

HARBOR BRANCH

FLORIDA ATLANTIC UNIVERSITY®

2017 ANNUAL

# IMPACT

REPORT

*Dive* into...

Ocean Science for a Better World®



## PRESIDENT'S MESSAGE:

Upon my arrival in Boca Raton in 2014, I shared my intention to make FAU the fastest-improving university in America. We're well on our way, and Harbor Branch is playing a key role in helping us reach that goal. As a pillar of our 10-year strategic plan, Ocean Science and Engineering/Environmental Sciences is a priority for FAU. The university's significant investment in the pillar and the world-class research already underway at Harbor Branch will help further its reputation and global impact in marine and related sciences.

FAU's 2017 President's Gala celebrated excellence in ocean science and engineering. Proceeds, through the Kelly Family Foundation, support two exciting new initiatives: the coastal affairs internship program for undergraduates focused on marine science and coastal management and policy; and the scholarship program for graduate students enrolled in the Master's degree in marine science and oceanography—the first of its kind in the state. The learning experience that Harbor Branch offers has helped make FAU a first-choice destination for students interested in marine science and related fields.

Last year was a banner year for FAU, and we're ready to face new challenges and celebrate more successes in the coming year. Our research efforts will continue to focus on conserving and protecting our oceans, river basins and coastal communities, with Harbor Branch leading the charge.

### **John Kelly, Ph.D.**

President, Florida Atlantic University



## EXECUTIVE DIRECTOR'S MESSAGE:

When I joined FAU Harbor Branch Oceanographic Institute a year ago, I articulated a vision where we equate ocean health to human health. Our coastal oceans—including estuaries like the Indian River Lagoon—are essential to our physical and mental health. About 50% of the oxygen we breathe comes from the ocean, and we rely on the ocean for much of our food supply—two facts that lend credence to the important work that is being conducted every day by the researchers at the Institute. Our scientists and engineers develop the new tools and instruments to explore the world's oceans. From creating novel remote sensing systems and next generation ocean-observing tools, innovating ways to grow healthier and ecologically safer shrimp and fish, searching for cures for disease from the deep ocean, to monitoring fragile ecosystems like the Indian River Lagoon; Harbor Branch is leading the way in marine science and technology.

Taking the above one step further, the Institute integrates ocean and environmental science across the FAU campuses to perform groundbreaking research that results in science solutions to the challenges we face when managing the coastal ocean. Collectively, our scientists and engineers work to improve quality of life and economies of coastal communities, making the Institute a key contributor to local, regional and global marine research.

### **Anton Post**

Executive Director, FAU Harbor Branch Oceanographic Institute

#### **COVER PHOTO:**

The Carrie Bow Cay Field Station in Belize, documented using drone technology and a composite of nearly 500 photos under the direction of Harbor Branch scientist Joshua Voss, Ph.D., and members of the Coral Reef Health and Molecular Ecology Lab.



# ENSURING SAFE, HEALTHY SEAFOOD

**GROUNDBREAKING RESEARCH** conducted at the Institute's 30-acre Aquaculture Development Park has helped to expand aquaculture to satisfy an expected doubling in the global demand for food over the next 40 years. 2017 marked the twentieth anniversary for the Institute's 30-acre Aquaculture Development Park, and two decades of groundbreaking research that has helped to expand aquaculture to satisfy an expected doubling in the global demand for food over the next 40 years.

Harbor Branch works to create new and improved ways of growing a variety of species in a healthy and environmentally friendly way, in an effort to expand domestic aquaculture and alleviate the need for importing foreign seafood. More than 50% of the seafood we eat comes from aquaculture, but less than 1% of it is produced in the United States. Harbor Branch researchers study everything from culturing macroalgae, clams, shrimp, and finfish to searching for ways to increase the supply of nutritious, safe and high-quality domestic seafood.



40+  
YEARS

## THE POWER OF PARTNERSHIPS

The Institute's long history of aquaculture research is built upon a foundation of strong industry partnerships and collaborations. By partnering with companies, both established and start-ups, government agencies and academic colleagues, Harbor Branch scientists have collaborated to effectively redefine the boundaries of what is possible in aquaculture. Current collaborators include:



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## HARBOR BRANCH FACULTY AND PROJECT MANAGERS

**Aaron Adams, Ph.D.**

*Fish Habitat Ecology*

**Jim Adovasio, Ph.D.**

*Archeology*

**Matt Ajemian, Ph.D.**

*Fisheries Ecology & Conservation*

**Gabby Barbarite, Ph.D.**

*Community Outreach & Ocean Literacy*

**Steve Burton**

*Marine Mammal Stranding*

**Laurent Chérubin, Ph.D.**

*Ocean Modeling & Bio-physical Processes*

**Anni Vourenkoski Dagleish, Ph.D.**

*Optical & Physical Properties of Particle Suspensions*

**Fraser Dagleish, Ph.D.**

*Ocean Visibility & Optics*

**Megan Davis, Ph.D.**

*Aquaculture & Stock Enhancement*

**Nick Dickens, Ph.D.**

*Omics & Bioinformatics*

**Esther Guzmán, Ph.D.**

*Cancer Cell Biology*

**Dennis Hanisak, Ph.D.**

*Indian River Lagoon Observatory, Marine Botany*

**Andy Hemmings, Ph.D.**

*Archeology*

**Mingshun Jiang, Ph.D.**

*Physical-Biogeochemical Ocean Observation & Modeling*

**Brian Lapointe, Ph.D.**

*Harmful Algal Blooms*

**Susan Laramore, Ph.D.**

*Aquatic Animal Health*

**Jim Masterson, Ph.D.**

*Marine Science Education*

**Marilyn Mazzoil**

*Dolphin Photo Identification*

**Peter McCarthy, Ph.D.**

*Microbiology, Education*

**Greg O'Corry-Crowe, Ph.D.**

*Population Biology & Behavioral Ecology*

**Bing Ouyang, Ph.D.**

*Underwater Imaging Applications*

**Annie Page-Karjian, DVM, Ph.D.**

*Marine Wildlife Veterinary Medicine & Research*

**Shirley Pomponi, Ph.D.**

*Sponge Biotechnology*

**Anton Post, Ph.D.**

*Microbial Genetics & Genomics*

**John Reed, MSc**

*Coral Reef Discovery & Conservation*

**Marty Riche, Ph.D.**

*Nutrition & Physiology of Aquatic Animals*

**Adam Schaefer, MPH**

*Epidemiology & Population Health*

**Jim Sullivan, Ph.D.**

*Phytoplankton Dynamics*

**Larry Taylor**

*Manatee Protection Systems*

**Mike Twardowski, Ph.D.**

*Optical Sensing Techniques*

**Joshua Voss, Ph.D.**

*Coral Reef & Molecular Ecology*

**Guojun Wang, Ph.D.**

*Biosynthesis & Biocatalysis of Natural Products*

**Paul Wills, Ph.D.**

*Finfish Aquaculture*

**Amy Wright, Ph.D.**

*Natural Products Chemistry*



# HARBOR BRANCH AT SEA

**FAU HARBOR BRANCH CONTINUED ITS LEGACY OF OCEAN EXPLORATION IN 2017 THROUGH EXPEDITIONS WITH THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION'S (NOAA) COOPERATIVE INSTITUTE FOR OCEAN EXPLORATION, RESEARCH AND TECHNOLOGY (CIOERT), HEADQUARTERED AT THE INSTITUTE.**

In summer 2017, CIOERT scientists and students led a collaborative mission to explore never-before-studied coral reefs off the coast of Cuba (pictured, center). Prior to this expedition, there were very little data describing reefs beyond the shallow reef zone. Overall, researchers noted that the majority of the reefs explored appeared very healthy—nearly pristine—as compared to many shallow reefs found in the United States. The NOAA-funded mission was a collaboration between three CIOERT partners (FAU Harbor Branch, the University of Miami Cooperative Institute for Marine & Atmospheric Studies, and the University of North Carolina at Wilmington), the Cuba National Center for Protected Areas, the University of Havana Center for Marine Studies, the Cuba Institute of Marine Sciences and the National Aquarium of Cuba.

**Ocean exploration-related research also reaches into the Gulf of Mexico, the Caribbean, the Atlantic, Pacific and Arctic oceans.**

Harbor Branch scientists explored and studied the Caribbean reefs through aerial mapping along Belize's Carrie Bow Cay (pictured, cover). Grouper spawning aggregations were surveyed in the waters of the U.S. Virgin Islands and Puerto Rico using Wave Glider® technology. Scientists and students continued field studies of coral reef communities in the Gulf of Mexico's Flower Garden Banks and along Florida's southeastern coast (pictured, top left). Researchers traveled to remote areas of Alaska to observe and document the behavior of various marine apex predators, including beluga whales and stellar sea lions, in order to draw conclusions on their changing Arctic ecosystems (pictured, top right). Scientists and students also explored the poorly known deep-water areas in the Kingman Reef, Palmyra Atoll and Jarvis Island Units of the Pacific Remote Islands Marine National Monument in the Pacific Ocean via telepresence and Harbor Branch's Exploration Command Center, a facility that allows for real-time access to expeditions through satellite transmissions and chatrooms.

FOR MORE THAN THREE DECADES, SCIENTISTS WITH HARBOR BRANCH'S MARINE BIOMEDICAL AND BIOTECHNOLOGY RESEARCH PROGRAM HAVE WORKED TO DISCOVER NEW DRUGS FROM THE SEA. IN 2017, RESEARCHERS EXPLORED NEW WAYS TO UTILIZE THE POWER OF MARINE NATURAL PRODUCTS IN THE FIGHT AGAINST A VARIETY OF DISEASES INCLUDING ALZHEIMER'S, TUBERCULOSIS, MRSA AND CERTAIN TYPES OF CANCER.

Recent results from a study on the natural product leiodermatolide — found in a deep-water marine sponge collected off the coast of Ft. Lauderdale, Florida—were published in the International Journal of Cancer, after Harbor Branch scientists and collaborators found the compound has the ability to inhibit the growth of pancreatic cancer cells. Another study by scientists found potent antimicrobial activity in dragmacidin G, another compound extracted from a deep-water marine sponge, which shows great promise against the drug resistant bacteria MRSA. The program also received a major grant to study the nodal protein survivin in colon, breast and lung cancers as a new potential means of preventing and treating the disease.



# DISCOVERING MEDICINE FROM THE SEA

# FINDING SOLUTIONS FOR THE INDIAN RIVER LAGOON

THE INDIAN RIVER LAGOON IS AN ESTUARY OF NATIONAL SIGNIFICANCE, MAKING IT ONE OF FLORIDA'S MOST PRECIOUS NATURAL RESOURCES.

Harbor Branch remains committed to studying this complex 156-mile system. Research efforts focus on understanding the relationships between water quality and the species that inhabit the lagoon, with studies centered on everything from macroalgae and seagrass to dolphins and sharks.

Harbor Branch scientists are studying harmful algal blooms in the lagoon and their far-reaching effects. One study is examining toxins in dolphins caused by recent toxic algae outbreaks. Researchers are also looking at how septic tanks and storm water runoff play into algae growth, and the results of that work are helping lawmakers in counties along the lagoon make decisions about converting key neighborhoods from septic to sewage systems. Additionally, Harbor Branch teams are tracking dolphins, sharks and rays in the lagoon to assess health and abundance. For the third year in a row, the Institute's network of 10 environmental sensors are tracking water quality data 24 hours a day/7 days a week, with results available online to anyone at [fau.loboviz.com](http://fau.loboviz.com) or at the new Ocean Discovery Visitor's Center exhibit on the Harbor Branch campus.

# 24/7 TRACKING



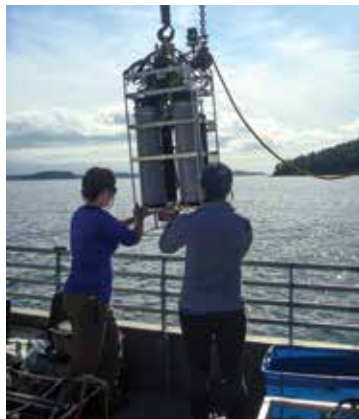
NOAA permit no: 18182

# EDUCATING THE NEXT GENERATION

HARBOR BRANCH OCEANOGRAPHIC INSTITUTE IS ONE OF FAU'S TREASURES FOR TRAINING THE NEXT GENERATION OF OCEAN AND ENVIRONMENTAL SCIENTISTS AND ENGINEERS.

This year, the University launched a new master's degree program in marine science and oceanography, headquartered at Harbor Branch. In partnership with the Charles E. Schmidt College of Science, the interdisciplinary program officially began in Fall 2017. Students participating in the hands-on program are gaining a broad understanding of coastal and open ocean science while working alongside world-class researchers, both at Harbor Branch and throughout FAU.

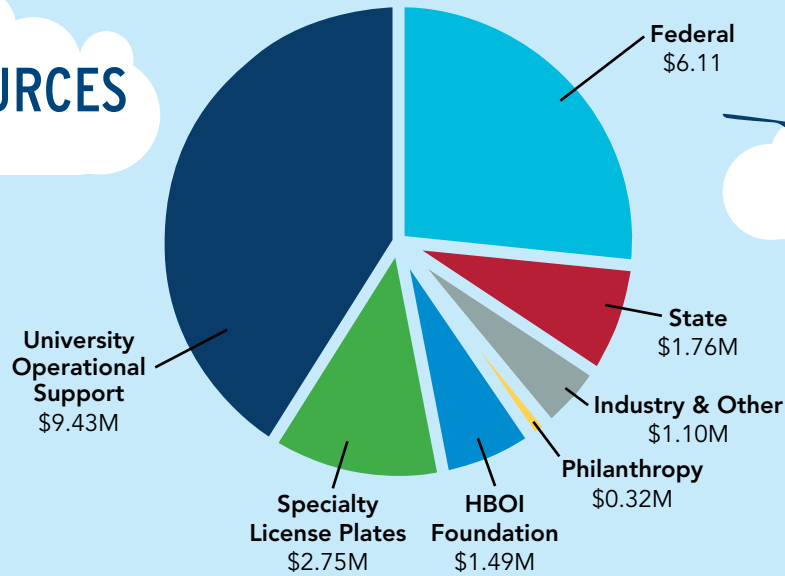
For more information on Harbor Branch's other longstanding programs like Semester by the Sea and summer internships, visit [fau.edu/hboi/education](http://fau.edu/hboi/education).





# FUNDING SOURCES

## FISCAL YEAR 2017



### COMPETITIVELY AWARDED GRANTS & CONTRACTS

**\$8,966,074**

FEDERAL	\$6,114,379
National Oceanographic & Atmospheric Administration	\$3,231,172
U.S. Dept. of Defense	\$1,064,310
National Science Foundation	\$733,580
National Aeronautics and Space Administration	\$408,413
U.S. Dept. of Energy	\$238,222
National Institutes of Health	\$209,674
U.S. Dept. of Health & Human Services	\$194,250
U.S. Environmental Protection Agency	\$34,758

### STATE

**\$1,756,004**

Florida Department of Health	\$622,683
Florida Division of Historical Resources	\$443,830
Florida Dept. of Environmental Protection	\$350,000
School Board of St. Lucie County	\$238,875
St. Lucie County	\$57,250
St. Johns River Water Management District	\$25,000
Sea Turtle Conservancy	\$18,366

### INDUSTRY & OTHER

**\$1,095,691**

Bonefish & Tarpon Trust	\$669,643
Zeigler Brothers, Inc.	\$157,172
Foundations	\$101,611
Florida Chamber of Commerce	\$90,000
Raytheon	\$41,609
Biomin, Inc.	\$25,756
American Assoc. of Zoo Veterinarians	\$9,900

### HARBOR BRANCH OCEANOGRAPHIC INSTITUTE FOUNDATION GRANTS

**\$1,490,792**

New Faculty Hires	\$850,791
Rewarding Faculty Excellence	\$357,264
Ensuring Faculty Excellence	\$152,963
Ensuring a Robust Development Strategy	\$30,964
HBOI Executive Director Operational Support	\$4,968
Love Your Lagoon Gala Net Proceeds:	
- IR Lagoon Graduate Research Fellows	\$89,826
- Indian River Lagoon Symposium	\$4,016

### SPECIALTY LICENSE PLATE AWARDS

**\$2,747,366**

*Granted through the Harbor Branch Oceanographic Institute Foundation*

Protect Wild Dolphins	\$1,240,000
Save Our Seas	\$780,480
Protect Florida Whales	\$426,886
Aquaculture	\$300,000



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