



ANNUAL REPORT

2018





Cover Images: Mote scientists respond to various ecological emergencies, including stranded wildlife, coral disease and red tide.

Right: Staff Technician Raymond Banister observes coral in Mote's Coral Health & Disease lab.

Photos by Conor Goulding and Miguel Montalvo / Mote Marine Laboratory.

MOTE'S MISSION

The advancement of marine and environmental sciences through scientific research, education and public outreach, leading to new discoveries, revitalization and sustainability of our oceans and greater public understanding of our marine resources.

FROM THE CHAIRMAN



Dear Friends:

It has been a great pleasure to be a part of Mote Marine Laboratory & Aquarium during one of the most exciting periods in its history.

The story of Mote Marine Laboratory, which dates back to our humble beginnings in a one-room research facility in Cape Haze, is the story of great passion, innovative partnerships and philanthropy-fueled scientific research. This *Annual Report* speaks to the most recent chapter of our story — a story that has evolved and grown but stayed true to its mission: world-class marine research and unstoppable dedication to the oceans and those who depend on them.

These commitments led us to announce the new Mote Science Education Aquarium (SEA). The new Mote SEA will be an iconic, 110,000-square-foot public aquarium along the I-75 corridor at a nexus site for Sarasota and Manatee counties and is projected to draw 700,000 visitors in its first year. In addition to increasing out-of-state tourism, Mote SEA will increase students' access to technology and marine science through strategic partnerships with area schools. Students from across the region will participate in no-cost programming in fully-equipped STEM teaching labs at Mote SEA, ensuring Florida's children are engaged with the world of marine science and helping foster the next generation of researchers and environmental stewards.

The completion of Mote SEA will pave the way for the evolution of Mote's primary research campus on City Island, Sarasota, into an International Marine Science, Technology & Innovation Park. As Mote's research programs continue to progress, more facilities and space are needed to allow Mote scientists and their partners from around the world to excel. This expansion means that the marine science and technology sector will increase its positive impact on Florida's "blue" economy.

As our scientists and aquarium biologists take up some of the world's most important and pressing challenges, know that the solutions start with your support. On behalf of Mote's Board of Trustees, I'd like to extend our sincere gratitude for joining us as we boldly seek, now and forever, to ensure *Oceans for All*.

A handwritten signature in black ink, appearing to read 'R. Essner', written in a cursive style.

Robert Essner
Chairman, Mote Marine Laboratory Board of Trustees



Dear Friends,

A common thread has been woven throughout Mote's 64-year history: world-class research for the benefit of our oceans. This past year highlighted why that thread is forever critical to our mission.

As the marine and coastal ecosystems of South Florida have been experiencing multiple environmental emergencies, Mote Marine Laboratory has been a leader on the front lines of responding with science, technology, passion and partnerships.



In 2018, an unusually intense and prolonged red tide persisted along Southwest Florida, causing heartbreaking marine-life mortalities and significant impacts to Gulf Coast economies. In October, Mote, which has led innovative red tide research for decades, announced a major step toward realizing a vision for addressing Florida red tide: a generous philanthropic investment from The Andrew and Judith Economos Charitable Foundation to establish and support the first year's operations for the Red Tide Institute at Mote Marine Laboratory. I invite you to read about the new Institute, the renowned scientist we recruited to lead it, and the outstanding red-tide-related efforts by numerous Mote staff in our "Spotlight" section of this report.

While much societal attention has rightfully focused on harmful algal blooms, an ecological catastrophe has also been unfolding on our coral reefs. A devastating epizootic event is pushing Florida's coral reefs to the brink of functional extinction. This coral disease has a mortality level exceeding 80 percent for infected corals, and it has spread like an unstoppable wildfire throughout the Florida Reef Tract. A natural recovery of the reef is highly unlikely. That means conservation strategies alone can't solve this dilemma.

A bold, science-based, coral disease response and restoration initiative is essential for the recovery of this ecosystem. Mote scientists now have the ability to "re-skin" a dead, 100-year-old coral skeleton in just two years with living tissue from native coral strains resilient to the impacts of disease, warming waters and ocean acidification. This science-based strategy is the key for restoring reefs in Florida and worldwide. As you will learn in the "Research" and "Looking Ahead" sections of this report, by year's end our response plan was poised for major steps forward.

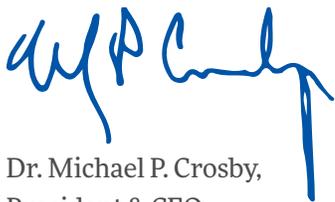
While responding to these critical issues, we also looked forward in 2018. In February, I was pleased to announce our plans for the re-birth of our Aquarium on the mainland as a spectacular new

LETTER FROM THE PRESIDENT CONTINUED...

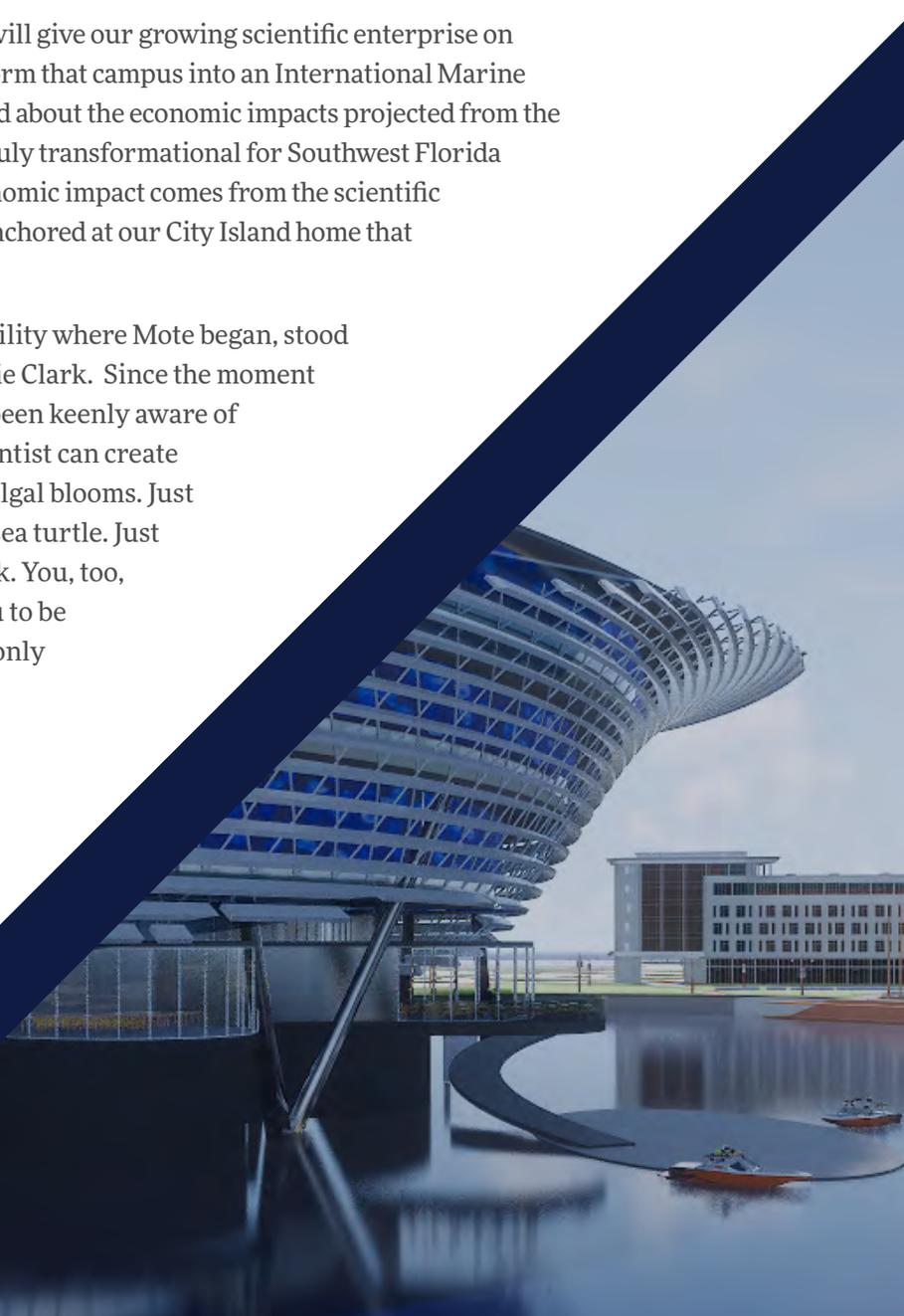
Mote Science Education Aquarium (SEA), where “Science is the Attraction.” Mote SEA will be an iconic facility with 110,000 square feet, more than 1 million gallons of exhibits featuring marine life and scientific displays from around the world, STEM teaching labs and workforce training labs, and much more, detailed in the “Translate & Transfer” section of this report. There you can discover our exciting progress to secure land for Mote SEA at a nexus site for Sarasota and Manatee counties and the broader Southwest Florida region, fueled by the very special fundraising effort whose name encapsulates our goal: *Oceans for All*.

Critically, establishing Mote SEA on the mainland will give our growing scientific enterprise on City Island, Sarasota, the necessary space to transform that campus into an International Marine Science, Technology & Innovation Park. As you read about the economic impacts projected from the creation and operation of Mote SEA – which are truly transformational for Southwest Florida – please know that the vast majority of Mote’s economic impact comes from the scientific enterprise that has been, and will continue to be, anchored at our City Island home that Mr. Bill Mote established.

Sixty-four years ago, in the one-room research facility where Mote began, stood one woman – Mote Founding Director Dr. Eugenie Clark. Since the moment she committed to lead this organization, we have been keenly aware of the impact that one person can make. Just one scientist can create innovative advances in the fight against harmful algal blooms. Just one animal care professional can save a stranded sea turtle. Just one educator can inspire the next Dr. “Genie” Clark. You, too, can create immeasurable impacts. I encourage you to be proud of your membership in our Mote family – only through your help will we ensure *Oceans for All*!



Dr. Michael P. Crosby,
President & CEO



Rendering of Mote Science Education Aquarium.

Renderings subject to change.

PHOTO BY: CONOR GOULDING / MOTE MARINE LABORATORY



Mote scientists focus on hard-hit wildlife in the wake of a record-breaking red tide event. Pictured here: Dr. Jim Locascio, Manager of Mote's Fisheries Habitat Ecology & Acoustics Research Program.

Red tide: Turning problems into progress

A major Florida red tide bloom that began in late 2017 intensified and persisted through 2018, at times stretching more than 100 miles along the state's Gulf Coast. This vast accumulation of the toxic algae species *Karenia brevis* killed countless fishes and was confirmed or suspected to have killed hundreds of sea turtles and marine mammals. It caused challenging respiratory irritation among beachgoers, driving visitors away from economies that depend on them. Throughout this ecological emergency, **Mote Marine Laboratory mounted a herculean research and response effort.**



Mote divisions and research programs involved (key on page 9)

ESSENTIAL RED TIDE INTEL

Mote and its partners at the Florida Fish and Wildlife Conservation Commission (FWC) **lead extensive red tide monitoring that protects public health and quality of life, while fueling studies of how Florida red tides work.** In 2018, they and partners statewide worked tirelessly to meet demands for data on this unforgettable bloom.

2018 RED TIDE RESPONSE AT A GLANCE

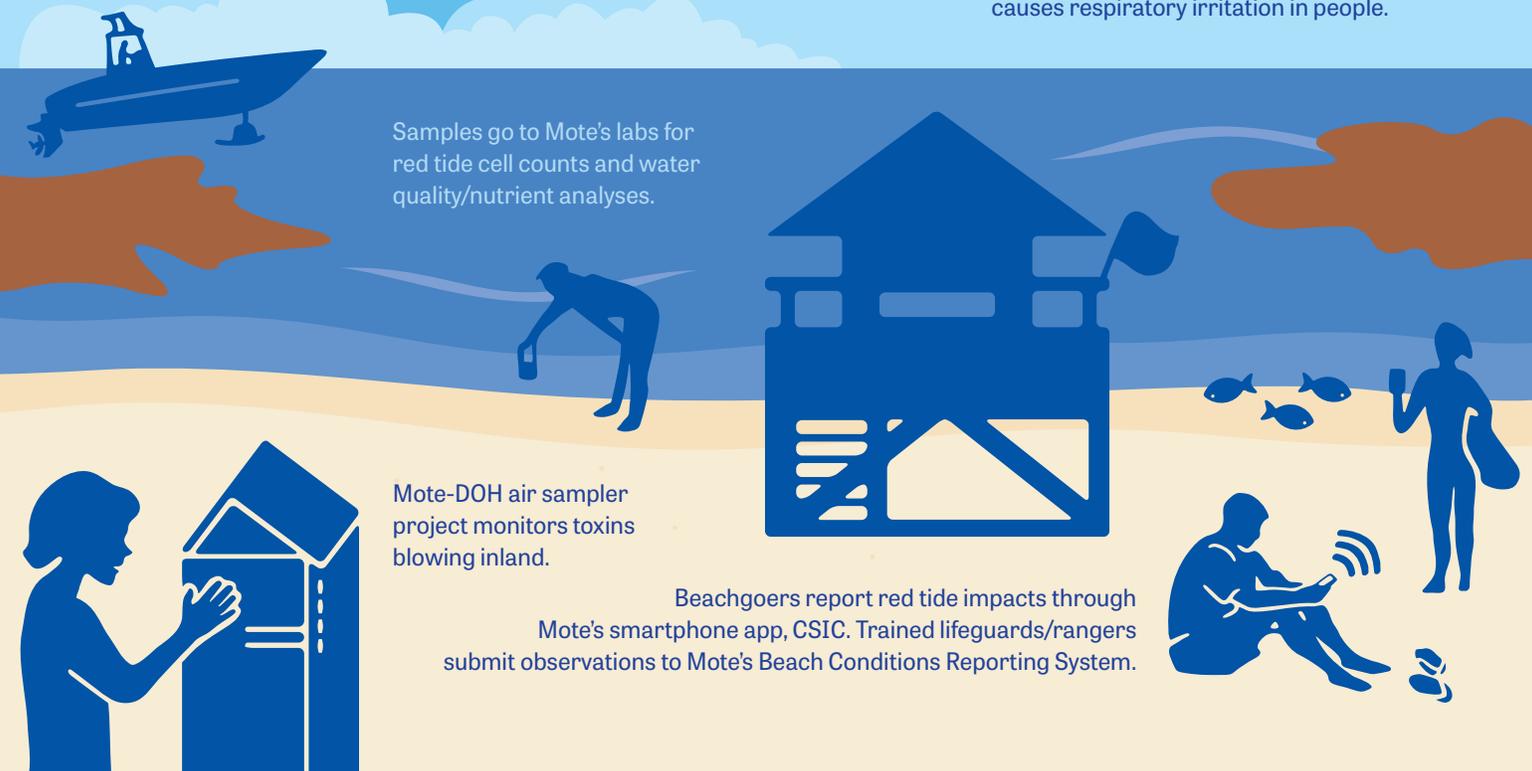
Mote-FWC boat surveys collect 516 **water samples** from Tampa Bay to San Carlos Bay. Mote and the Florida Department of Health (DOH) collect 1,600 from Sarasota County's beach and bay waters.

Florida red tide bloom discolors water, kills marine life, causes respiratory irritation in people.

Samples go to Mote's labs for red tide cell counts and water quality/nutrient analyses.

Mote-DOH air sampler project monitors toxins blowing inland.

Beachgoers report red tide impacts through Mote's smartphone app, CSIC. Trained lifeguards/rangers submit observations to Mote's Beach Conditions Reporting System.



FOCUS ON HARD-HIT WILDLIFE

Red tide demanded an intensive response to deceased and stranded sea turtles, dolphins and manatees.

Mote's Stranding Investigations Program responds 24 hours a day to sick, injured and deceased animals of these species, primarily in Sarasota and Manatee counties. Demand for their efforts shot up this year, largely due to red tide.

Number of stranding-related calls from the public to Mote:



Of the calls that required a field response, Mote staff responded to:



312 sea turtles

→ Part of Florida's largest number of stranded sea turtles attributed to a single red tide event.

29 dolphins and 4 whales

→ NOAA declared a dolphin Unusual Mortality Event



33 manatees

→ Mote assisted FWC, Florida's primary manatee responder

In September, an Unusual Mortality Event (UME) was declared by the National Oceanic and Atmospheric Administration (NOAA) for southwest Florida bottlenose dolphins, likely related to the red tide.

Mote's Stranding Investigations Program manager, Gretchen Lovewell, was designated as on-site coordinator for the federal UME investigation. Of the dolphins Mote recovered this year, 17 died due to red tide poisoning (brevetoxicosis), and more were suspected or have test results pending.

Supported by a \$428,000 NOAA grant, Mote and Florida International University scientists launched a three-year research effort ultimately geared **toward improving veterinary care for red tide-affected manatees.** This research effort is designed to investigate how cells in manatee immune systems respond to certain antioxidants, to understand if they work better than existing treatments.



Along Boca Grande, where 2018 red tide fish kills made national news, Mote scientists led by Dr. Jim Locascio conducted a rapid assessment of common snook, a popular sportfish, in August along Gasparilla and Little Gasparilla islands. Though many spawning, adult snook were killed by red tide in June and July, the scientists observed some spawning-condition snook at the study beaches when red tide cell concentrations temporarily decreased to tolerable levels, demonstrating that other adult snook re-occupy spawning grounds when conditions improve. Red tide concentrations later re-strengthened in September and caused additional fish kills at these sites. It's vital to continue studying adult snook at these sites to provide baseline information to understand future impacts and recovery, and to continue studies of fisheries enhancement strategies to aid recovery.

BATTLING BLOOMS: THE NEW RED TIDE INSTITUTE

This year's red tide drove home a key lesson: Studying blooms is not enough; science must be applied to decrease their impacts. In that spirit, the **Red Tide Institute at Mote Marine Laboratory** launched in **October 2018 thanks to a \$1-million philanthropic investment from its Founding Donor, the Andrew and Judith Economos Charitable Foundation.**

The Institute is dedicated to finding the best red tide mitigation tools, expediting the effort to test them and selecting the most promising candidates that fight the algae, its toxins and their impacts.

Mote leaders announced that, in January 2019, the Lab would **welcome Red Tide Institute Director Dr. Cynthia Heil**, who has decades of harmful algal bloom research experience.

Leading up to the Institute's establishment, Mote's long-standing focus on science-based, red tide mitigation has included studies of: a new clay formula for red tide mitigation, in collaboration with Woods Hole Oceanographic Institution and other partners; "living dock" structures with filter-feeding animals to remove

red tide from limited areas; compounds from certain macro-algae (seaweeds) that can kill red tide in the lab; and algae called *Amoebophrya* that have potential as a natural control parasite for Florida red tide algae.

This summer, Mote advanced research on its **patented ozone system for removing Florida red tide and its toxins** from limited-flow areas such as canals and small embayments. The system successfully purifies water entering Mote's Aquarium and animal hospitals. Mote scientists demonstrated its success with red tide seawater in a 25,000-gallon pool, and most recently, Mote conducted a pilot-scale field test in a Boca Grande canal, supported by community giving through **Mote's Boca Grande Initiative**. The system functioned effectively, providing proof of concept. Results also show the need for **a larger-scale ozone system for canal settings** because the re-oxygenated water was rapidly "used up" by sediments and red tide induced decomposing matter. Mote scientists look forward to working with qualified businesses seeking to apply the technology to future red tide events.

Below: Mote scientists field test their patented ozonation method for mitigating Florida red tide in the closed end of a canal in Boca Grande. The method uses ozone to destroy *Karenia brevis* and its toxins inside a special system that releases no ozone into the environment and restores oxygen that is often deficient in Florida red tide areas.



RESEARCH DIVISION PROGRAMS

- Benthic Ecology 
- Chemical & Physical Ecology 
- Coral Health & Disease 
- Coral Reef Ecology & Microbiology 
- Coral Reef Monitoring & Assessment 
- Coral Reef Restoration 
- Dolphin Research 
- Ecotoxicology 
- Environmental Laboratory for Forensics 
- Environmental Health 
- Fisheries Ecology & Enhancement 
- Fisheries Habitat Ecology & Acoustics 
- Manatee Research 
- Marine & Freshwater Aquaculture Research 
- Marine Biomedical Research 
- Marine Immunology 
- Ocean Acidification 
- Ocean Technology 
- Phytoplankton Ecology 
- Sea Turtle Conservation & Research 
- Sharks & Rays Conservation Research 
- Stranding Investigations 

MOTE BY THE NUMBERS

- 231 total staff
- 88 research staff
- 37 doctoral-level scientists
- 22 research programs
- 26 partnerships
- 14 patents, 2 pending

OTHER DIVISIONS & PROGRAMS

- Education, Aquarium & Outreach 
- Mote Animal Hospitals 

PHOTO BY: CONOR GOULDING / MOTE MARINE LABORATORY

World-class research at Mote Marine Laboratory

Coral reefs: Countering a crisis

 The planet's **coral reefs support more than 25 percent of marine life** and provide ecosystem services valued **over \$100 billion**, but they have declined at alarming rates due to climate change, disease outbreaks, pollution and other increasing stressors.

 In 2018, Mote scientists advanced critical efforts to understand and address these challenges, focusing strongly on the unprecedented disease outbreak killing large, slow-growing corals on 96,000 acres of the Florida Reef Tract: **stony coral tissue loss disease**.

AMID THE DISEASE, A BEACON OF HOPE

While Florida's coral reefs are unlikely to recover naturally from tissue loss disease, Mote scientists are pursuing a bold and innovative response strategy: **restoring depleted reefs with resilient genetic varieties of coral**.

Scientists at Mote's Elizabeth Moore International Center for Coral Reef Research & Restoration (IC2R3) on Summerland Key, Florida, are on the **front lines of the disease response**. Mote is co-leading a **Restoration Trials Team** with the Florida Department of Environmental Protection

Stony coral fragments grow in Mote's land-based nursery at IC2R3 on Summerland Key, Florida.



to determine best practices and impacts of planting nursery-grown corals for science-based reef restoration. One key goal: benefiting the Florida Reef Tract without unintended side effects such as increasing the spread of tissue loss disease. The team is also working to develop research questions and weave disease research into coordinated, coral restoration efforts by multiple institutions.

Mote's preliminary laboratory experiments suggest the massive coral species genotypes that Mote has been restoring and will restore may be relatively resilient to waterborne disease exposure, which appears to be the primary way the disease has spread throughout the Florida Keys. Additionally, complete genetic resistance to the current disease outbreak is likely for some of the hundreds of genetic strains Mote uses in restoration, and Mote scientists have been working to test that prediction.

CORAL REEF RESEARCH FRONTIERS

Mote scientists **broadened the horizons of coral reef research** in 2018, publishing multiple peer-reviewed studies on diverse reef species, issues and locales.

A research paper published in May by scientists from Florida Institute of Technology, Mote and partners reported that the progression of **Caribbean yellow-band disease — a widespread killer of reef-building corals — can be significantly impeded** by chiseling a “firebreak” around the diseased coral tissue, but more research is needed to maintain the firebreak long-term.

On May 30, Mote announced a new published study examining **how a Red Sea coral species responds to stress**, both global (the climate change impacts of ocean acidification and elevated temperature) and local (nutrient pollution). The coral species, *Stylophora pistillata*, was resistant to the global climate change stressors alone, but it lost some of that resistance once the pollution was added. Mote scientists worked with study partners from Bar-Ilan University and the Interuniversity

Institute for Marine Science in Israel, along with the University of South Carolina Beaufort and University of Mississippi.

In September, Mote and Penn State scientists announced their new published study suggesting that a threatened Florida and Caribbean species called **staghorn coral was likelier to die from white-band disease if it was already bleaching due to elevated temperatures**. The team also found that two coral genotypes (genetic varieties) resisted the disease even while bleached. Study authors emphasized that **it's crucial to preserve coral genetic diversity including resilient genotypes** that can help coral populations survive amid Earth's changing climate.

Mote Postdoctoral Research Fellows advanced studies of ocean acidification (OA) – decreasing seawater pH owing to human-contributed carbon dioxide entering the ocean – with a month-long experiment studying OA effects on interactions between corals, macroalgae (seaweeds) and sponges. Results provided limited support for the hypothesis that **OA may facilitate shifts towards increased sponge and macroalgae abundance on reefs**.

Mote research in 2018 also strengthened the concept that **seagrasses could help protect nearby coral reefs from OA**. Mote scientists tested the impacts of the presence of two seagrass species on carbonate chemistry and health of staghorn coral, finger coral and mustard hill coral in OA scenarios with present day conditions and conditions expected this century. Physiological responses varied among coral species; however, coral growth and the photosynthesis rates of their zooxanthellae (the algae living in coral tissues that provide much of their nutrition) were generally higher in the presence of seagrass – suggesting the seagrass may buffer against negative effects from OA.

In 2018, Mote staff **rebuilt and doubled the capacity of their OA research system in the Florida Keys**, enhancing it with finer-scale controls of experimental conditions, after Hurricane Irma destroyed the previous OA system in September 2017.



Sportfishes to seafood: Sustaining marine resources



The “**fishing capital of the world**” is Mote's home state, Florida, where saltwater recreational fishing has an \$8-billion impact. Florida's commercial fisheries support 92,858 jobs, with the highest value catches including stone crabs and spiny lobster.



However, fisheries regionally and worldwide are challenged increasingly by human impacts including habitat loss, overfishing, pollution, climate change and more. In the Gulf of Mexico, Florida red tide wiped out hundreds of thousands of fish in 2018. This year Mote led **multiple studies designed to inform sustainable fisheries management and improve methods for restocking after environmental disturbances**. Simultaneously, Mote's research on **environmentally sound methods of farming marine fish and plants** advanced to provide the technology for restocking as well as expand local seafood production. Close to 91 percent of U.S. seafood is imported and over half of that comes from aquaculture (fish farming) outside the U.S.; this percentage will certainly grow over the next 10 years. However, Mote science is poised to help launch new sustainable aquaculture efforts in the U.S.

CRUCIAL CRUSTACEANS

The **stone crab fishery, centered along west Florida, was valued at \$31.3 million** in the 2016-17 season, but since 2000 the average annual commercial harvest has declined by about 25 percent. Dr. Phil Gravinese is investigating multiple potential contributors to

A Florida stone crab.



the decline. Research published by Mote and FWC scientists in 2018 showed that **Florida red tide algae toxins can stress and even kill sublegal stone crabs** – young adults whose claws are growing toward legal harvest size. Mote research continues focusing on red tide-related stress and mortality throughout the crabs' life cycle. This year, other published Mote research provided the **first evidence that stone crab embryos develop more slowly and fewer eggs hatch in controlled lab systems mimicking ocean acidification.**

Caribbean spiny lobsters – one of the highest-value fisheries in their region – were in the science spotlight this year. **Mote Postdoctoral Research Fellow Dr. Abigail Clark announced a new diagnostic test for a virus that can sicken or kill young Caribbean spiny lobsters.** The test detects the virus, known as *PaV1*, with greater sensitivity than previous methods and can measure the virus' abundance to investigate disease severity and spread, report study partners from Mote, University of Florida and Virginia Institute of Marine Science. In another project, Mote's Dr. Robert Nowicki and the Dutch Elasmobranch Society have been **investigating how to keep nurse sharks from getting stuck in spiny lobster traps, to benefit both species and the lobster fishery.** The Saba bank in the Dutch Caribbean is a shark sanctuary, but the area's lobster fishery inadvertently catches many nurse sharks, which can damage or consume lobsters and reduce fishery efficiency.

A juvenile spiny lobster.



Mote scientists release hatchery-raised juvenile snook into Phillippi Creek.

SNOOK SENDOFF

In total in 2018, **Mote scientists released 5,465 hatchery-reared, common snook – their largest number in a single year since 2004** – into Phillippi Creek and North Creek in Sarasota County after tagging them with passive integrated transponders (microchip tags) that are detected when the snook swim near antenna arrays on shore. Releases help researchers understand the habitat preferences of snook – a popular Florida sportfish and model species for fisheries enhancement research at Mote. **Results inform efforts to provide fish-friendly shorelines and also help Mote improve methods for responsible, effective fisheries enhancement,** an important tool to help fish populations recover from disturbances such as red tides and cold snaps. (Read about the related, Adopt-a-Snook program on page 22.)

(AQUA)CULTURE OF SUSTAINABILITY

This year, Dr. Kevan Main and colleagues at Mote Aquaculture Research Park in Sarasota County advanced studies with their **sustainable, prototype aquaponics greenhouse,** which raises edible sea purslane in high-nutrient, part-salt water together with the popular sportfish red drum, or redfish. **The greenhouse's self-contained circulation and filtration system recycles 100 percent of its water,** and its operations were described in a peer-reviewed study published this year. Mote scientists note that, **with the planet's limited freshwater resources, one of the only ways to expand food production is through seafood and sea vegetable production,** and

it's important to find the best candidate species and develop efficient, eco-friendly systems. In 2018, Mote partnered with the National Center for Mariculture in Eilat, Israel, to test a new way to remove nutrients and clean the water in their aquaponics system: plant-based biofilters comprising nets covered with “periphyton” – various algae and bacteria. If successful, the **periphyton may have potential to be “recycled” as food for the fish – another plus for sustainability.**

Many fish farms use commercial feeds containing wild-caught sources of “fish meal,” but many wild fish sources have plateaued or declined. **Aquaculture diets are projected to rely increasingly on alternative feeds**, including plant-based foods and waste from fish-processing operations, notes the U.N. Food and Agriculture Organization’s 2018 report “The State of World Fisheries and Aquaculture.” In 2018, Mote scientists advanced their research on a related concept: **turning excess mullet from a southwest Florida fishery into food for fish farms.** To help Mote begin its second phase of the study, the **Chiles Restaurant Group, together with fishermen from Cortez, procured and donated 600 pounds of frozen mullet**, which was used to produce feeds for experimental diet trials with marine fish.

Sea purslane.



Conservation quest: Studying vulnerable marine species

     Sharks and rays, sea turtles, marine mammals and other marine animals play important roles in their ecosystems, serve as indicators of environmental change, strengthen economies through ecotourism, and in the case of some shark and ray species, support important fisheries.

  However, each group faces global, existential challenges. **As many as one-quarter of shark and ray species are estimated to be threatened with extinction**, while the conservation status of nearly half is poorly known. **All seven sea turtle species are considered threatened or endangered**, and Florida’s famous marine mammals, **West Indian manatees, are threatened.**

In 2018, Mote scientists and partners advanced their decades-long research programs to inform conservation for each of these vulnerable groups.

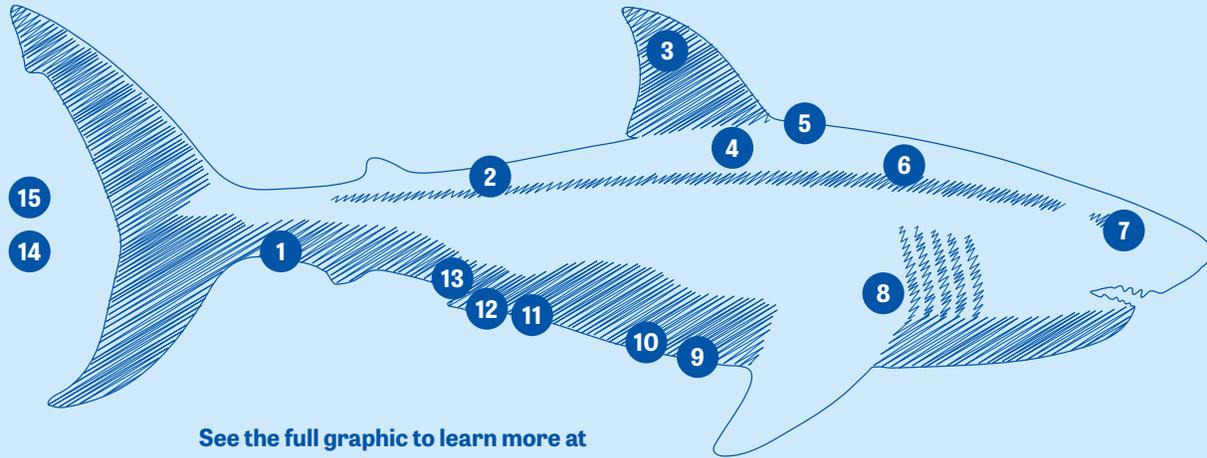
SHARKS: CARIBBEAN TO CANADA

Many shark species migrate locally to internationally. Tracking their movement is essential for conservation. In March, Mote scientists and their Cuban colleagues celebrated their newly published study **tracking the movement of three silky sharks** with satellite-linked tags off Cuba’s Caribbean coast. The tracks are the **result of the first expedition to satellite-tag sharks in Cuban waters**, which took place in 2015 in accordance with Cuba’s National Plan of Action for Sharks, also announced that year. The tracked sharks made movements away from the inshore reef area where they were tagged, one diving as deep as 2,073 feet. These animals were not confined to the reef areas where eco-tours tend to attract sharks with food, suggesting they didn’t depend on diving charters and were likely foraging in a natural way beyond that area.

In June, **Mote scientists satellite-tagged two whale sharks – Earth’s largest fish species –** in the Gulf of Mexico. Near the end of 2018, their tags “popped up” and scientists began analyzing the data to track

How scientists sample and tag a shark aboard OCEARCH ship

- | | | | |
|------------------------|-----------------------|------------------------------|--------------------------|
| 1. Blood sampling | 5. Girth measurement | 9. Acoustic tagging | 12. Fin clip |
| 2. Parasite collection | 6. Muscle biopsy | 10. Ultrasound (if female) | 13. Fecal sampling |
| 3. SPOT tagging | 7. Eye measurement | 11. Semen sampling (if male) | 14. Length measurements |
| 4. Pop-up tagging | 8. Microbiology swabs | | 15. Weight determination |



SOURCE: OCEARCH; GRAPHIC BY: ALEXIS BALINSKI / MOTE MARINE LABORATORY

When a shark is caught, examined and released during an OCEARCH expedition, scientists take samples for multiple research projects and attach one or more electronic tracking tags to the shark. Many samples are taken at once, and the whole process takes less than 20 minutes.

the sharks' migrations. Also in June, **Mote scientists placed tracking tags onto their sixth manta ray in partnership with the Atlantis, Paradise Island resort in The Bahamas.**

From Sept. 18-Oct. 12, **seven great white sharks** were caught, sampled, measured and released – six with location-tracking satellite tags – during OCEARCH's Expedition Nova Scotia with Expedition Chief Scientist Dr. Bob Hueter, Senior Scientist at Mote. **The team discovered an exciting concentration of white sharks south of Lunenburg,** and the expedition supported the work of **25 scientists from 18 institutions.**

NEW WINDOW ON SEA TURTLE MIGRATION

Sea turtles can migrate hundreds of miles between nesting beaches, where females come ashore, and their feeding grounds at sea. Their lives in the ocean remain largely mysterious, especially for male sea turtles that never come to shore unless sick or injured. Understanding their journeys is essential for conservation.

Mote scientists have tagged sea turtles with satellite transmitters since 2005, and **this year Mote launched a new sea turtle tracking page (mote.org/seaturtletracking).**

The first group featured on the page included seven turtles tagged from June through September 2018

Mote staff tag Intrepid, a loggerhead sea turtle, with a satellite tag before releasing him off Lido Key beach in July.



(six rehabilitated male loggerhead turtles and one nesting green sea turtle). By mid-January 2019, **those seven turtles had traveled a cumulative distance of 7,024 miles (11,304 kilometers), about one-quarter of the Earth's circumference!** At that time, four of their tags continued transmitting. The male loggerhead turtles spent their time near their tagging location, southwest Florida, and their tracking – during a time when Florida red tide was present in some areas – **may help scientists better understand whether sea turtles avoid red tide.** The female green turtle departed her nesting beach and followed a path that approached western Cuba and Mexico's Yucatan Peninsula.

MARINE MAMMALS: MEANINGFUL METRICS

Mote's resident manatees, Hugh and Buffett, put their extensive training to great use in spring 2018. In a project by Mote and University of California, Santa Cruz, the manatees swam against the current in an Endless Pool water flume – the same kind of swimmer's treadmill used by human athletes – for the **first study of energetic costs in continuously swimming manatees.** Results could enhance the care of rescued manatees in rehabilitation facilities. By knowing how much energy a healthy manatee burns, scientists can better understand the caloric intake needed for an animal of a given size.

Hugh and Buffett participate voluntarily in research through training based on positive-reinforcement: food rewards. Their participation allowed for a peer-reviewed study published this year, focused on **detecting temperature changes that can impact manatees' health and survival.** The study's first author is Mote Postdoctoral Research Fellow Dr. Nicola Erdsack whose work is supported by the German Research Foundation, and co-authors hailed from the University of Wales, Bangor, University of North Carolina, Wilmington, and FWC.

Long-lived bowhead whales were the focus of another science success in 2018. Their lifespans are estimated to approach 200 years, and measuring their age is important for conservation, but even the best age estimates aren't precise for all animals in a



Mote's resident manatees, Hugh and Buffett, swim against a current in an Endless Pool water flume to establish baseline data that is useful for wild manatee rescue, rehabilitation and research. Study done under USFWS permit MA770191-5.

population. **This year, Mote scientists announced the most precise, population-wide age estimation method to date for this species,** described in a research paper by Mote, the University of Queensland, Givens Statistical Solutions, LLC, the University of South Florida, and the Department of Wildlife Management at North Slope Borough in Barrow, Alaska.

The Sarasota Dolphin Research Program (SDRP, a Mote collaboration with a Chicago Zoological Society program), documented **11 new calves accompanying Sarasota Bay resident bottlenose dolphin females in 2018, with seven still alive** at year's end. **Severe red tide** reached Sarasota Bay in August and continued, **causing abundance of primary dolphin prey fish to decline more than 90 percent** in September-November compared with June-July, SDRP surveys found. The Sarasota resident dolphins have redistributed within their community range in response to the red tide, appearing a bit further offshore and further up rivers and creeks than usual. In June, SDRP completed a five-day, dolphin health assessment project in Sarasota Bay. This year, a new component involved testing and refining cardiac assessment techniques and developing baseline information for application in subsequent, comparative dolphin health assessments in Louisiana and Alabama – where dolphin populations were affected by the *Deepwater Horizon* oil spill.



Mote scientists and partners tag various species with acoustic tags that will allow the animals to be tracked by scientists in Sarasota Bay as part of the SCAN project.

A map of the SCAN receivers and land-based acoustic stations around Sarasota Bay.

MULTIPLE SPECIES, ONE NETWORK

In 2018, Mote scientists and partners announced some of the first results from the **Sarasota Coast Acoustic Network (SCAN) that monitors rays, sharks, dolphins, and sportfishes** prized by anglers – animals that spend part or all of their lives in Sarasota Bay, its creeks, or the passes connecting these inshore areas to neighboring Gulf of Mexico waters.

SCAN was established in 2015 by scientists from Mote, the SDRP, New College of Florida, Florida Atlantic University at Harbor Branch and Loggerhead Instruments. Its two primary components are tracking tagged animals, including spotted eagle

rays, multiple shark species and other fishes, and listening for environmental sounds, including those produced by bottlenose dolphins and fishes. SCAN shed some light on **animals' behavior during recent blooms of Florida red tide**. For instance, in 2016 a red tide bloom coincided with interesting behavior among Mote-tagged spotted eagle rays, which normally leave the area for the winter. In October 2016, some tagged rays lingered along Sarasota Bay, but **the rays left right when red tide arrived**. Scientists had suspected the rays have the ability to move away from red tide, and these new data raised the question of whether the bloom sped up their departure to their winter habitat. SDRP's and Loggerhead Instruments' listening stations have shown one impact of the 2018 red tide bloom – decreased sounds from fishes and boats traffic.



Mote Senior Scientist Jim Culter dives to the mouth of a blue hole off the coast of Florida.



New horizons



In 2018, Mote scientists and their partners continued to push the frontiers of marine research, undertaking deep dives and asking deeper questions.



'HOLE' NEW LOOK AT OFFSHORE FRONTIERS

Mote and partners initiated a new study in the Gulf of Mexico focused on some of **the deepest sites divers can access without piloting submersibles – two offshore structures called blue holes** – which the scientists will explore in new detail by deploying a “benthic lander” that, to the untrained eye, looks suited for sampling on a distant planet.

Study partners from Mote, Florida Atlantic University's Harbor Branch Oceanographic Institute, Georgia Institute of Technology and the U.S. Geological Survey will build upon Mote's earlier pioneering surveys of Florida's blue holes and ask exciting new questions.

They will: survey the life in blue holes in more detail, with a new focus on their mysterious microscopic organisms; explore the potential for blue holes' connection to the Florida Aquifer; expand knowledge of how blue holes – which are numerous in the Gulf – influence carbon cycles; and more. Earth's carbon cycles, including the “greenhouse” gas carbon dioxide, must be deciphered to understand and forecast large-scale processes including climate change.

POTENTIAL *DEEPWATER HORIZON* OIL SPILL IMPACTS ON FLOUNDER

In a 2018 laboratory study, **Mote scientists Drs. Dana Wetzel and Kevan Main found that southern flounder exposed to oiled sediment for 30 days showed evidence of stress and damage to cellular DNA.** Even though fish have natural biochemical defenses to cope with harmful chemicals, they could not ameliorate all of the “oxidative stress” (a potentially damaging impact) from this exposure. The scientists exposed the flounder to 3 grams of *Deepwater Horizon* oil per kilogram of sediment, a concentration that could be observed in coastal areas of the Gulf of Mexico affected by the 2010 *Deepwater Horizon* spill.

This is one of several oil-exposure studies in a series conducted by Mote scientists, who are leading the toxicology task group within the C-IMAGE research entity focused on *Deepwater Horizon*.

Mote is expanding knowledge on native, Gulf of Mexico fishes using a unique, adult-marine-fish exposure-research system at Mote Aquaculture Research Park in Sarasota County, Florida. These studies are helping to rigorously document specific ways that oil and dispersant can affect southern flounder, red drum and Florida pompano, focusing on DNA integrity, oxidative stress, immune and reproductive health, viability of offspring and other traits important for maintaining fish populations.

Mote scientists measured the impacts of a 30-day oil exposure on key biochemical processes in the exposed flounders' blood and specific tissues, compared with those of unexposed flounder. In exposed flounder they found disturbances in the

balance between harmful chemical species called “reactive oxygen species” and defense mechanisms against them, including the natural antioxidant glutathione. The glutathione defense mechanism appeared to be less able to respond adequately to the impacts of oxidative stress – resulting in measurable levels of DNA damage and lipid peroxidation. These responses do not mean that a fish will be sick, but they increase the risk of health issues. Using these lab results to make inferences about wild fish is a complex challenge, dependent on continued and consistent research efforts including C-IMAGE.

At press time, Mote’s research had been presented at the 2019 Gulf of Mexico Oil Spill & Ecosystem Science Conference and was in preparation for submission to a peer-reviewed journal.

All-around impact

Mote Marine Laboratory shares its research with the world through its public Mote Aquarium, which holds a prestigious accreditation from the Association of Zoos & Aquariums (AZA). This year, Mote achieved another exciting honor within the AZA community.

Of 228 AZA-accredited zoos and aquariums, **Mote produces the most research of any nonprofit and ranks No. 2 overall**, reported a study published online in the journal *FACETS* during spring 2018. The study revealed the productivity of AZA members using scientific publications indexed in the Thomson Reuters ISI Web of Science database from 1993 to 2013 (inclusive). This special honor confirms what Mote scientists, Aquarium biologists and educators know: World-class marine research is, and forever will be, the heart of Mote’s mission.

Staff Recruitment & Nurturing

Mote Postdoctoral Research Fellowship

These two-year fellowships are funded entirely by donations and provide 100-percent salary support, research start-up, supplies, equipment and mentorship to postdoctoral scientists conducting outstanding work early in their careers.

2018 Fellows

Dr. Philip Gravinese
Dr. Robert Nowicki
Dr. Heather Page
Dr. Ryan Schloesser
Dr. Andrea Tarnecki

Mote Eminent Scholar Awards

This award is funded entirely by donations and provides 50-percent salary support to Mote Senior Scientists who can use the funding to advance a current research initiative or develop a new one consistent with Mote's *2020 Vision & Strategic Plan*.

2018 Eminent Scholar

Dr. Dana Wetzel

Mote Scholarly and Service Activities

This award is funded entirely by donations and provides 25-percent salary support for scientists to conduct scholarly and service activities that reinvigorate their research and allow them to give back to the community.

2018 Scholars

Dr. Nathan Brennan
Dr. Tracy Fanara
Dr. Emily Hall
Dr. Robert Hueter
Dr. James Locascio
Dr. Vince Lovko
Dr. Kevan Main
Dr. Erinn Muller
Dr. David Vaughan

EDUCATION PROGRAMS

- Adult learning programs
- Afterschool programs
- Aquarium experiences
- Birthday parties
- Boy & Girl Scout programs
- Breakfast programs
- Spring Break, Summer Break and Winter Break camps
- College internships
- Digital Learning program
- Field trips
- Fishing clinics
- Florida Master Naturalist courses
- High school internships and volunteer program
- Homeschool programs
- Interpretive Bay walks & talks
- Kayaking programs
- Preschool programs
- Science Cafés
- Outreach programs
- Overnight programs
- Research Experiences for Undergraduates
- School classroom kits
- School partnerships
- Special Lecture Series
- Special needs programming
- Teacher professional development
- Volunteer opportunities
- Youth Ocean Conservation Summit
- Youth clubs

MOTE BY THE NUMBERS

- 21 total Education staff
- 53 total Aquarium staff
- 1 doctoral-level Aquarium staff member
- 345,987 Aquarium visitors
- 49 Education programs
- 28,424 Education program participants served
- 210 undergraduate interns hosted
- 69 high school interns hosted
- 52 sea turtles, 3 whales and 1 dolphin cared for in animal hospitals

Translate and transfer scientific knowledge to the public

Exceeding Aquarium expectations

 The public Mote Aquarium has translated Mote Marine Laboratory's research for people of all ages since 1980. This year the Aquarium and its staff proved outstanding in their field and prepared for an exciting new chapter.

AQUARIUM REBIRTH TO ENSURE 'OCEANS FOR ALL'

On Feb. 8, 2018, Mote announced its vision for a spectacular new Aquarium on mainland Sarasota County, Florida. **Mote Science Education Aquarium (Mote SEA)** will be an iconic, educational and outreach hub **designed to vastly improve public access to marine science and technology** for an estimated three million residents living within a 60-minute drive and visitors from around the world. This rebirth of the current Mote Aquarium **will clear space for scientific research to expand at Mote Marine Laboratory** on City Island, Sarasota, which will evolve into an **International Marine Science, Technology & Innovation Park**.

Mote leaders plan to establish Mote SEA on 12 acres of the Sarasota County-owned land in Nathan Benderson Park, within a rapidly growing nexus location for Sarasota and Manatee counties and the Southwest Florida region. Powering this major advance is Mote's \$130-million capital construction fundraising effort, ***Oceans for All: Improving Access to Marine Science & Technology***, focusing on philanthropic, public and corporate giving. By the end of 2018, philanthropic donors alone had already pledged or donated close to \$30 million, and eight had joined Mote's exclusive group of **SEA Explorers**, visionary philanthropic leaders who have each pledged \$250,000 or more.

Following many productive discussions between Mote and community leaders, the **Sarasota County Commission unanimously approved an initial term sheet for Mote's use of the desired land** on Oct. 24, 2018, setting the stage for Mote and the county to formalize a lease and long-term, land-use agreement in 2019 and begin construction at the end of 2019 or beginning of 2020.



Mote SEA will:

- Feature 110,000 square feet of space and 1 million gallons of exhibit water, **more than doubling the size of Mote Aquarium on City Island;**
- Educate and inspire close to **700,000 visitors** in its opening year;
- Expand the ability to feature marine animals and scientific displays from **around the world;**
- Provide roughly **68,000 K-12 students with no-cost programming** in fully-equipped STEM teaching labs;
- Expand **research and workforce training opportunities** for high schoolers and undergraduates... and more!



Mote's Amanda Hodo (yellow dress) stands with the three other winners of the "Find Your Heroes" video contest and their hosts at the AZA Annual Conference; Hodo works with seahorses and other species at Mote Aquarium.

MOTE AQUARIUM SHINES

In 2018, **Mote was accredited by the Association of Zoos & Aquariums**, a prestigious honor signifying that Mote is committed to meeting the very highest standards in the zoological profession, serving as a leader in animal care and visitor education. Mote has successfully received accreditation for every five-year AZA review period since 2003.

Mote's success depends on its amazing staff. This year **Mote Aquarium Biologist Amanda Hodo was one of four winners, among 95 contestants, in the "Find Your Heroes" video contest** hosted by AZA and judged in part by Mutual of Omaha's Wild Kingdom host Stephanie Arne. Hodo is committed to quality animal care and conservation, participating in the lined seahorse Species Survival Plan and raising other species in Mote Aquarium. She also works hard to encourage increasing diversity in scientific fields.



Benefiting sea life and society



Mote scientists believe that **our research must serve the oceans and societies that depend upon them**. This year, Mote realized that commitment through multiple efforts to translate and transfer its knowledge. Below are just a few examples.



SERVING THOSE AFFECTED BY RED TIDE

During the red tide bloom that began in 2017 and continued through 2018 in the Gulf of Mexico, **Mote's online Beach Conditions Reporting System was in high demand**. More than 946,000 unique users visited the site (visitbeaches.org) more than 3.16 million times for daily Gulf Coast beach observations by Mote-trained volunteers, including red tide-related respiratory irritation and fish kills. One of Mote's newest tools for the public, the free smartphone app known as **CSIC, or Citizen Science Information Collaboration**, also saw an uptick in use as iPhone and Android owners reported their respiratory irritation, observed fish kills and water discoloration during the bloom.

To help the popular sportfish common snook recover from significant red tide impacts, Mote joined with Coastal Conservation Association of Florida and the Florida Fish and Wildlife Conservation Commission to create the **Adopt-A-Snook fundraising effort to hatchery-raise and release 5,000 juvenile snook in 2019** along southwest Florida.

PROTECTING SHARKS AND RAYS BY INFORMING POLICY

Mote Senior Scientist Dr. Robert Hueter served as a scientific reviewer for the **Sustainable Shark Fisheries and Trade Act**, a bipartisan bill introduced in U.S. Congress during March 2018 that encourages a **science-based approach to significantly reduce the overfishing and unsustainable trade of sharks, rays and skates around the world and prevent shark finning**. Hueter provided feedback based on published research and his decades of experience as a shark scientist to inform policymakers who ultimately determined the content of the legislation.

The Act would require that shark, ray and skate parts and products imported into the U.S. be permitted only from countries certified by NOAA as having in place and enforcing management and conservation policies for these species comparable to the U.S., including science-based measures to prevent overfishing and provide for recovery of shark stocks.

RESTORING 11,000 CORALS... AND COUNTING!

In 2018 Mote scientists continued their **major efforts to restore depleted coral reefs** in the Florida Keys with diverse genetic varieties of nursery-raised coral, translating scientific understanding to conservation action. This year **Mote planted a total of 11,700 coral fragments!**

With permits and cooperation from the Florida Keys National Marine Sanctuary, Mote scientists **outplanted 4,505 nursery-raised coral colonies of “massive” species this year**, primarily mountainous star coral, great star coral and knobby brain coral. Those corals included 21 genetic varieties (genotypes) planted across eight sites in the Lower Florida Keys and Key West. After one month, the corals’ average survival rates were nearly 93 percent across Key West sites and 98 percent across Lower Keys sites. This year Mote scientists **outplanted 6,820 nursery-raised colonies of staghorn coral and 375 of elkhorn coral**,

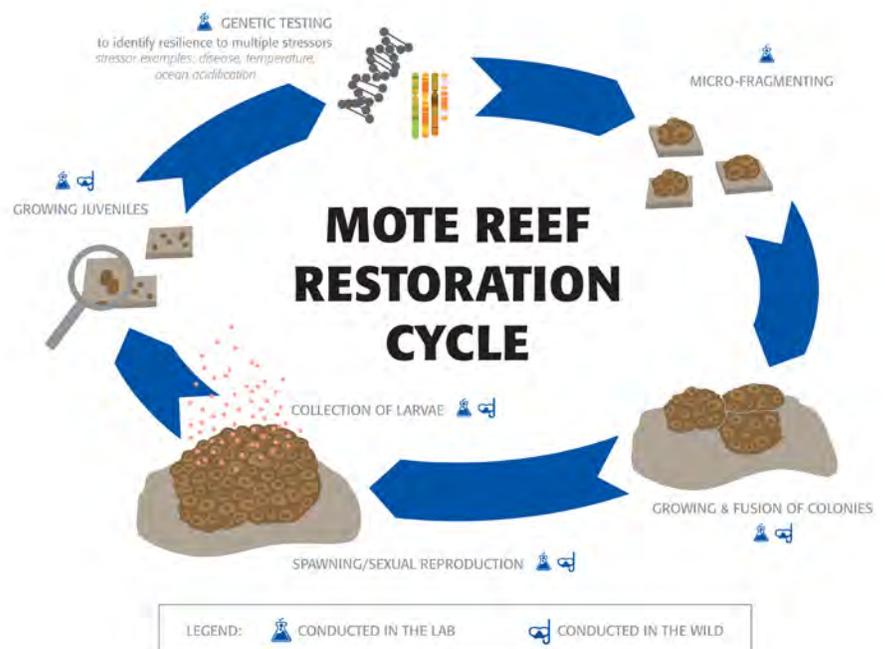
both threatened, branching coral species. Those included 28 staghorn genotypes and nine elkhorn genotypes. The staghorn corals, planted across 14 sites in the Lower Keys and Key West, had an average survival rate of nearly 85 percent after one month, while the elkhorn averaged 98 percent across its 10 sites.

Mote continues its regular monitoring of the outplanted corals to understand their survival, growth and responses to environmental stress, with some sites monitored as often as monthly.

As 2018 rolled into 2019, Mote’s Elizabeth Moore International Center for Coral Reef Research & Restoration (IC2R3) on Summerland Key geared up for another productive year of research-based restoration, with:

- 32,000 fragments of elkhorn coral, mountainous star coral, great star coral and knobby brain coral growing in 74 raceways at IC2R3’s land-based nurseries.
- 10,371 staghorn corals and 164 elkhorn corals in its underwater nurseries at Looe Key and Sand Key.

Outplanted coral; Mote’s restoration cycle.



GRAPHIC BY: ALEXIS BALINSKI / MOTE MARINE LABORATORY

Educating and inspiring the next generation



Above all, **the ocean's future depends on the next generation of marine scientists, innovators and stewards.** This year, Mote researchers shared their knowledge with bright and passionate young people, and it grew in their capable hands.

Eleven Mote scientists participated in the December **2018 Reef Futures Symposium** held in Key Largo, Florida, and **Mote sponsored the attendance of two former Mote interns with full scholarships.** Those former interns are Aneri Garg from University of Alberta and **Benjamin Young from University of Miami, who received the best student presentation award** for “Transcriptomic response to disease exposure in the threatened Caribbean branching coral, *Acropora palmata*.”

In 2017, Mote welcomed its **first recipient of the Mote-NCF Eugenie Clark Undergraduate Marine Research Fellowship: Maria Shehata, a student from Egypt** pursuing her undergraduate degree at New College of Florida (NCF). **In 2018 Shehata continued conducting coral genetics research** with her Mote mentor, Dr. Erinn Muller, Science Director for Mote's Elizabeth Moore International Center for Coral Reef Research & Restoration. Since fall semester began in 2018 **she's been working with Mote's Ocean Acidification Program**, managed by Dr. Emily Hall, on water quality sampling and analyses, as well as data downloading and data analyses with key support from Mote Trustee Penelope Kingman. Mote and NCF established the Eugenie Clark Undergraduate Marine Research Fellowship in honor of the memory of Mote's Founding Director. Additional funding for Shehata's research fellowship was provided by the **Community Foundation of Sarasota County.**

Approximately **330 juvenile snook were released by Mote scientist Dr. Ryan Schloesser and Riverview High School students** into Phillippi Creek on Dec. 7 for Mote's fisheries enhancement research. The snook were cared for by Riverview students in the school's unique partnership with Mote.



Engineering students from Booker High School collaborated with Mote to create a housing for Mote's Programmable Hyperspectral Seawater Scanner (PHYSS).

New College of Florida senior Constance “Coco” Sartor worked with Mote's Dr. Erinn Muller to study a unique batch of corals in Hurricane Hole, U.S. Virgin Islands, which were particularly resilient during a coral bleaching event caused by elevated temperatures in 2004-2005. Sartor examined which bacteria were associated with three main coral species to understand how they may relate to heat tolerance. Her undergraduate thesis results, presented in 2018, suggested that **corals that tolerate heat stress may harbor different bacteria than others,** critical information that may help scientists find or raise corals more resilient to increasing temperatures projected with climate change.

This year, **Booker High School Engineering students used the school's high-tech tools to build housings for the new red tide detectors created by Mote's Ocean Technology Program.** Booker Engineering students Victor Arismendi and Evan LeFils visited Mote scientists in March to check out the early results of their ongoing partnership – **Mote's Programmable Hyperspectral Seawater Scanner (PHYSS)** inside the student-designed housing, ready to process seawater samples and detect red tide algae.

Public Service

Informing societal leaders

 This year, **Mote scientists informed government decisions at all levels with results from decades of their independent and objective research**, from red tide response efforts to conservation of protected sea turtles and coral reefs.



RED TIDE INFORMATION CENTRAL

 Mote scientists hosted and briefed multiple federal and state elected officials serving on the front lines of the policy response to this year's intense bloom of Florida red tide. For example: **U.S. Sen. Bill Nelson** visited and toured Mote in September for a red tide news conference, and **U.S. Rep. Vern Buchanan** turned to Mote for independent, objective expertise as he championed a successful bipartisan effort for critical appropriations to NOAA's National Ocean Service to improve red tide research and mitigation efforts. Buchanan visited Mote scientists in July to discuss this important issue further.



Mote President & CEO Dr. Michael P. Crosby presented during a red tide briefing at the Capitol in Washington, D.C., discussing Mote's rapid

Congressman Vern Buchanan speaks at Mote about an appropriation that will help scientists fight red tide impacts.

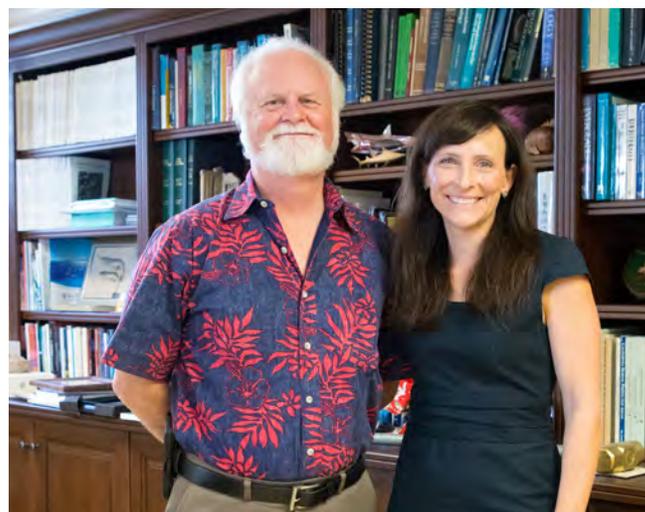


response efforts to the ongoing bloom and its strategic vision for the future of red tide research, technology development and mitigation. Ocean Conservancy and Citizens' Climate Lobby hosted the briefing, with honorary hosts U.S. senators Bill Nelson and Marco Rubio.

Florida Governor Rick Scott visited Mote in March, joining Mote President & CEO Crosby for a news conference highlighting environment-related appropriations in the state budget, including for red tide research and coral reef restoration.

Mote hosted leaders of the Florida Department of Environmental Protection (DEP), Florida Fish and Wildlife Conservation Commission (FWC), and Florida Department of Health (DOH) during a September red tide roundtable with scientists and stakeholders. There, FWC Executive Director Eric Sutton announced that the governor was directing \$2.2 million for testing cutting-edge red tide mitigation technologies, including Mote innovations such as its patented ozone system.

Florida State Representative Margaret Good visits Mote Marine Laboratory and meets with Mote President & CEO Dr. Michael P. Crosby.



A CRITICAL RESOURCE FOR GOVERNMENT LEADERS

In total during 2018, Mote scientists shared their knowledge through **more than 60 interactions with government decision-makers**, including:

U.S. SENATE: Sen. Bill Nelson (D-Florida); Sen. Marco Rubio (R-Florida); staff in the Senate Committee on Commerce, Science, and Transportation; and staff in the Senate Committee on Appropriations and its Subcommittee on Commerce, Justice, Science, and Related Agencies

U.S. HOUSE OF REPRESENTATIVES: House Resources Chairman Rob Bishop (R-Utah); Rep. Madeleine Bordallo (D-Guam); Rep. Vern Buchanan (R-Florida); Rep. Charlie Crist (D-Florida); Rep. Carlos Curbelo (R-Florida); Western Caucus Chairman Paul Gosar (R-Arizona); Resources Committee member Rep. Doug LaMalfa (R-California); Rep. Amata Radewagon (R-American Samoa); House Rules Committee Chairman Pete Sessions (R-Texas); staff in the offices of Florida Congressional delegation members including Republican Reps. Gus Bilirakis, Carlos Curbelo, Tom Rooney, Dennis Ross, Dan Webster and Ted Yoho; and staff in the House Committee on Natural Resources and its Subcommittee on Water, Power and Oceans

U.S. GOVERNMENT AGENCIES: Staff from the National Oceanic and Atmospheric Administration and the National Science Foundation.

FLORIDA EXECUTIVE OFFICE: Governor Rick Scott

FLORIDA SENATE: State Sens. Lauren Book (D-Plantation), Bill Galvano (R-Bradenton), Joe Gruters (R-Sarasota) and Greg Steube (R-Sarasota), as well as multiple legislative staff

FLORIDA HOUSE OF REPRESENTATIVES: State Reps. Ben Albritton (R-Wauchula), Jim Boyd (R-Bradenton), Julio Gonzalez (R-Venice), Margaret Good (D-Sarasota), Michael Grant (R-Port Charlotte), Kristin Jacobs (D-Coconut Creek), Wengay "Newt" Newton (D-St. Petersburg) and Holly Raschein (R-Key Largo), as well as multiple legislative staff

STATE GOVERNMENT AGENCIES: DEP Secretary Noah Valenstein, FWC Executive Director Eric Sutton, and State Surgeon General, DOH Secretary Dr. Celeste Philip and multiple staff from each agency

SARASOTA COUNTY: Commissioners Paul Caragiulo, Nancy Detert, Charles Hines, Al Maio and Mike Moran, as well as multiple county staff

MANATEE COUNTY: Commissioner Betsy Benac and County Administrator Ed Hunzeker

CITY OF SARASOTA: Commissioner Hagen Brody and City Manager Tom Barwin

Other local to state interactions included the Council of the City of Venice and legislative delegation meetings from Charlotte to Manatee counties.

SEA TURTLE NESTING NEXUS

Mote scientists and volunteers completed their **37th year of monitoring sea turtle nesting activity across 35 miles of beaches from Longboat Key through Venice, Florida**, providing critical data for Florida-wide monitoring and conservation coordinated by state wildlife officials at FWC.

This year, Mote scientists:

- Documented **3,151 sea turtle nests, their third-highest total ever**, and collected a suite of data to support local to state conservation;
- Reported that **10 percent of nests experienced hatchling disorientation – with hatchlings (babies) crawling toward artificial light** instead of the ocean – and notified the appropriate code-enforcement authorities of this ongoing challenge;
- Revealed the **amazing abilities of individual sea turtles, including one female that laid 164 eggs in one nest!** (The average was 94 per nest.)
- Monitored beaches daily throughout nesting season, May 1-Oct. 31, and for two weeks before season started in southwest Florida, **coping with intense red tide conditions**. Mote scientists on the beach served as essential “eyes and ears” to help Mote’s primary wildlife responders recover deceased and stranded sea turtles and marine mammals, and they provided hands-on assistance with several challenging responses.
- Identified 353 individual, nesting sea turtles (in 528 encounters), including 242 individuals seen and tagged for the first time. **One returning sea turtle was first observed in 1987, meaning she is at least 57 years old!**

A hatchling sea turtles crawls toward the surf.



EYES ON THE REEF

Mote monitors coral reefs in collaboration with NOAA’s Florida Keys National Marine Sanctuary, thanks to critical help from **volunteers who are often the first to report new signs of coral bleaching and other changes**.

In June-October 2018, Mote’s program **BleachWatch received 380 reports from 41 trained volunteers**, documenting the presence or absence of heat-driven coral bleaching (loss of the important algae in coral tissues). Most of this year’s reports showed mild to moderate impacts including paling and partial bleaching. **While summer’s bleaching events were largely not severe, Mote staff and volunteers continue to monitor rampant coral disease**, including the outbreak of stony coral tissue loss disease. Mote scientists review NOAA’s remote sensing data to understand the risk of potential bleaching, and in turn, provide BleachWatch reports to federal officials at NOAA to inform their management of the Florida Reef Tract.

Mote’s C-OCEAN (Community-based Observations of Coastal Ecosystems & Assessment Network) allows the public to report various changes in the Florida Keys and surrounding waters, without special training. C-OCEAN received **459 reports from 59 different observers** this year, primarily of coral bleaching and disease.

LIVING SEAWALL

Mote scientists are monitoring the new **“living seawall” that was installed by the City of Sarasota** in October along 262 feet of Bayfront Park with the goal of attracting more marine life to benefit Sarasota Bay.

The new installation presents an important opportunity for research on living seawalls, which are increasingly popular due to their purported environmental benefits. The city’s living seawall is a series of naturalistic concrete, rock and shell structures full of nooks and crannies designed to attract fish, oysters and other living things, absorb wave energy without causing erosion, and improve aesthetics.

Helping marine animals in need

Jane's Refuge: The Hospital for Dolphins & Whales at Mote Marine Laboratory, has provided thousands

 of hours of round-the-clock care for bottlenose dolphin "Salem," who stranded on Halloween 2018 near the Sunshine Skyway Bridge. **The adult, female dolphin arrived in critical condition, and Mote's excellent care has been helping her recover** from a severe infection, gastritis (stomach inflammation), a deep shark bite wound, anemia and low body weight.

By January 2019, Salem's condition had improved greatly thanks to Mote's hardworking staff and volunteers. **Volunteers alone had already dedicated 1,625 hours to her care and Salem had consumed 1,765 pounds of fish** — totals expected to keep growing as Salem progressed toward her planned day of release back to the Gulf of Mexico.

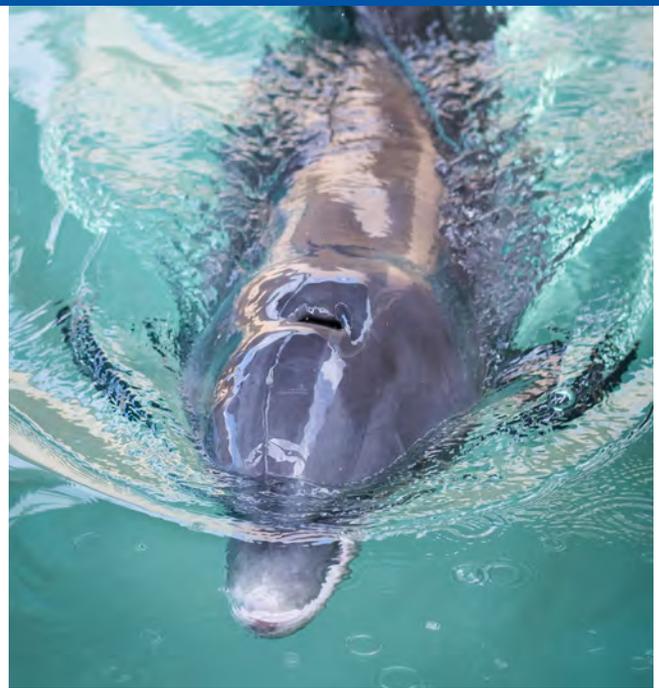
Mote also provided care for two pygmy killer whales and a melon-headed whale this year, little-understood, offshore species that arrived in very critical condition. Despite intensive care at all hours, the seriousness of the whales' illnesses ultimately required that they be humanely euthanized. **Data and preserved skeletons from the whales are helping Mote and its partners learn as much as possible about their species, to further their conservation.**

Mote's Sea Turtle Rehabilitation Hospital had a busy 2018, treating 52 patients including turtles affected by Florida red tide and male sea turtles later able to be satellite tagged to document their journeys in the ocean (see "Translate & Transfer" section of this report).

Engaging communities from Sarasota to Key West

FISHING WITH FIFTH GRADERS

 **Mote shared sustainable fishing with 88 fifth graders** from Florine J. Abel Elementary during its Teach-A-Kid Fishing & Ecology Clinic in November at Mote Aquaculture Research Park in Sarasota County, Florida. The no-cost clinic was presented by Carol



Salem the Atlantic bottlenose dolphin swims in the patient pool at Jane's Refuge: The Hospital for Dolphins and Whales.

and Barney Barnett and received generous support through a competitive grant from the Manatee Fish & Game Conservation Fund at the Manatee Community Foundation. Supporters also included Fish Florida, FWC, Willis A. Smith Construction and Gold Coast Eagle Distributing/Icelandic Glacier and several generous sponsors. Mote staff and trained volunteers engaged students in fish biology, casting, bait and tackle, ethical angler practices, sun/water safety and **fishing at Mote's pond, where many children caught their first fish.**

Dr. Nathan Brennan, Mote Staff Scientist, teaches a fifth grade student how to hold his catch at Mote's fishing clinic.





Former First Lady Laura Bush celebrates the fifth anniversary of Mote's Boca Grande Outreach Office with Mote's CEO and staff.

CELEBRATING FIVE YEARS AT MOTE'S BOCA GRANDE OUTREACH OFFICE

More than 70 people, including former First Lady Laura Bush, Mote scientists and other ocean enthusiasts, gathered on Jan. 9 under a star-filled sky to celebrate the **fifth anniversary of Mote's Boca Grande Outreach office – a regional hub of marine science outreach and education.** This office, at 480 Railroad Ave., is a focal point and resource where residents and visitors can learn more about Mote's research efforts – particularly with locally significant topics such as fisheries and red tide.

EXPANDING MOTE'S OCEAN FEST

Some 3,500 people celebrated marine ecosystems in Key West and 800 in Islamorada during Mote's Ocean Fest celebrations in 2018. This was Mote's first year featuring the new, second event in Islamorada, following eight years solely in Key West.

These free events lifted spirits and raised funds for coral reef research and restoration through family fun, music, food and educational displays highlighting the Keys' treasured marine resources. Ocean Fest highlights Mote's world-class coral reef research and restoration, which relies on philanthropic donations and funds from sales of the **Protect Our Reefs specialty license plate** (motereefplate.com).



Mote staff teach visitors how to outplant coral at the Protect Our Reefs booth at the Inaugural Islamorada Ocean Fest event.

BRINGING CORAL REEFS ASHORE IN ISLAMORADA

On Nov. 30, Mote and the Florida Keys History and Discovery Foundation unveiled the **new exhibit "Coral Reef Exploration" at the Keys History & Discovery Center in Islamorada.** It features three aquariums, interpretative displays and interactive kiosks to provide a **beautiful and educational view of the Florida Keys' unique and imperiled coral reefs.** The exhibit's largest aquarium holds 1,250 gallons and features angel fish, butterfly fish, tangs and wrasse. Guests can also discover live corals, crustaceans, reef fishes and the beautiful but invasive lionfish. The exhibit embodies a key part of Mote's vision: working with impactful partners in meaningful public outreach and education.

Mote President & CEO Dr. Michael P. Crosby and a visitor enjoy the new Mote exhibit in Islamorada.



PARTY ON THE PASS

SAIL AWAY WITH MOTE

More than 400 people attended the nautical-themed 2018 Party on the Pass on March 23, in support of Mote's Sea Turtle Rehabilitation Hospital and Jane's Refuge: The Hospital for Dolphins and Whales at Mote Marine Laboratory. The evening was full of good food provided by local restaurants, good music and good will. A silent auction was held to raise funds for the animal hospitals.



1



2



3

1. Mote Trustee Rande Ridenour and wife Betsy.

2. Mote Chief Financial Officer Dena Smith considers a handmade chest available as a silent auction item. Proceeds from the auction supported Mote's animal hospitals.

3. Greg Byrd, USCG Captain at Mote Marine Laboratory and Lynne Byrd, Mote's Rehabilitation and Medical Care Coordinator.



SAND, SWEAT & SMILES

More than 1,000 runners and walkers hit the beach to help sea turtles during Mote's 32nd Run for the Turtles on April 7 on Siesta Key Public Beach.

The Run, a joint effort between Mote, the Manasota Track Club and Sarasota County Parks and Recreation, raises funds to help Mote scientists study and protect sea turtles.



1



2

1. Volunteers teach race participants about sea turtle nests. Proceeds from the event supported Mote's Sea Turtle Conservation & Research Program.
2. Runners prepare to start the 5K race.
3. Tied 1-mile female winners, sisters Chloe (left) and Brooke Cicilioni, with Mote Mascot Shelley the Sea Turtle.



3



A COMMUNITY CELEBRATION

Mote is redoubling its efforts to restore Florida's coral reefs, so naturally, the community celebrated with double the enthusiasm during the first year of two Mote Ocean Fest events. Ocean Fest in Key West and the new Islamorada Ocean Fest drew 4,300 visitors collectively, amplifying support for Mote's world-class coral reef research and restoration and giving community members a free day of live music, marine art, educational booths, great food and family fun.



1. Musician and Event Partner Howard Livingston and the Mile Marker 24 Band provided entertainment at the 8th Annual Key West Ocean Fest event. Renowned marine artist Wyland supplied his artwork for auction to support Mote's work.

2. Shelby Luce, a Staff Biologist with Mote's Coral Reef Monitoring & Assessment Program, speaks with an event attendee about Mote's research methods.

3. Mote President & CEO Dr. Michael P. Crosby leads the auctioning of an original piece by painter Pasta Pantaleo at the Inaugural Islamorada Ocean Fest event in December.

A VISION FOR THE FUTURE

Mote's Oceanic Evening evoked a galaxy far, far away, but highlighted a future vision that is just steps from success. This annual, black-tie, fundraising gala celebrated the exciting progress toward creating Mote Science Education Aquarium (Mote SEA), honored the world-class science that will benefit from it and thanked its visionary supporters known as Mote's SEA Explorers.



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1. Mote President & CEO Dr. Michael P. Crosby with Event Chair and Mote Trustee Judy Graham.
2. Mote Board of Trustee Chairman Robert Essner speaks about Mote's vision for the future.
3. SEA Explorers Gina Benderson and Barbara Brizdle enjoy the gala.





Mote Volunteer Jim Linke teaches Aquarium visitors about conch snails.

MOTE BY THE NUMBERS

1,734 volunteers

236,214 hours volunteered

532 volunteer award recipients

30 YEARS: BERT TAYLOR started

volunteering with Mote's Sea Turtle Patrol in April 1989. As a Bradenton native who studied marine biology before earning a degree in political science, he has a lifelong interest in marine life. In Mote's Sea Turtle Patrol, which monitors 35 miles of sea turtle nesting beaches, he started his volunteer service on North Lido Key. With no cell phone, Taylor had to go to the Lido Beach pavilion pay phone to call and report his observations of turtle nesting activity to Mote staff. In 2002 he was joined by fellow volunteer June, who became his wife in 2008 and received her 15-year Mote volunteer award in 2017. Taylor has dedicated an amazing 30 years to Mote and 45 years to Asolo Repertory Theatre, where he enjoyed a productive career in sound engineering and later building scenery.

25 YEARS: MORTON KALLMAN has had an incredibly adventurous life, including living with headhunters in Western New Guinea for three months, tagging sharks off Honduras and serving as a volunteer guide at Mote Aquarium. Kallman was an educator in the New York City School System as well as at Fordham University, before retiring on Florida's

Volunteers' vital role is growing

Volunteers are essential to every aspect of Mote Marine Laboratory: marine research, education, outreach in Mote Aquarium, service on the Board of Trustees and much more.

Mote President & CEO Dr. Michael P. Crosby thanked volunteers for helping the Aquarium earn its prestigious accreditation from the Association of Zoos and Aquariums in 2018, which it has done successfully every five years since 2003. "The accreditation committees who visit Mote each time rave about our volunteers," he said.

Volunteers will have even more critical roles to play as Mote plans the rebirth of its Aquarium on mainland Sarasota County, and the subsequent expansion of research at Mote's City Island campus. "Our new Mote Science Education Aquarium will be an incredible asset that will reach far more individuals," Crosby said. "We will need every one of our volunteers engaged, whether

at the new Aquarium or here at our evolving scientific campus. Mote would not be Mote without all of you."

At press time in 2019, Mote was gearing up for the awards ceremony honoring the volunteer corps for their 2018 service, with special awards for those who have served 30 years, 25, 20, 15, 10, seven, five, three and one.

Mote President & CEO Dr. Michael P. Crosby with some recipients of the Volunteer Emeritus Award.



Volunteer spotlight

Gulf Coast. He began volunteering with Mote in 1993 and has been a Monday afternoon Aquarium guide since then. For a year-and-a-half, he was also one of the first specially trained volunteers for what is now the Sarasota Bay Explorers boat tour program. Kallman has enjoyed educating people about the great treasure of life that lies off Florida's Gulf Coast. Kallman credits the strength of his wife, Barbara, and says it's "good to be surrounded by very strong women."

25 YEARS: NICOLE MACHENHEIMER joined Mote's Sea Turtle Conservation & Research Program as an intern during summer 1994. Then she became a volunteer in Mote Aquarium, until she was hired as the first coordinator of the sea turtle exhibit and rehabilitation facility. During her time as coordinator, Machenheimer continued volunteering for the Sea Turtle Conservation & Research Program. She held the permit for Casey Key turtle surveys for a number of years. During her volunteer service, she has worked on the nighttime sea turtle tagging team and on the morning survey team.

25 YEARS: DORIS ANNE PRIEUR has volunteered all throughout Mote. She and her husband, Bob, began volunteering after he noticed an ad for volunteer opportunities in Mote's brand new Marine Mammal Center. Prieur said, "At that time, the Center was just an information display area located in the former gift shop." After becoming a volunteer, she noticed "much building and revamping of the campus" before Mote eventually welcomed its resident sea turtles and manatees. Prieur began volunteering as a guide at the Center and in her favorite role, with Mote's mobile exhibit that has traveled from Tallahassee to Key West. Her husband volunteered with her for 22 years until passing away three years ago. Prieur has also volunteered with Mote for animal care, Dr. Bob Ballard's JASON project, Mote's lecture series and special events, and as a day chair, Volunteer Board member, gift shop cashier and Sea Turtle Patrol participant.

[SEE THE LIST OF AWARD RECIPIENTS](#) ▶

2018 Volunteer Association Officers

Anna Marie Martin
President

Bruce Butterfield
Vice President

Pam Baker
Secretary

Peter Galway
Treasurer

30 years

Bert Taylor

25 years

Morton Kallman
Doris Anne Prieur
Nicole Machenheimer

20 years

Callie Desormier
The Honorable Bill Galvano**
Brenda Jameson
Alexander Klashnya
Milton Kruk
Stephanie Kruk
Betty Linke
Jim Linke
Nancy Lyon
Mary Pexa
Cathy Wilson

15 years

Betty Austin
Jean Dawson
Dr. Sylvia Earl**
Tamara Eddy
Irving Fink
Tom Fulks
Linda Katt
Terry Katt
Sandy Kellam
Peg Magee
Rick Magee

Ronald Saper
Ann Tannen
Rosemary Treonis

10 years

Carol Arscott
Kenneth Babineau
Melanie Babineau
Kim Bassett
Christy Brinton-Perz
Sherman Brown
Melanie Buckalter
James Ericson*
Barb Fulton
Maggie Gat
Dolores Giles
John Harrison
Don Hildewig
David Kaufman
Michael McCarthy
Greg Nelson
Linda Pine
Dave Powell
Linda Powers
Sheryl Schrepf
Rodney Sills

Emeritus Volunteer inductees

Robert Benninghoff
Dave Bracy
Diana Britton
Carol Cleland
Dave Cleland

Peter Ekstrom
Jill Fisher
Dee Flanagan
Karol Goldstein
Joan Goulder
Don Hildwig
Hamilton Jones
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Mary LaFollette
Jo Legg
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Marvin Morse
Wendell Runnels
Judy Shannon
Bill Thibodeau
Virginia Walsh

* Mote Trustee

** Honorary Trustee

PHOTO BY: FRANTISEK HOJDYSZ / ADOBE STOCK

**MOTE BY
THE NUMBERS**

4,020 donations

\$7,973,270 raised

102 Legacy Society members supporting
Mote through their estate plans

8 SEA Explorers – leadership donors for
Mote Science Education Aquarium

10,193 members

141 corporate members

Embodying 'Oceans for All'

Mote's donors are remarkable people who recognize that the ocean supports life on Earth. They are retired professionals, school children, friends across the water, and others from all backgrounds. They are the driving force behind Mote's vision of *Oceans for All: Improving Access to Marine Science & Technology*.

While Mote scientists work tirelessly to secure competitive grants and agreements, it's important to note that Mote's Research Division derives more than 40 percent of its funding from philanthropic giving. This year donors took the lead in supporting Mote's red tide research and technology development, formed the new SEA Explorers group of leadership donors for Mote Science Education Aquarium, and championed many other pivotal efforts – more than we can recognize in a single volume.

These amazing people and organizations have earned our deepest gratitude.

\$500,000 and over

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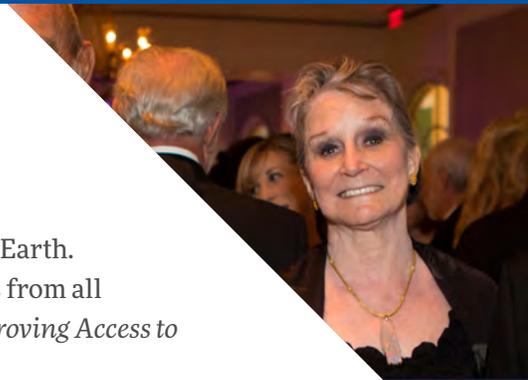
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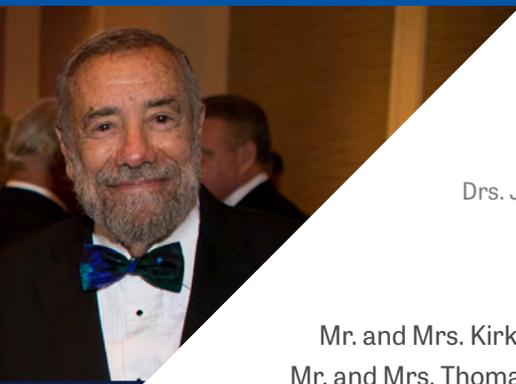
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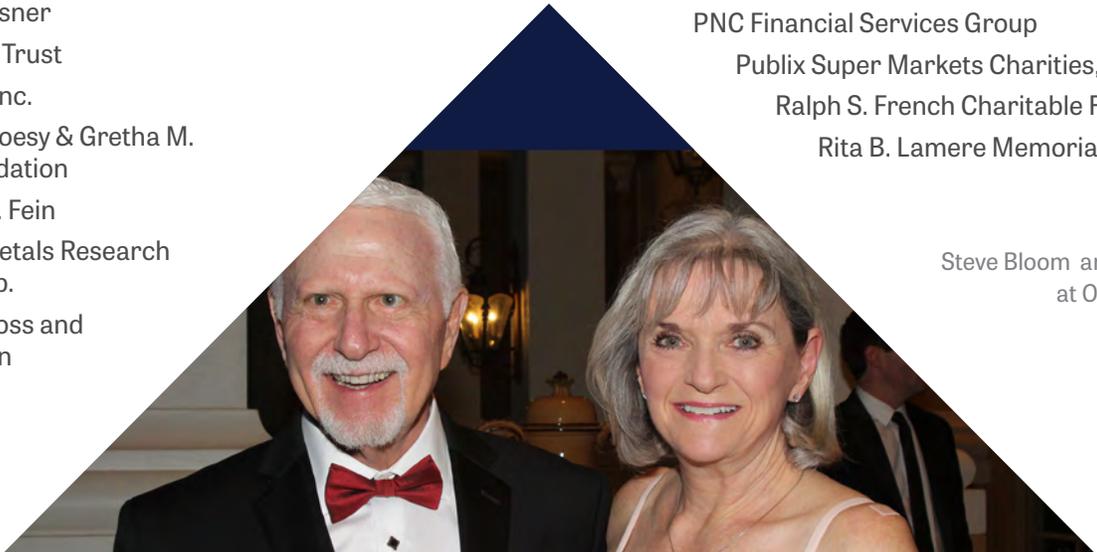
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 Seider at Oceanic
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Ms. June Zaccone

Members of all ages enjoy
Mote Aquarium exhibits;
Mote's SEA Explorers at
Oceanic Evening.





Mote Members are part of something amazing

If Mote were an ecosystem, our Members would be keystone species — essential for the health of the whole. We sincerely thank all 10,193 Mote Members for supporting ocean research and conservation, the care of Mote Aquarium animals, education programs and public outreach encouraging ocean literacy and stewardship.

Those considering Mote Membership can visit mote.org/membership to discover the benefits — a year of unlimited Aquarium admission, reciprocal benefits at more than 100 zoos, aquariums and gardens, discounts on purchases and programs, Member-only events and more.

SEA Explorers power Aquarium vision

In February, Mote leaders shared their vision for Mote Science Education Aquarium (Mote SEA) and announced the fundraising campaign to create it: *Oceans for All: Improving Access to Marine Science & Technology*. Since then, a pioneering group of philanthropic supporters has stepped forward — Mote’s SEA Explorers have each pledged \$250,000 or more. By year’s end, philanthropic donations and commitments for Mote SEA totaled about \$30 million, critical progress that will be complemented through ongoing philanthropic, public and corporate support.

Learn more: moteoceansforall.org.

Mote sincerely thanks the following SEA Explorers:

Benderson Family
Barbara Brizdle
Robert & Anne Essner
Ellen Hanson & Richard Perlman
Ryan & Maureen Martin
Edward D. and Anna Mitchell
Family Foundation
Elizabeth Moore
Hobart & Janis Swan
Anonymous



Legacy Society: A timeless impact

Mote's Legacy Society members truly understand the meaning of "today's research for tomorrow's oceans" – they are committed to ensuring that Mote's research enterprise remains strong, independent, and ready for each new challenge facing our oceans. Legacy Society members include Mote in their estate planning programs, knowing their positive impacts will ripple across generations. Learn more: plannedgiving.mote.org

Legacy Brunch

Each year, Mote hosts a brunch event for members of its Legacy Society. This year's brunch was held on Feb. 22, in the Emily & Roland Abraham New Pass Room at Mote Marine Laboratory. Mote Senior Scientists Dr. Carl Luer and Nigel Mould spoke to the audience (photos 1 and 2) before Mote President & CEO Dr. Michael P. Crosby mingled with the members during the brunch (photo 3).

1



2



3



Legacy Society members

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Ms. Patrice Boeke

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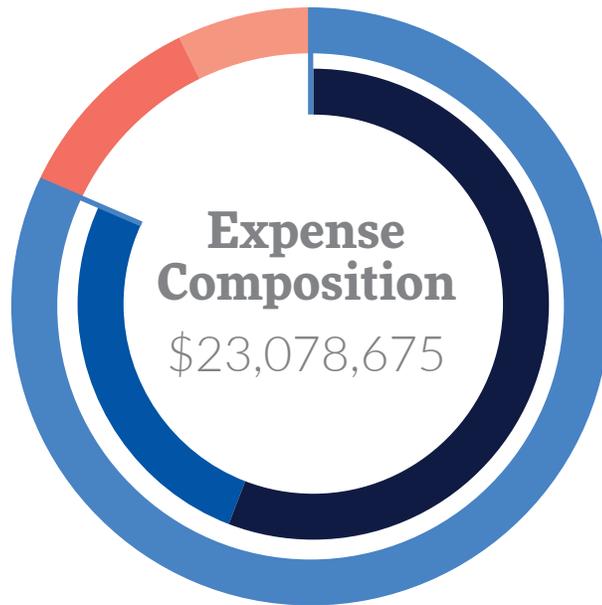


- 48% ■ Research¹ \$10,383,645
- 37% ■ Education, Membership & Outreach² \$8,083,190
- 15% ■ Contributions & Investments \$3,198,190

¹Research includes Protect Our Reefs program and Mote Aquaculture Research Park management

²Education and Outreach includes Aquarium and science education programs

* Does not include beneficial interest in Mote Marine Foundation



- 81% ■ Program Services \$18,697,749
- 54% ■ Research¹ \$12,550,315
- 27% ■ Education & Outreach² \$6,147,434
- 11% ■ Administrative & General \$2,627,002
- 8% ■ Fundraising \$1,753,924

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90 technical reports

67 peer-reviewed journal articles
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Peer-reviewed journal articles

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MOTE LOCATIONS

- City Island campus
- Mote Aquaculture Research Park
- Mote Boca Grande Outreach Office
- Elizabeth Moore International Center for Coral Reef Research & Restoration
- Florida Keys National Marine Sanctuary's Eco-Discovery Center
- “Living Reef” exhibit
- Florida Keys History Discovery Center
- “Coral Reef Exploration” exhibit

MOTE BY THE NUMBERS

- 6 locations in Florida
- 19 off-site aquariums
- 331,152 total square feet

Saving Florida's treasured coral reefs

 By early 2019, the unprecedented outbreak of stony coral tissue loss disease was affecting nearly half the coral species on the Florida Reef Tract, spanning  Martin County to Key West, and responders were investigating whether it might be linked to disease observations at other Caribbean sites. 

At this dire time, Mote scientists were raising the bar on disease research and responsive reef restoration, within a network of more than three dozen partners. Specifically, 2019 marks the first year of the Mote-led **Florida Keys Coral Disease Response & Restoration Initiative**, a powerful attack against threats to Florida's reefs.

Over three years, Mote and partners will:

- **Plant approximately 70,000 coral fragments** of diverse, endemic genetic varieties, emphasizing those demonstrated to be resilient to climate change conditions and/or coral disease;
- Conduct necessary research to **identify naturally resilient, endemic genetic varieties of coral** species, cross-breed them in a targeted way for healthy genetic diversity, and investigate why they are resilient;
- Establish and maintain quality control of life-support systems in a remote, secure, inland-based, **living coral gene bank** to ensure the long-term viability and persistence of threatened coral species and their genetic diversity;
- Establish an isolated, **“clean room” laboratory for coral disease research** – a necessity for studying contagious diseases whose ability to spread is not fully understood; and
- Implement multi-year monitoring and analyses to scientifically **evaluate ecological impacts and benefits of restoration**.

The Initiative focuses on “massive” species of brain, boulder and star corals susceptible to tissue loss disease, along with branching elkhorn and staghorn corals that have been decimated by other threats, notably white band disease. Mote has identified genetic strains of staghorn coral resistant to white band, and preliminary lab experiments suggest that the massive coral species genotypes that Mote has been restoring and will restore may be relatively resilient to waterborne disease exposure.

Below: Coral fragments at Mote's Elizabeth Moore International Center for Coral Reef Research & Restoration (IC2R3).

Bottom: Sarah Hamlyn, Staff Biologist with Mote's Coral Reef Restoration program.



Mote's new Initiative includes partners from NOAA's Florida Keys National Marine Sanctuary and Coral Reef Conservation Program, Biscayne National Park, Florida Fish and Wildlife Conservation Commission, Florida Department of Environmental Protection, The Nature Conservancy and others.

These monumental efforts are possible thanks to a combination of philanthropic giving, State of Florida funding and Mote's recent grant of nearly \$1.5 million from the National Coastal Resilience Fund, a partnership of the National Fish and Wildlife Foundation, NOAA, Shell Oil Company and TransRe.

The grant challenges Mote to raise matching funds. To support this important initiative, visit mote.org/donate, click **DONATIONS**, and under **DESIGNATION**, select **CORAL REEF RESEARCH & RESTORATION**.

Healthy staghorn coral in Bonaire offers a glimpse of the "rainforests of the sea" Mote aims to restore in Florida.



PHOTO BY: CONOR GOULDING



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RESEARCH STATIONS

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**Florida Keys National Marine Sanctuary's
Eco-Discovery Center**

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