Those on board had an up-close, hands-on look at juvenile white trout, catfish, banded rudderfish, a purse crab, ship worms and snapping shrimp. Also on board for the trip was a volunteer with the DISL's citizen science CAMEO program. These volunteers collect data on the animals brought up on trawls which contributes to an understanding of local populations of different species.

Connor Wiggins and the PowerGrid Services crews from Hartselle, Alabama help to get the flag flying again after Hurricane Sally.

The 2020 Hurricane Season also brought along challenges with closures related to Hurricane Sally, Hurricane Delta, and Hurricane Zeta. The aquarium gift shop and offices sustained water damage due to Hurricane Sally. Repairs included new flooring in the gift shop and roof repairs. Unrelated to storms, facility updates included the replumbing of the Mobile Bay Tank, new sails and renovations to the Rays of the Bay Exhibit, and a new gateway sign.

Despite the challenges of 2020, two interns enjoyed the opportunity to learn from the aquarist team. Mississippi-Alabama Sea Grant funded the internships for Charlotte Falls and Tori Ryan. Falls' internship ended in March and Ryan continued her internship into 2021.

Aquarium Visitors	**33,934**	**Total Volunteer Hours**	**1,111.75**
Boardwalk Talks	**22**	**Excursion Participants**	**194**

The aquarium also benefited from the support of an AmeriCorps team to help clean the marsh of debris and invasive plants.

DISL FOUNDATION

The Dauphin Island Sea Lab Foundation did well to manage the fast-moving, constantly changing tides of 2020. The steady support of donors throughout the year was inspirational.

Donor gifts enabled the DISLF to support the Sea Lab's efforts to attract extraordinary students and faculty and to provide preeminent Marine Science education and research. The DISLF was able to offer funding for the BayMobile, DISL's traveling classroom, and funding for a campus master plan to improve the infrastructure of the campus, addresses student safety, and identify areas for future growth and modernization as the DISL continues to grow.

The DISLF funded three scholarships for Discovery Hall Programs' four-week residential high school course. Some students use the course to adjust their college and career path. Others just have an interest in the marine world. Whatever the reason, the experience leaves a lasting impression. For some students, donations and grant-supported scholarships make the experience possible

Diamond Contee, Wyatt Stanley, and Emma Graves received scholarships supported by the DISL Foundation.

"The scholarship has given me the opportunity to see if I wanted to pursue a career in marine science," Diamond Contee of Maryland shared. "I want to thank those that funded the scholarship because I know now I want to do this for the rest of my life."

Contee benefited from the newly established Mike deGruy Scholarship funded by the Dauphin Island Sea Lab Foundation and the Mobile Bay National Estuary Program. Wyatt Stanley, a homeschool student, and Emma Graves, a Thompson High School senior, were recipients of the Jenny Cook Memorial Scholarships this year, funded partially by Austal USA.

Teaching virtually presented new challenges for University Programs summer faculty this year. Field trips, labs, and classes all went online for the more than two dozen courses offered this summer.

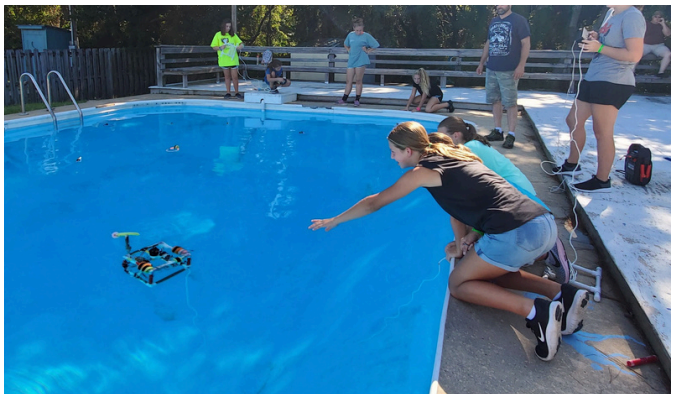
With the support of Regions Bank, students in several classes still had a close-up look at the microscopic world of marine science. The donation allowed for the purchase of four high-powered microscopes, two Accuscope compounds, and two Unitron 2850 dissectors. One of each included cameras. These cameras made virtual viewing and virtual teaching more dynamic.

Cocktails with the Critters is the DISLF's largest fundraiser of the year. With the challenges of 2020, the Foundation decided to take the annual event virtual for the first time. With more than 80 items and 300 Bidders, the virtual event raised an impressive $25,000. The money raised is used to support scholarship sand campus needs.

Unfortunately, the DISLF was not able to hold the annual Marine Environmental Awards Luncheon. The event is normally held in November and recognizes an individual and an organization each year for their outstanding contributions to marine environmental sustainability in the Alabama Gulf Coast Region. The 2019 luncheon featured award-winning bioluminescence scientist Dr. Edie Widder as the keynote speaker. Jimbo Meador and Thompson Engineering Eco Team were recognized for their contributions in the community.

The Friends of the Sea Lab had a record year in 2020 with 178 members. A membership includes unlimited visits to the Estuarium each year and a gift shop discount. Members also receive updates from The DISL Foundation and the DISL campus.

The DISL Foundation launched a campaign in December to meet the needs of STEM learning at the Sea Lab with a larger and deeper pool and an adjacent outdoor classroom. The facility would expand opportunities for teaching, allow for more students participating simultaneously, a larger area for recreation, and provide a teaching location adaptable to times of pandemics.



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