Dauphin Island Sea Lab

Alabama Center for
Marine Education and Research

Annual Report 2023

Founded in 1971 by the State of Alabama Legislature to maximize the marine sciences capabilities of several Alabama institutions and minimize duplication.

Research programs range from biogeochemistry and oceanography to ecosystem ecology and ecotoxicology. While much of our research focuses on the near-shore and estuarine processes of the northern Gulf of Mexico, field sites of our internationally renowned faculty also include the Arctic, Mexico, Australia, and other countries.

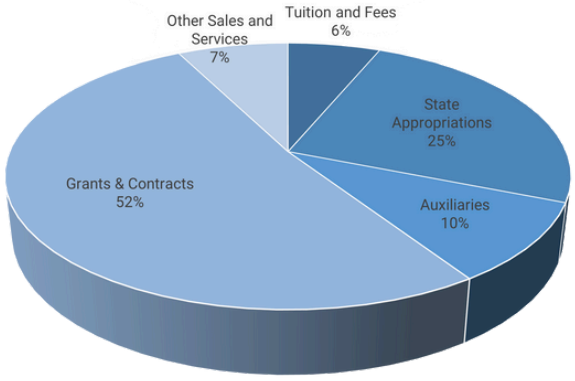
Located on the eastern tip of Dauphin Island, a barrier island in the northern Gulf of Mexico, DISL is surrounded by Mobile Bay, the Mississippi Sound, and the waters of the Gulf, making it a perfect location to conduct a wide range of marine science activities.

Planned efforts to expand the DISL's capacity began taking shape in 2023.

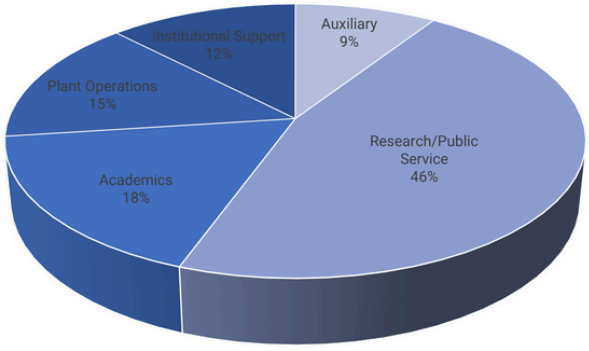
In the coming year, we look forward to breaking ground on two new outdoor classrooms, bidding on the construction of a new 65-foot research vessel, completing the design for a new dormitory, and expanding our undergraduate and K-12 programs.

Dr. John F. Valentine
Executive Director, Dauphin Island Sea Lab

Where the Money Comes From FY 2023 Revenues



Where the Money Goes FY 2023 Budgeted Categories



On the cover:
Dr. Kenneth Hoadley with the help of Marine Technical Support created a tool to determine the thermal tolerance of a species of coral in the field as opposed to in the laboratory. Instruments like this submersible algal phenotyping (SAP) fluorometer can be tested in the scientific pool before going into the field.

Campus Updates

Expanding and Improving

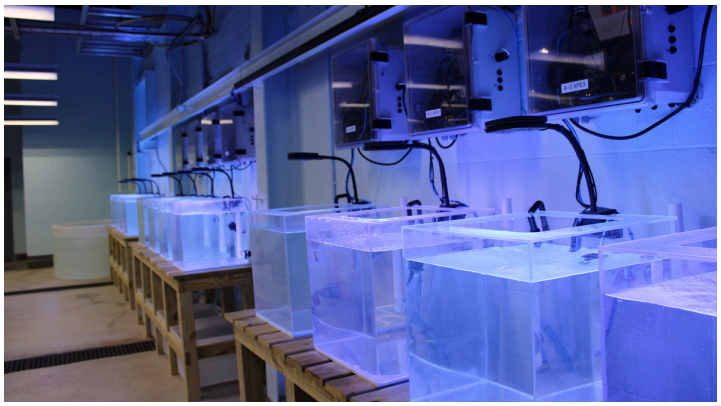
Old Storage becomes State of the Art Multistressor Wet Lab

A new state-of-the-art wet lab facility came online in January 2023, expanding the research capabilities of students, faculty, and visiting researchers. This facility is one of the few in the United States.

The multi-stressor wet lab allows researchers to examine how marine organisms handle more than one stress at a time. This includes oxygen, pH, salinity, and temperature. In comparison, most research wet labs only allow a researcher to examine the impact of one stress at a time, which is suitable for establishing a threshold.

Before

After



“This could be called a time machine because we will be able to expose marine organisms to future conditions of varying levels,” DISL Senior Marine Scientist Dr. John Lehrter explains. “When you start to expose animals to multiple stresses, the threshold identified for one stress may change based on the combination of stresses exposed at one time.”

The new wet lab will be instrumental in research projects funded by the Alabama Center of Excellence through funding from the U.S. Department of Treasury under the Resources and Ecosystem Sustainability, Tourist Opportunities, and Revived Economies of the Gulf States Act, also known as the RESTORE ACT, signed on July 6, 2012.

Scientific Diving Pool Completed

The scientific pool, completed mid-2023, expands possibilities for ocean technology classes and research programs. It's a captivating classroom for all ages. The pool design highlights include more space around the pool for students to gather and more depth for diving students to work together. The facility marks a significant step forward in the Sea Lab's commitment to providing cutting-edge resources and facilities to support its academic programs and research initiatives.

Discovery Hall Programs frequently uses the pool with the 'ROVing the Gulf' classes. Students in these classes learn how to build and drive underwater remotely operated vehicles (ROVs). The added depth and space allow students to be more creative with their designs.

Many research projects DISL faculty and students conduct require scientific diving to gather data and deploy instruments. Marine Technical Support will use the scientific pool to evaluate and train scientific divers, practice underwater operations, and test new instruments. They also routinely deploy instruments in 30 feet to 90 feet of water on offshore moorings.

Designs are being completed to build an open-air classroom adjacent to the pool. This addition will offer space to house diving equipment and marine technology tools and enhance the applicability of ocean technology classes.

Sunshades Improve Outdoor Spaces

Outdoor learning spaces are a favorite of students, faculty, and staff. Now, those spaces have some extra shade.

A grant from the Alabama Dermatology Society put the shades in place over the deck of the Endeavor Classroom and adjacent to the outdoor pavilion.

The Dauphin Island Sea Lab Foundation secured the grant.

University Programs

Graduate
Undergraduate
Research

University Programs (UP) oversees graduate and undergraduate course study with the 22 Marine Environmental Sciences Consortium (MESC) members. The program also supports faculty research. In 2023, 61 peer-reviewed publications highlighted the work of DISL faculty.

University Programs continues to grow in student enrollment in graduate and undergraduate courses and credit hours delivered. In the academic year, 332 graduate hours were earned, and summer undergraduate hours totaled 1,495 undergraduate credit hours.

In January 2023, University Programs hosted the first undergraduate spring courses on the DISL campus. Before 2023, undergraduate courses were only offered during the summer sessions. The addition of spring undergraduate classes was connected to the University of South Alabama's addition of a Bachelor of Science in Marine Science. Tabor Smith, Leah Townsend, Cadie Barnes, and Stefan Bednarczyk were the first four students to take spring undergraduate courses at the Dauphin Island Sea Lab. The courses offered included marine ecology, geology, technical methods, and operations and research. The spring attendance is expected to grow in the coming years.

University Programs chair Dr. Lee Smee (center) and University of South Alabama undergraduate students Tabor Smith, Leah Townsend, Cadie Barnes, and Stefan Bednarczyk.

In 2023, the vessels and technical support were consolidated into Research Operations with Josh Goff being named the head of the department.

Currently, the Sea Lab operates two large research vessels: the R/V Alabama Discovery and the R/V E.O. Wilson. In addition to the Wilson and the Alabama Discovery, there are several small (14 to 30 feet) outboard boats and skiffs.

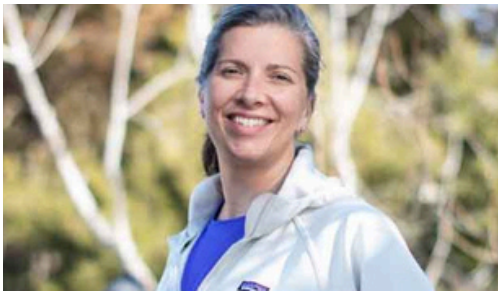
In 2023, the R/V Alabama Discovery supported 239 trips for education and research. The R/V E.O. Wilson supported 62 trips. Small Vessel trips totaled 170.

On the cover: Dr. Kenneth Hoadley uses the submersible algal phenotyping, or SAP, fluorometer to collect data on the health of a coral reef.

A tool developed with the support of DISL Tech Support to aid in coral restoration practices across the globe resulted in two grant-funded projects totaling more than $2 million.

The researchers coordinating efforts on these projects include Dr. Kenneth Hoadley with The University of Alabama and Dauphin Island Sea Lab, Dr. Mark Warner with the University of Delaware, Dr. Erinn Muller with Mote Marine Laboratory, Drs. Bastian Bentlage and Laurie Raymundo with the University of Guam, and Victor Bonito with Reef Explorer Fiji - a community-based conservation NGO in Viti Levu, Fiji.

For the projects, the researchers will run a series of thermal bleaching experiments and capture data on the performance of individual coral colonies. They will also collect data using the submersible algal phenotyping, or SAP, fluorometer, which Hoadley and Grant Lockridge at DISL created. This data will be used to construct a predictive model using machine learning algorithms.



Dr. Ruth Carmichael, DISL/USA

Senior marine scientist Dr. Ruth H. Carmichael was appointed as a Special Advisor to the DISL Executive Director, Dr. John Valentine, on Research and Ocean Health Initiatives.

The goal of the initiative will be to identify opportunities for regionally relevant discovery, innovation, education, and workforce development in the area of Ocean and Human Health.

Dr. Brandi Kiel Reese and two of her students spent the beginning of the year on the Research Vessel Nathanial B. Palmer collecting samples in the Ross Sea of Antarctica. As marine geomicrobiologists, they were interested in microbe interactions with its environment. The samples collected were analyzed to gain a deeper understanding of methanogens and methanotrophs.

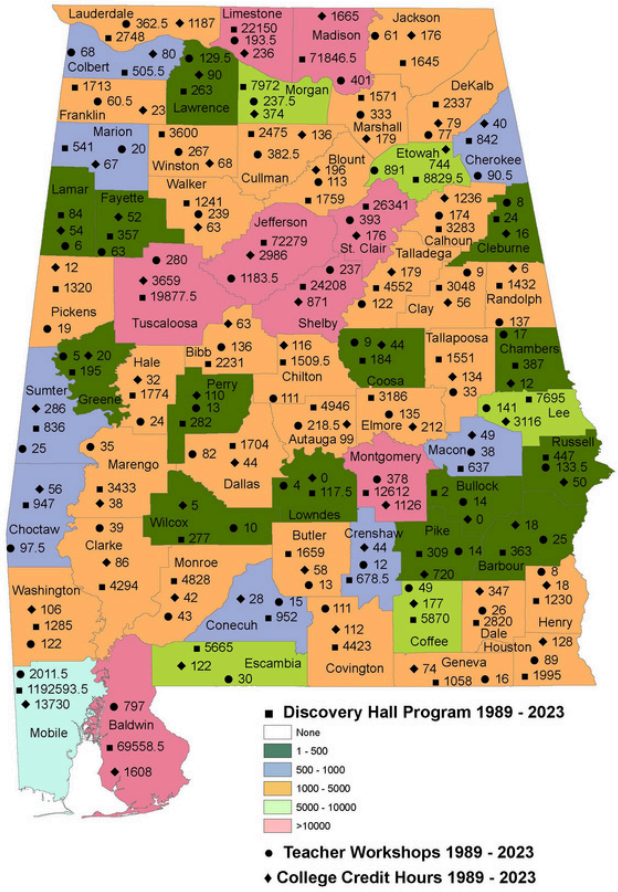
Rachel Weisend, Dr. Brandi Kiel Reese, and Caleb Boyd took part in an expedition to the Ross Sea, Antarctica.

Research Notes

- Drs. Jeffrey Krause and Brandi Kiel Reese are co-PIs on a new National Science Foundation Project from Chemical and Biological Oceanography. The grant will include 20 days of vessel time.
- Dr. Krause served on a National Science Foundation core programs proposal panel.
- Dr. Krause spent three and a half weeks working in their mass spectrometry facility as a visiting scientist at Eidgenössische Technische Hochschule Zürich (ETH Zürich).
- Dr. Krause participated in a collaborative research cruise aboard the R/V Sally Ride (a Scripps vessel) off the Oregon Coast with colleagues from Woods Hole Oceanographic, Rutgers University, Stanford University, the University of New Hampshire, George Washington University, and the University of Washington.
- Dr. Krause served in two editorial roles for scientific journals.
- The Greater Amberjack Count- U.S. Congress funded a large-scale study to provide an independent estimate of the absolute abundance of Greater Amberjack in the Gulf of Mexico (GOM) and South Atlantic (SA). Through MS-AL Sea Grant, the project is led by Dr. Sean Powers, with more than 20 scientists from 15 institutions. The interdisciplinary teams are measuring abundance using direct observations of these fish along the Atlantic and Gulf coasts. Using emerging video, acoustic, fish tagging, and genetic technologies, these teams worked together in 2023 to collect density data across five GOM and four SA states.
- More than 50 Dauphin Island Sea Lab, University of South Alabama, and Mississippi State University students, faculty, and staff volunteered to help with outreach and scientific research at the 90th Alabama Deep Sea Fishing Rodeo. The group sampled 1,350 fishes across 33 categories for updated life history information, including age and growth, microchemistry, diet, contaminants, and reproductive status. These data will contribute to the life history information for these GOM fishes through undergraduate, graduate student, and staff research projects. Over 80 fish were brought in alive and released for Tag Alabama. USA and DISL were represented through outreach tables, and scientists interacted with the public, sharing species information and explaining the scientific collections.
- Tag Alabama is an angler-based saltwater recreational fish tagging program. Anglers can tag Speckled Trout, Red Drum, Tarpon, and Tripletail. In its fifth year of data collection, the program has over 193 taggers, 300 anglers reporting, and over 10,178 fishes tagged.
- DISL's Manatee Sighting Network received 650 reported manatee sightings in 2023, including 300 in Alabama. The team also responded to three live, distressed manatees and three dead-stranded manatees.
- In 2023, the Alabama Marine Mammal Stranding Network responded to 33 cetacean strandings in Alabama and assisted in three stranding responses as mutual aid to partner states. Twenty-eight of the 33 strandings were bottlenose dolphins. In November, the team responded to one live melon-headed whale in Orange Beach.
- The ALMMSN provided ADCNR biologists and law enforcement training in marine mammal response. Two training sessions were held in February, and one volunteer training session was held in November. They also gave multiple trainings and presentations to various other groups, such as GulfCorps and Mississippi State University, throughout the year

Discovery Hall Programs

K-12 Education
Educator Workshops
Summer Camps
Family Programs



Discovery Hall Programs (DHP) hosts classes, field trips, and summer programs for K-12 students and educators. The hands-on learning programs promote conservation to increase public awareness and understanding of our ocean.

DHP educators led a total of 984 field classes for 187 groups during the academic year (September to May). Seventy-six percent of the groups represented 33 Alabama counties.

For schools that are unable to send students for an overnight or day trip to the Dauphin Island Sea Lab, virtual opportunities are available. DHP participates in the Alabama State Department of Education ACCESS Program. DHP educators taught fourteen sessions with 3,197 participants representing 33 Alabama counties.

DHP educators also provided education through the BayMobile, the Sea Lab's traveling classroom. The BayMobile visited 27 Alabama schools and attended 14 events. The events were hosted in Alabama, Louisiana, and Mississippi.

DHP welcomed two new educators to the team in 2023, Taylor Kilgore and Sabrina Atkinson.

Bayside Academy's team works together to maneuver the mission course at the SeaPerch ROV Competition held at UMS-Wright Prepatory.

DHP hosted two student underwater robotics competitions. In each competition, the remotely operated vehicles (ROVs) were designed and built by the students.

The third annual SeaPerch ROV Competition, co-hosted by UMS-Wright Preparatory School in Mobile, Alabama, on Saturday, March 18, welcomed eleven teams. Eleven teams representing schools in Alabama competed in two pool courses - an obstacle course and a mission course. The Alabama schools represented were Baker High School, Barton Academy, Bayside Academy, Loveless Academic Magnet Program High School, Robertsdale High School, and UMS-Wright Preparatory School.

The 2023 mission course focused on ocean exploration and included three tasks: mapping the seafloor, removing and relocating marine life, and collecting a water sample. The obstacle course included a series of hoops that the ROV must fly through to test its maneuverability and speed.

The 10th annual Northern Gulf Coast Regional MATE ROV Competition was held the last weekend of April. The competition is a part of the Marine Advanced Technology Education (MATE) network of 30 regional competitions held across the U.S. and worldwide. Twenty teams from three states competed with their custom-built remotely operated vehicles (ROVs).

This year's missions addressed marine renewable energy, monitoring water quality, and ecosystem health.

Lowndes Robinson of Gadsden Middle School, Gadsden, Alabama, reaches for the team ROV during the 2023 Northern Gulf Coast Regional MATE ROV competition.

The teams included Alabama schools Eastwood Presbyterian Church School of Montgomery, Northridge High School of Tuscaloosa, Gadsden Middle School of Gadsden, Clark Shaw Magnet of Mobile, Alma Bryant High School of Irvington, and Fairview High School of Cullman. The Florida schools represented were Pensacola Catholic High School and Tyndall Academy of Panama City. Louisiana schools competing were Walker High School of Walker and Acorn to Oaks of Slidell.

"In the past 10 years, we have grown from a competition of six teams to more than 20," Dr. Tina Miller-Way, Chair of Discovery Hall Programs, said. "In that time, the technology has improved and the sophistication of what the students can do in the classroom has grown tremendously. This is a perfect STEM activity for students."

DHP continues to see success with programs started during the COVID pandemic to fill gaps left by the decrease in school participation.

The Family Camp weekends offer the same academic year activities to non-traditional campers like kayaking.

Family Camp opened the door for groups outside of an academic setting to participate in an adventurous and educational weekend. The two sessions offered in 2023 welcomed 47 participants from Alabama, Louisiana, and Mississippi. Activities included a trip aboard the Sea Lab's research vessel to trawl and learn about Mobile Bay's inhabitants, a nighttime crab hunting 'crawl', a barrier island beach exploration, a kayak expedition through the salt Marsh, a tour of Dauphin Island's history and historic locations, and a behind-the-scenes tour of the Alabama Aquarium.

Science Friday was created to offer the same educational classes offered to schools throughout the year. DHP hosted seven sessions and welcomed 265 participants who ranged in age from six years old to adult.

Continuing educational opportunities are vital for formal and informal educators. DHP offered five professional development workshops virtually and in-person throughout the year to help educators develop lesson plans based on the most recent data and information related to marine science topics. The workshops also provide materials for the educators to use in the classroom and field exercises. Educators from five states, Alabama, California, Colorado, Florida, Georgia, Louisiana, Maryland, New Hampshire, New Jersey, Ohio, Pennsylvania, South Carolina, Tennessee, Texas, and Washington, took advantage of the opportunities.

The Sea Stars Camp offers students with special needs an opportunity to explore with DHP educators.

The three-day Sea Stars Camp for students with special needs and their adult companions, which brought new and old friends together, was held September 22 through 24. The campers were treated to a muddy adventure in the salt marsh, a chance to navigate Mobile Bay, and a private evening in the aquarium. On the first evening, the campers got acquainted with the beach and its evening inhabitants. While some preferred staying in the dry sand to look for ghost crabs, others waded in the shallow waters to look for fish and hermit crabs.

Campers boarded the R/V Alabama Discovery the following day to explore Mobile Bay and the Gulf of Mexico. This gave them an up-close look at fish, shrimp, and other marine animals, as well as an insight into how research is conducted at the DISL.

Alabama Aquarium

The Alabama Aquarium, the DISL's public aquarium, was renovated to provide a fresh perspective of the Alabama Watershed. The Aquarium closed on May 8 and reopened on July 10. The renovation delivered an improved visitor experience, a refreshed interior, and a deeper connection to the research led by DISL faculty and students.

"Our goal has always been to provide an unparalleled experience that inspires visitors to care for and protect the ocean and its creatures, and we believe that the improvements we've made will help us achieve that goal," said DISL Executive Director Dr. John Valentine.

The annual visitorship for the Aquarium topped 96,000.

The Boardwalk Talk program connects Aquarium visitors to the current research happening at DISL. The talks are free and offered in-person and streamed live on the first and third Wednesdays of the month. Of the ten in-person talks, 135 visitors attended. The talks also garnered 677 views on the YouTube DISL channel. Five talks were given by DISL graduate students, three by DISL educators, one by an Auburn graduate student, and one by the outreach team of PLACE: SLR.

The Aquarium educator, Mendel Graeber, led 21 excursions with a total of 420 participants. Fourteen of the 21 excursions were open to the public with 275 attendees, while seven were for private groups with 145 attendees. Ticket sales and fees totaled approximately $8,400. The excursion opportunities include a Research Vessel Alabama Discovery trip into Mobile Bay, a visit to the salt marsh, and a walk along the beach and into the maritime forest on Dauphin Island.

The Alabama Aquarium docent/volunteer program included 54 participants offering one-on-one information for visitors. There were also 22 volunteer gardeners who helped beautify campus year-round.

Dauphin Island Sea Lab Foundation

The Dauphin Island Sea Lab Foundation provides vital support to the programs and facilities of the Sea Lab. The generosity of donors creates the best experiences for students, visitors, and educators.

Fourteen students focused on a career in marine science had a little less pressure for their summer studies with the support of scholarships funded by the DISL Foundation. A dozen students completed their degree requirements during the University Programs Summer Session. They represented the University of Alabama, Auburn University, University of Alabama at Birmingham, University of South Alabama, Troy University, Jacksonville State University, University of North Alabama, and University of West Alabama. Their scholarships covered room and board needs.

The scholarships also provided full tuition for two students to attend the DHP's Marine Science Residential High School Course. This course is the perfect stepping stone to higher learning in marine sciences. We often see many of these students return for their undergraduate and graduate studies.

Cocktails with the Critters is one of two fundraising events held during the year that help to raise funds to support scholarships, programs, and campus improvements. The 2023 event boasted the largest crowd of attendees, with more than $110,000 raised.

The 2023 Marine Environmental Awards Luncheon was also deemed a success, with keynote speaker Dr. Charlie Rolsky, who is the Director of the Science for Plastic Oceans International. Awards were also presented to John Shell and the Downtown Mobile Alliance, who have both made outstanding contributions to marine environmental sustainability in the Alabama Gulf Coast Region.

During the luncheon event, the creation of the Sessions-Brown Conservation Leadership Award was announced. The award honors Alabama Senator David Sessions and Representative Chip Brown who are champions for conservation in the Mobile-Tensaw Delta and Mobile Bay. The first recipient will be named at the 2024 Marine Environmental Awards Luncheon.

Those interested in enhancing the support of the Sea Lab can make a donation at sealabfoundation.org.

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