

ANNUAL REPORT

2014-2015



HARBOR BRANCH

FLORIDA ATLANTIC UNIVERSITY®

Ocean Science for a Better World®



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FLORIDA ATLANTIC UNIVERSITY*

Ocean Science for a Better World®



A Message From the Executive Director

Every day each of us has the opportunity to discover or become aware of something new. At FAU Harbor Branch, our research discoveries in our labs and in the field, from the estuaries to the deep blue sea, are especially rewarding because they help make a difference in everyday life.

We are motivated by a sense of responsibility. Many global challenges have answers in marine science and technology. We pursue these with a broad variety of partners at local, state, and federal levels. Conducting research that is relevant to the lives of so many people is a true honor, and we're always looking for ways to make our research results more accessible.

This 2014-2015 Annual Report provides a sampling of highlights from the past year of research, education and outreach. These are a tribute to the Harbor Branch scientists, engineers, educators, staff, students, volunteers and partners who brought them to life. Our enthusiasm for discovery runs throughout the sections of this report, which reflect the themes of our 2012-2017 strategic plan, "Our Living Oceans."

Thank you for joining us on this journey. Your support and involvement are part of what makes *Ocean Science for a Better World*® such a rewarding pursuit.

Mega Davis

Interim Executive Director,
FAU Harbor Branch Oceanographic Institute

OCEAN EXPLORATION

OCEAN EXPLORATION

GULF CORALS CAPTIVATE COOPERATIVE INSTITUTE

Scientists know that healthy coral reefs are hotspots of marine life and an essential component of ocean health, but many reef areas are yet to be discovered and characterized. The need to advance understanding of this vital resource is part of why corals are a primary ocean exploration target for organizations such as the National Oceanic and Atmospheric Administration's (NOAA) Cooperative

Institute for Ocean Exploration, Research and Technology (CIOERT) at FAU Harbor Branch. Research cruises conducted or supported by CIOERT in 2014 focused on reefs at the West Florida Escarpment, Pulley Ridge and Flower Garden Banks National Marine Sanctuary (FGBNMS), all in the Gulf of Mexico.

CIOERT, one of 16 NOAA Cooperative Institutes located at universities and research institutes to help advance the agency's research agenda, is charged with increasing the pace, scope and efficiency of undersea research. University of North Carolina

Wilmington (UNCW) serves as FAU's co-managing partner of CIOERT, which also includes University of Miami (UM) and SRI International in St. Petersburg, Fla. The consortium has been awarded more than \$7.8 million in research funding since it was established in 2009 under a five-year cooperative agreement with NOAA. Based on the strength of its results, CIOERT has been renewed for a second five-year period.

The Pulley Ridge expedition provided one of the more important discoveries of 2014: After five years of extensive surveys and mapping, CIOERT



Researchers watch a live video feed from a remotely operated vehicle while entering data in the FAU Harbor Branch Exploration Command Center.

investigators and Harbor Branch Research Professors Dennis Hanisak, Ph.D., and John Reed, M.Sc., along with Biological Research Specialist Stephanie Farrington were surprised and thrilled to discover a significant area of high coral cover. This August cruise aboard the UM's R/V *Walton Smith* was part of a multi-year effort to define what role Pulley Ridge reefs may play in replenishment of fish species, corals and other organisms in the downstream reefs of the Dry Tortugas and Florida Keys. The April exploration of the West Florida Escarpment with the NOAA Ship *Okeanos Explorer* encountered great coral diversity and two potential new species of crinoids, a type of animal, and involved the inaugural run of the CIOERT Exploration Command Center at Harbor Branch (see story on page 5). In October Assistant Research Professor Joshua Voss, Ph.D., Reed and graduate students Michael Studivan and Jennifer Polinski partnered with FGBNMS staff and UNCW aboard NOAA's R/V *Manta* to explore and characterize areas in the sanctuary and two adjacent,

biologically diverse banks. Data from the cruise will contribute directly to the proposed sanctuary expansion plan, and corals sampled during the cruise will provide valuable insights regarding ecological connectivity across the Gulf of Mexico.

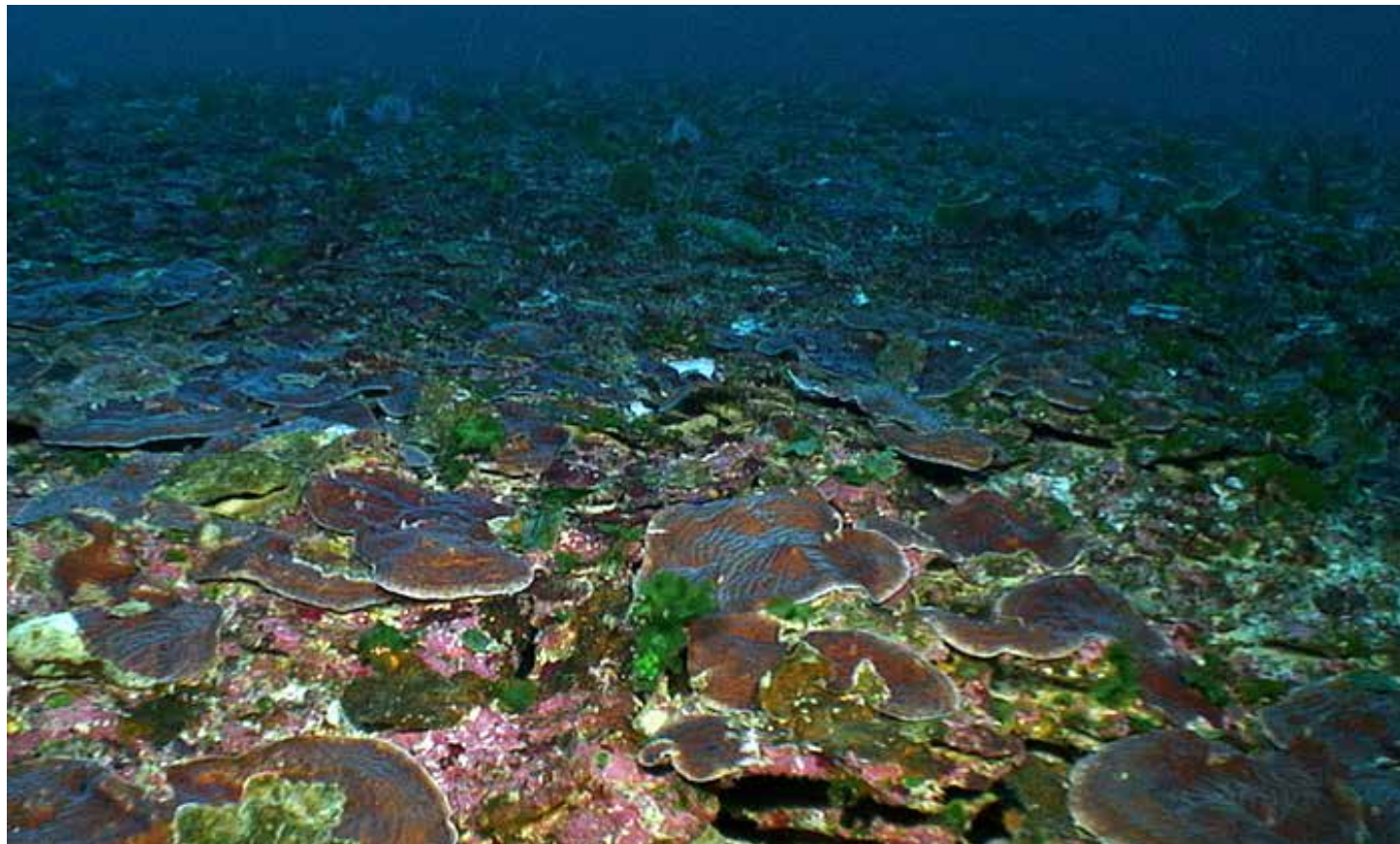
WINDOW TO OCEANS OPENS

Few pursuits have the power to captivate the imagination like ocean exploration, but the remote nature of the work has made sharing the excitement with a wider audience a challenge. This is changing with the advent of NOAA's Exploration Command Centers (ECC), which provide a means of viewing and participating in research cruises from remote locations.

A manifestation of NOAA's commitment to telepresence-enabled ocean exploration, the ECC is designed to receive and display high-definition video feeds from remotely operated undersea vehicles (ROV), and to enable researchers to

communicate with the ship during the dives. The ECC might host, for example, scientists with expertise in corals, fish, sponges and marine drug discovery, any of whom could help direct the ROV operator and identify species that appear on screen.

With the ability to broadcast video from the ocean's depths, telepresence-enabled exploration is also a strong education and outreach tool. NOAA provided public access to live dive feeds via its website – attracting more than 700,000 visits – along with complementary curricula developed for grades 5 through 12. At the Harbor Branch ECC, FAU graduate students assisted the data gathering and documentation for each dive with the help of a specialized keypad system developed by Farrington (see story on page 6) to facilitate this type of work. This evolution in ocean exploration through telepresence provides new opportunities and allows ocean explorers to broaden interest and participation in the field.



A newly found field of continuous plate coral (*Agaricia* spp.) found near Pulley Ridge, Gulf of Mexico.

INNOVATIVE TECHNOLOGY DEVELOPMENT

INVENTIVE OPTICS LAB EXTENDS VISION

Studying and working in the ocean is complicated by the challenges of seeing underwater. The researchers of the FAU Harbor Branch Ocean Visibility and Optics Lab (OVOL) are dedicated to continually pushing the bounds of what's possible. Much of their work focuses on laser imaging and light detection and ranging (LiDAR), and improvements in the equipment, methods and data processing it entails. The past year has provided ample validation of their efforts.

In July 2014, Associate Research Professor Fraser Dalgleish, Ph.D., and Assistant Research Professors Anni Vuorenkoski Dalgleish, Ph.D., and Bing Ouyang, Ph.D., were named as inventors on a patent for MEMS (Micro-Electro-Mechanical Systems) Microdisplay Optical Imaging and Sensor Systems for Underwater and Other Scattering Environments. The technology improves image acquisition in part by selectively rejecting scattered light, which can be caused by dust, smoke or fog as well as by water and its contents. Dr. Vuorenkoski Dalgleish also has submitted patent disclosures for a fluorescence sensor and a data processing algorithm to prove LiDAR in high-scattering environments. Furthermore, Dr. Ouyang has developed an imaging system prototype that uses an array of individually controllable lasers, a

technology common in high-speed printing applications.

The lab's success has also led to invitations for OVOL researchers to participate in and present at multiple conferences, and for Dr. Dalgleish to spend 10 weeks as a visiting researcher at the NATO Science and Technology Organization in La Spezia, Italy. OVOL is collaborating with NATO oceanographers in developing hardware designs, calibration methods and computationally efficient algorithms for autonomous LiDAR sensors, a potential game-changing technology for real-time assessment of water-column optical properties during military operations and ocean research.

BIOLOGIST ADVANCES EXPLORATION DATA TECHNOLOGY

For those who engage in ocean exploration, the singular excitement of discovery is balanced by the meticulous documentation it requires. Experience is needed to characterize the geographic features and to identify the living things in an area of interest. These data must be systematically recorded, along with geographic coordinates, to provide reports that both catalog and summarize the information. The data are important for managers and scientists within state and federal agencies including NOAA and its Fisheries Management Councils, and may be used to better understand the long-term health

and status of shallow and deep reef ecosystems. It's a labor-intensive process, and the demands grow with the size of the exploration area.

Armed with a science background and keen aptitude for data management, FAU Harbor Branch Biological Research Specialist Stephanie Farrington has developed a Microsoft Access database that streamlines the effort required to document and generate reports for exploratory expeditions. For example, a report that might have taken months to create now can be produced in weeks. In addition to greater efficiency, the system's automation significantly reduces the risk of human error while producing superb customized reports and maps.

Farrington started thinking about the system not long after joining Harbor Branch in 2010 to work with Research Professor John Reed, M.Sc., a central figure in the institution's four decades of ocean exploration. His guidance and encouragement included recommendation of a programmable keyboard that simplifies entry of complex information into single keystrokes. Because of Farrington's work, NOAA invited her to serve as a science co-lead on its April 2014 Gulf of Mexico exploration expedition (see story page 5). The system, which she continually improves based on current project needs, is a true innovation in a field where efficiency, accuracy and timely dissemination of data are increasingly important.

UNDERSTANDING MARINE ECOSYSTEM FUNCTION

IRLO PROGRAM RECEIVES FUNDING AND EXPANDS

The Indian River Lagoon (IRL) is a unique, highly diverse, shallow-water estuary of national significance stretching along 40% of Florida's east coast with an economic value to Florida estimated at more than \$3.5 billion per



Mechanical Engineers Ben Metzger and contractor Geoff Beiser inspect a LOBO unit prior to deployment.

year. Recognizing the need to build an estuarine observation and prediction network to determine the effects of environmental change in the IRL, Harbor Branch researchers initiated the Indian River Lagoon Observatory (IRLO) program in 2011 under the direction of Research Professor Dennis Hanisak, Ph.D. The backbone of this network is an emerging array of Land/Ocean Biogeochemical Observatory (LOBO) units, which are sophisticated and proven water-quality monitoring systems that provide high-quality data in real time. This year an influx of

funding has enabled IRLO to expand the number of LOBO units in the IRL.

In April, the Harbor Branch Oceanographic Institute Foundation Board of Directors underwrote the purchase of three LOBO units (see page 16) for IRL deployment in St. Lucie and Indian River counties. Additionally, as part of Florida's 2014-15 legislative budget, a Senate Select committee

included \$2 million for Harbor Branch as part of the funding for IRL-focused projects, which will be used to create a LOBO-based monitoring program in the St. Lucie Estuary in partnership with the Florida Department of Environmental Protection. The real-time water quality measurements from the LOBO network will help provide policy-makers with vital information to make informed decisions on the estuary and the lagoon.

SCIENTISTS USE GENETIC TESTING OF IRL DOLPHINS TO UNCOVER NEW INFO

Scientists with the FAU Harbor Branch Population Biology and Behavioral Ecology program believe genetic testing may be the key to solving many mysteries surrounding dolphins in the Indian River Lagoon (IRL) and beyond. Their research, involving the genetic testing of over 600 dolphins sampled both within the lagoon and along the adjacent Atlantic coastline, sheds new light on the population structure and dispersal patterns of the dolphins that inhabit the IRL.

The study, conducted by FAU Harbor Branch Research Biologist Sarah Rodgers (pictured below) under the guidance of Associate Research Professor Gregory O'Corry-Crowe, Ph.D., examined two different types of genetic markers, or parts of the genome, in dolphins - one from the mother and the other from both parents. Scientists found distinct genetic differences between dolphins in the IRL and those in the Atlantic Ocean.

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Research Biologist Sarah Rodgers at work in the lab.

UNDERSTANDING MARINE ECOSYSTEM FUNCTION

Researchers also uncovered discrepancies in the theory that the IRL dolphin population is a “closed population,” meaning all IRL dolphins stay in the lagoon and do not interact with Atlantic dolphins. Several of the dolphins sampled in the IRL had full Atlantic genetic profiles, despite, in some cases, being sighted and tracked within the lagoon for over a decade and sampled during lagoon health assessments. Further, scientists discovered several dolphins with a genetic background likely indicating one IRL parent and one Atlantic parent. The DNA also revealed dramatic differences between dolphin populations in the Mosquito Lagoon and the IRL proper.

The findings from this study, coupled with other genetic and genomic dolphin research being conducted by O’Corry-Crowe’s group, could help to provide new answers for health and management issues surrounding the recent mass die-off of dolphins spanning the entire Atlantic eastern seaboard. Rodgers’ current genetic research is focused on investigating the Mosquito Lagoon phenomenon.

STUDY LINKS FISH CONSUMPTION AND ELEVATED MERCURY LEVELS IN PEOPLE

FAU Harbor Branch scientists analyzed hair samples to determine mercury concentrations of 135 residents living along the Indian River Lagoon (IRL) and found that individuals who reported eating locally-caught seafood three or more times per week are nearly four times more likely to have a mercury concentration above the Environmental Protection Agency’s recommended daily dose for human health. Researchers began the study after finding high levels of mercury in IRL Atlantic bottlenose dolphins - they are considered a “sentinel species”

because they are long lived, have defined home ranges and consume some of the same fish species as humans.



Harbor Branch’s Adam Schaefer, M.P.H. epidemiologist and lead scientist on the study, believes the results show how a sentinel animal can help identify a public health hazard. The information collected can be used to develop interventions to reduce exposure among high risk groups, particularly pregnant women. The key interventions include education regarding general guidelines for seafood consumption and specific species of fish that should be avoided during pregnancy.

Results from the peer-reviewed study are published in the July 2014 edition of the *International Journal of Environmental and Public Health*.

Mercury is a global environmental pollutant that causes adverse health effects, particularly on neurodevelopment in the fetus. Human exposure to mercury comes primarily from the consumption of fish and shellfish. In Florida, adults consume significantly more seafood on average when compared to the general population of the United States.



FAU HARBOR BRANCH IS A LEADER IN MARINE MAMMAL RESCUE

FAU Harbor Branch’s Marine Mammal Research and Conservation (MMRC) program is a first responder for the Southeast National Marine Mammal Stranding Network, authorized by National Oceanic and Atmospheric Administration’s National Marine Fisheries Service. Since January 2014, Stranding Coordinator Steve Burton and his team have responded to 14 strandings (10 dolphins, 4 whales). Several necropsies were performed in the Harbor Branch pathology lab, allowing researchers to gain valuable insight into the reasons why marine mammals strand themselves. Team members also helped to disentangle a mother/calf dolphin pair from a crab pot line (pictured) and assisted the Florida Fish and Wildlife Conservation Commission on the rescue of a manatee calf that was stricken by a boat. In addition, MMRC team members participated in a collaborative training session with the Marine Animal Rescue Society which included over 100 law enforcement officers and volunteers. MMRC also attended several outreach events including “Touch a Truck” in Vero Beach, the IRL Science Festival in Fort Pierce, FAU’s High School Expo in Boca Raton and the Right Whale Festival in Jacksonville.

WISE USE OF MARINE RESOURCES

HARBOR BRANCH BUILDS WORLD’S FIRST OCEAN ENERGY TURBINES

Researchers at Florida Atlantic University’s Southeast National Marine Renewable Energy Center (SNMREC) will install the world’s first offshore test berth for small-scale ocean current turbines, which were constructed at Harbor Branch, under



An ocean energy turbine in the FAU Harbor Branch High Bay

an agreement between FAU and the U.S. Department of the Interior’s Bureau of Ocean Energy Management (BOEM). The lease allows installation of multiple anchored floating test berths on the U.S. outer continental shelf 13 miles offshore from Broward County, Fla. These test berths, each consisting of a buoy anchored to the

sea floor, allow ocean current turbine prototypes (up to 100kW generation capacity) to be deployed from vessels moored in the Gulf Stream for a few weeks at a time. Industry partners will have the opportunity to evaluate the efficacy of their turbine designs while mooring buoys collect measurements of ocean conditions nearby.

FAU’s SNMREC has been working since 2007 to establish the world’s first offshore ocean current turbine test site. Researchers recently performed

a successful final sea trial of the first test berth buoy as well as preliminary tow tests of a small-scale research turbine in late 2013 — key steps before the installation of the test site. Before receiving a lease offer from BOEM, an environmental assessment of the project concluded that “no significant impact” was expected.

Before installation of the first test berth, a project plan will be reviewed by BOEM. This work is supported by close to \$20 million in funding from the U.S. Department of Energy, the state of Florida and private companies.

AQUACULTURE PROGRAM DIVERSIFIES SYSTEM CROPS

Producing more with less has long been a guiding principle of FAU Harbor Branch aquaculture research, which in part seeks to help reconcile ever-growing human nutrition needs with finite planetary resources. The Aquaculture & Stock Enhancement program’s integrated multi-trophic aquaculture (IMTA) system, now in its third year of innovation, is designed to grow multiple animal and plant species while minimizing feed inputs and waste outputs. The past year has seen studies aimed at maximizing the use of plant material produced by the system and introduction of two new crops: sea cucumbers and hard clams.

Based on IMTA experiments showing the benefits of microalgae for the growth and development of oysters, new components to facilitate culture of the algae and delivery of the resource to clams were designed and integrated. Other feed studies focused on methods of drying extracted system resources including *Ulva*, also known as sea lettuce, and bacterial biofloc so that they can be stored and

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WISE USE OF MARINE RESOURCES



Salicornia bigelouii thrives as an extractive species in the IMTA system

used as feed when needs arise. One new species added to the system is a salt-marsh plant called *Salicornia*, which is adept at removing excess nutrients from the water and is prized for valuable byproducts that include edible succulent sprouts marketed as sea asparagus, vegetable oil and high-protein seed meal.

The Harbor Branch IMTA system crops grow in separate tanks connected by a computer-controlled hub that circulates the water and nutrients it contains according to the needs of the animals and plants, thereby minimizing water loss and waste byproducts. The project is lead by Associate Research Professor Paul Wills, Ph.D., and involves researchers from a variety of disciplines at Harbor Branch.

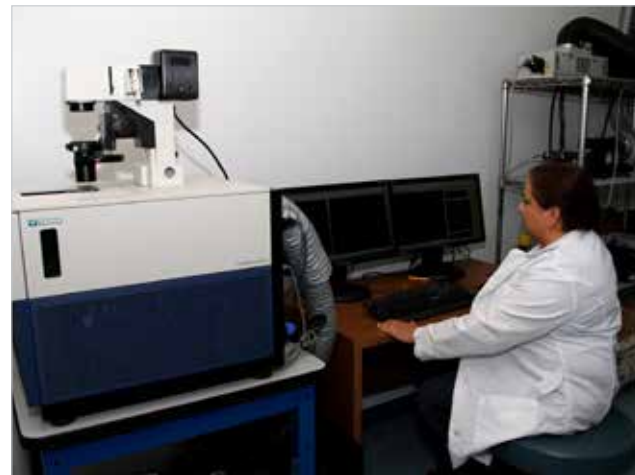
HIGH-CONTENT IMAGER EXPANDS MARINE BIOMED CAPABILITIES

The ability to see individual cells and bacteria has long been essential to the work of the FAU Harbor Branch Marine Biomedical & Biotechnology Research Program (MBBR). The recent acquisition of an ImageXpress Micro XLS Widefield High-Content

Analysis System (HCI) by Harbor Branch is bringing this ability to the cutting edge. In the past, measuring these essential images might have taken hours and could be conducted on one sample at a time; with the new HCI, hundreds if not thousands of images can be obtained in minutes. It can also perform time-lapse imaging on multiple samples, enabling real-time observation

of processes for those treatments. The speed and flexibility of this instrument, coupled with robust analysis to quantify the data, will enhance the exciting research that the MBBR conducts.

Associate Research Professor Esther Guzmán, whose Cancer Cell Biology Group aims to identify marine natural products that could be used in the fight against pancreatic cancer is a primary user of the system. She will use it to identify marine natural products that can kill cancer cells in entirely new ways. One project identifies compounds that block the unique ways that pancreatic cancers feed themselves. A second project focuses on identifying compounds that enhance the body's immune response to kill tumors. The instrument will also help her understand the signaling and structural changes a cancer cell undergoes after exposure to an active marine natural product, providing important clues about how the drug works and aiding in evaluating its therapeutic potential.



Esther Guzmán, Ph.D., with the High Content Analysis System

The system will also enable Dr. Guzmán to find compounds that target cancer stem cells, which are perhaps only 1% of the cells inside a tumor, but are the cells that if not killed can rapidly regenerate into a new tumor. The sensitivity of the new instrument will allow her to selectively see this population of cells and identify natural products that can kill them.

The programs of MBBR Research Professors Shirley Pomponi, Ph.D., and Peter McCarthy, Ph.D., who study sponge cell biology and marine microbiology, respectively, also are among the Harbor Branch research areas that will benefit from the new equipment. Dr. Pomponi will use the HCI to study the production of natural products by sponge cells. Sponges are one of the most productive sources of new natural products. Dr. McCarthy will use the HCI to discover new antibiotics that can kill drug-resistant bacteria such as MRSA. The purchase of the system is an investment that will enhance existing research and enable the pursuit of funding for new projects, with potential benefits that include new and improved tools to fight disease, deeper understanding of natural processes and stronger Harbor Branch research programs.

TRAINING THE NEXT GENERATION OF OCEAN SCIENTISTS AND ENGINEERS



Marilyn Link of the Link Foundation (left) and Erik Joh of the Skelly Foundation along with Dr. Andy Clark of the Link Foundation (right) with the 2014 FAU Harbor Branch summer interns.

SUCCESSFUL SUMMER INTERN SEASON

2014 proved to be another successful year for the Harbor Branch summer internship program. On July 31, interns presented results of their 10 weeks of research. Examples of some of the work included monitoring water quality using an underwater tow body vehicle, culturing new species in an integrated multi-trophic aquaculture system as well as data analysis and modeling of the St. Lucie Estuary.

NEW PROGRAM ENGAGES STUDENTS IN LAGOON RESEARCH

The inaugural year of the Indian River County Junior Scientist Program (JSP) is being deemed a success. The JSP is a partnership between FAU Harbor Branch and the Indian River Land Trust, which engages local high school students in scientific research

to manage waterfront properties and habitats along the lagoon in Indian River County. Ten students participated, with one of the high points being three team-authored posters at the Indian River Lagoon Symposium in February, 2014. Some of 2013-14's students returned this year and new ones were recruited over the summer. Funding was made possible through an Impact 100 grant and fundraising by the Land Trust and Harbor Branch. In November, JSP was awarded a grant for two years of new funding from Wells Fargo, allocated through the National Fish and Wildlife Federation.

HARBOR BRANCH PARTNERS FOR SUMMER PROGRAM

In summer 2014, Harbor Branch partnered with FAU Pine Jog for the Summer Research Institutes "H2O to Go," a program designed to enhance learning for high school students and

showcase the research being conducted throughout the university. Students who participated got to work side-by-side with scientists, spending time at various campuses and

research sites of FAU, including Harbor Branch and the Riverwoods Learning Center. The program provided first-hand experience with Florida ecosystems through activities like kayaking and seining in the Indian River Lagoon, a pontoon ride down the Kissimmee River and a trip to Lake Okeechobee. The goal of the summer experience was to increase awareness of environmental issues among high school students, as well as encourage and motivate the next generation of scientists.



Students with the "H2O to Go" program conduct hands-on research in the Indian River Lagoon.

PARTNERING IN INFORMAL EDUCATION & PUBLIC OUTREACH

PARTNERING IN INFORMAL EDUCATION & PUBLIC OUTREACH



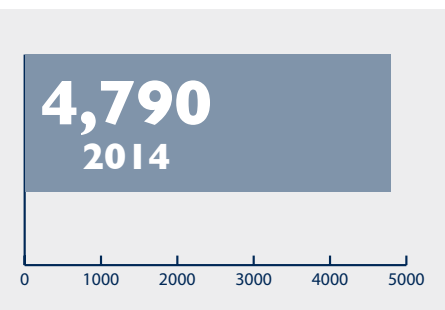
Harbor Branch Maintenance Mechanics Jay Adams and Pete Stock assist with the pompano harvest and donation.

aquaculture industry in the United States and globally.

The mission of Harvest Food & Outreach is to provide a hand for those in need, helping them to break free from poverty by offering hunger relief, crisis care, transformative education and employment training opportunities.

Volunteer Hours

Harbor Branch relies on the hard work of 156 dedicated volunteers who donate their time and talents in a variety of ways.



were met, researchers donated the crop of more than 6,000 pompano to the Harvest Food & Outreach Center in Indian River County.

Marine aquaculture in the United States contributes to seafood supply, supports commercial fisheries, enhances habitat and at-risk species, and maintains economic activity in coastal communities and at working waterfronts in every coastal state. The FAU Harbor Branch Aquaculture and Stock Enhancement Program works to advance seafood production, ecosystem restoration and development of techniques for the

FISH FARMING PROJECT HELPS NEEDY FAMILIES

What began as a project to test sustainable aquaculture methods turned into meals for local families in need. FAU Harbor Branch's Aquaculture & Stock Enhancement Program's Paul Wills, Ph.D., received a grant from the Florida Department of Agriculture and Consumer Services Aquaculture Review Council to produce a market-sized crop of pompano in a sustainable, land-based system. Once the project objectives

FoHB UPDATE

The Friends of Harbor Branch (FoHB) program provides members with outreach activities that meld art, conservation and environmental science that reflect FAU Harbor Branch research and innovation. In 2014, members and their guests visited sites including Adams Ranch, Archie Carr National Wildlife Refuge, Loggerhead Marine Rehabilitation Center and the Old Vero Man Dig Site. Participants learned about waterway restoration, wise stewardship of natural resources, successful monitoring of marine animals and the analysis of ancient DNA. Follow-up presentations by experts provided additional information about the Harbor Branch connection to these important topics.

FoHB participated in several beach clean ups and oyster and mangrove projects including the International Coastal Cleanup and Indian River Lagoon Spoil Island Conservation and Enhancement Program. In addition, a series of nighttime beach walks were sponsored by FoHB in collaboration with the Sea Turtle Conservancy and Friends of the Carr Refuge. In July, members and their guests traveled



FoHB members enjoy frequent kayaking trips on the IRL and in locations throughout southeast Florida.

to Merritt Island to hear Harbor Branch scientist Jim Masterson, Ph.D., discuss bioluminescence before paddling on the Mosquito Lagoon and experiencing the phenomenon firsthand.

Fort Pierce Mayor Linda Hudson led a tour of the area's historic downtown that culminated with a dinner presentation by Harbor Branch scientists and local divers about the evening's menu item – lionfish - an

invasive species found in the Indian River Lagoon.

In 2015, FoHB activities will include viewing shoreline management issues with trips to some of Florida's coastline communities. Trips, tours and presentations include viewing of the exhibit *Kiss of the Oceans: The Meeting of the Atlantic and the Pacific* – the story of the construction of the Panama Canal, a guided tour of St. Lucie Village, a series of motorized

kayak adventures and a stage performance of the book *A Land Remembered* narrated by Patrick Smith, Jr.

Members continue to enjoy the reciprocal benefit that accompanies their membership. More than 350 other museums and science institutions worldwide honor the FoHB membership card with free entry and other discounts.



FoHB members with the Marine Mammal Research and Conservation program team and the new marine mammal ambulance.

CULTIVATING PARTNERSHIPS FOR RESEARCH & DEVELOPMENT

CULTIVATING PARTNERSHIPS FOR RESEARCH & DEVELOPMENT

SEEKING INPUT FROM EXPERTS FOR WATER QUALITY MONITORING PROJECT

Water experts from across the region gathered at FAU Harbor Branch to provide input on which areas of the Indian River Lagoon and St. Lucie Estuary are in most need of monitoring from new Land Ocean Biogeochemical Observatory (LOBO) units funded by the state and the

the company that manufactures the water quality monitoring units and provides support once they are installed. Attendees also heard a presentation by Eric Milbrandt, Ph.D. from the Sanibel-Captiva Conservation Foundation about the organization's experience with its LOBO-based monitoring system. FAU Harbor Branch scientist, Dennis Hanisak, Ph.D., discussed the Harbor Branch LOBO network and explained how the new devices will expand and enhance research capabilities for the region. The meeting ended with a roundtable discussion, moderated by

Natural Resource Council Director Rae Ann Wessel, on the proposed locations of six new state-funded LOBO units in the St. Lucie Estuary and three HBOIF-funded units to be placed in Indian River and St. Lucie Counties.

The organizations

that participated included: the Florida Department of Environmental Protection, US Army Corps, Florida Fish & Wildlife Conservation Commission, South Florida and St. Johns River Water Management Districts, Brevard, Indian River,

St. Lucie and Martin Counties, University of Florida Water Institute, Florida Institute of Technology, Florida Oceanographic Society, the Smithsonian Marine Station and Ocean Research & Conservation Association.

HARBOR BRANCH TO PARTNER ON ARCHAEOLOGICAL DIG

FAU Harbor Branch will soon play a role in researching a piece of the Ice Age on the Treasure Coast. The Old Vero Man site has been called one of the most important finds in the history of North American archaeology, and has been carefully overseen since 2010 by the Old Vero Ice Age Sites Committee (OVIASC). Last year, the OVIASC hand-picked the experts at Mercyhurst University's Archaeological Institute to begin



Representatives from Mercyhurst, OVIASC and FAU Harbor Branch sign the Memorandum of Understanding.

exploring this historic site, and now, they've chosen the scientists who study ancient DNA at HBOI to process

some of the recovered bones.

In September, a Memorandum of Understanding was signed between OVIASC, Harbor Branch and Mercyhurst University, paving the way for Mercyhurst to send bones that are found at the Old Vero Man site to Harbor Branch's ancient DNA lab for faculty and staff to process. Harbor Branch is home to one of the only ancient DNA labs of its kind in the country, and just happens to be within ten miles of the dig site. Archaeologists and students will be back on the site searching for more artifacts in January, 2015.

THIRD YEAR OF LAGOON EVENTS A SUCCESS

Harbor Branch, with support from the Harbor Branch Oceanographic Institute Foundation (HBOIF), hosted its third annual Indian River Lagoon Series, February 6-7, 2014. The series kicked off with **The Indian River Lagoon Symposium 2014: Lagoon Biodiversity** which drew 300 scientists, students, water managers and interested public for



An IRL Symposium presentation takes place in the FAU Harbor Branch Johnson Education Center auditorium.

a total of 61 presentations in the Johnson Education Center. The annual symposium provides a forum for discussing lagoon science and its application to management of the lagoon. A "Meet the Scientists" poster session followed the symposium. Reporters with Scripps Treasure Coast Newspapers and researchers with Voss Laboratories live-Tweeted throughout the day using #IRLSymposium. The Fourth annual IRL Symposium is scheduled for February 5, 2014.

The week culminated with HBOIF's annual *Love Your Lagoon* dinner (for more info, see page 16).

COLLABORATION GIVES STUDENTS HANDS-ON RESEARCH EXPERIENCE

A group of students from Fort Pierce Westwood High School's Marine and Oceanographic Academy, located at Harbor Branch, are getting hands-on research experience as part of a collaboration between the Treasure Coast Education Research



Development Authority, Florida Atlantic University, Harbor Branch and the St. Lucie County School District. In fall of 2014, more than 40 students in the Advanced Placement Environmental Studies (APES) class, led by HBOI scientist Tracy Griffin and Westwood's MOA program facilitator and teacher Kasey Grace, conducted research at the seven-acre lake on the site of the Treasure Coast Research Park in Fort Pierce. The students took water samples, tested water quality, measured and identified shoreline vegetation and algae density and determined animal abundance. The project also provided students the opportunity to work with highly respected research scientists affiliated with the Research Park. The APES students will continue their research at the lake throughout the rest of the 2014-15 school year.



Water and estuary experts discuss LOBO placement in the Indian River Lagoon.

Harbor Branch Oceanographic Institute Foundation (HBOIF). In their first time convening, the Indian River Lagoon Observatory Science & Technology Advisory Committee learned more about the LOBOs from Dave Gillett with Sea-Bird Coastal,



A LETTER FROM THE CHAIR

Warm greetings on behalf of the Harbor Branch Oceanographic Institute Foundation's Board of Directors!

The mission of the Harbor Branch Oceanographic Institute Foundation (HBOIF) is to support FAU's Harbor Branch through impact funding for its research and education in marine science and ocean engineering. We are excited to share some news about our significant accomplishments and funding initiatives over the past year:

EXPANDING HARBOR BRANCH'S WATER QUALITY MONITORING NETWORK

A key component of FAU Harbor Branch's Indian River Lagoon Observatory program is building an advanced water quality monitoring network in the Indian River Lagoon (IRL) to identify threats to the ecosystem. The HBOIF Board of Directors recognized the important role this advanced technology plays in taking IRL research efforts to the next level, for Harbor Branch scientists and the entire research community along the lagoon. In April 2014, the board awarded Harbor Branch with funding in the amount of **\$559,295** for the purchase of three additional Land/Ocean Biogeochemical Observatory (LOBO) units to be deployed in St. Lucie and Indian River Counties to expand existing and planned IRL water quality monitoring efforts. Please refer to page 7 for details on the network.

GROWING SUPPORT FOR THE ANNUAL LOVE YOUR LAGOON EVENT

The Foundation's third annual Love Your Lagoon event, held in February 2014, was attended by almost 300 people and net proceeds exceeded the

prior year by over 200%. Since the inception of this signature fundraising event, proceeds have enabled the following innovative IRL research and education programming:

2012 Love Your Lagoon

\$11,836 Indian River Lagoon Symposium, February 10-11, 2012
\$22,340 Indian River Lagoon Research and Education in 2012-2013

2013 Love Your Lagoon

\$9,294 Indian River Lagoon Symposium, February 7-8, 2013
\$37,364 Indian River Lagoon Research and Education in 2013
Our Global Estuaries Workshop, October 21-23, 2013

2014 Love Your Lagoon

\$8,366 Luncheon on the Lagoon, January 23, 2014 featuring a pro bono keynote presentation by the 2012 Love Your Lagoon honoree Nathaniel Reed
\$10,017 Indian River Lagoon Symposium, February 6-7, 2014
\$80,995 2014-15 Indian River Lagoon Graduate Student Research Fellowships Program



From left: Dr. Peter McCarthy, 2014-15 Indian River Lagoon Graduate Student Research Fellowship recipients Alycia Shatters, Alison Feibel, Phyllis Klarmann, Kathryn Tiling, Gabby Barbarite and Jacob Berninger, HBOIF Director of Operations Colleen Brennan and HBOIF President & CEO Katha Kissman.

BUILDING CAPACITY

The HBOIF Board also announced in April multi-year grants funding at an annual level of **\$874,950** beginning in FY15 designed for internal capacity building for Harbor Branch's work on the issues of interdependence of the world's population and the ocean. Through this major impact funding, HBOIF has committed to directly supporting over 100 current and to-be-hired scientists, project managers, and technicians under the three research themes of Ocean Exploration, Understanding Marine Ecosystem Function, and Wise Use of Marine Resources. Areas of research include aquaculture, marine biomedical and biotechnology research, marine ecosystem health, marine mammals, ocean dynamics and modeling and ocean engineering. This is in addition to **\$45,000** in annual ongoing operational support previously granted. Support of this kind is essential to building a strong infrastructure for the Institute.

STEWARDED THE SPECIALTY LICENSE PLATES

HBOIF is the named recipient of the revenue generated from the four Harbor Branch specialty license plates. Owned by more than 140,000 Florida residents, the PROTECT WILD DOLPHINS, PROTECT FLORIDA WHALES, FLORIDA AQUACULTURE and SAVE OUR SEAS plates are among the state's most popular and provide nearly \$3 million for Harbor Branch research annually. Please refer to page 21 for an update on plate-funded projects.

We welcome others – governmental agencies, foundations, corporations and small businesses, and individuals – to join us in supporting FAU Harbor Branch Oceanographic Institute's important work in *Ocean Science for a Better World*®.

Thank you,

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WAYS TO GIVE

Attend a Harbor Branch Event and Become a Friend

In addition to the Harbor Branch Foundation's *Love Your Lagoon* Dinner held each February in support of Indian River Lagoon research and outreach (more information at

www.indianriverlagoon.org), the Institute hosts a variety of events year-round. The Ocean Science Lecture Series and Friends of Harbor Branch membership and activities are great avenues to learn while having fun. Visit www.fau.edu/hboi for event listings.

Purchase a Harbor Branch Specialty License Plate

Proudly display your support for conserving Florida's vital ocean resources by purchasing one or more of our four Florida specialty license plates. The Harbor Branch Foundation directs proceeds from these plates to Harbor Branch ocean exploration, research, conservation and education.

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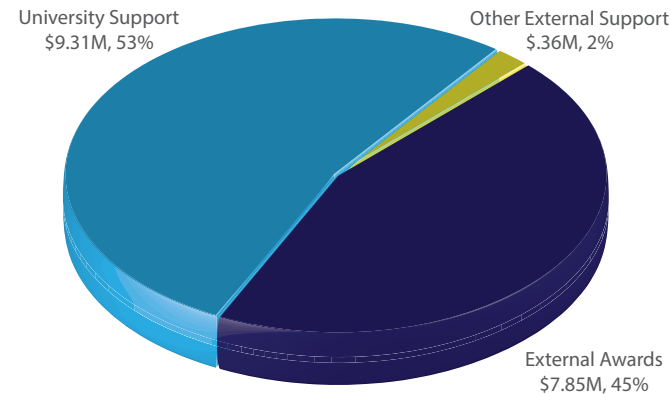
Harbor Branch researchers and educators depend on external funding to operate their research programs and train the next generation of scientists. Private gifts are essential for the continued growth and development of Harbor Branch. For more information, call the FAU Harbor Branch Development office at **772-242-2445**.

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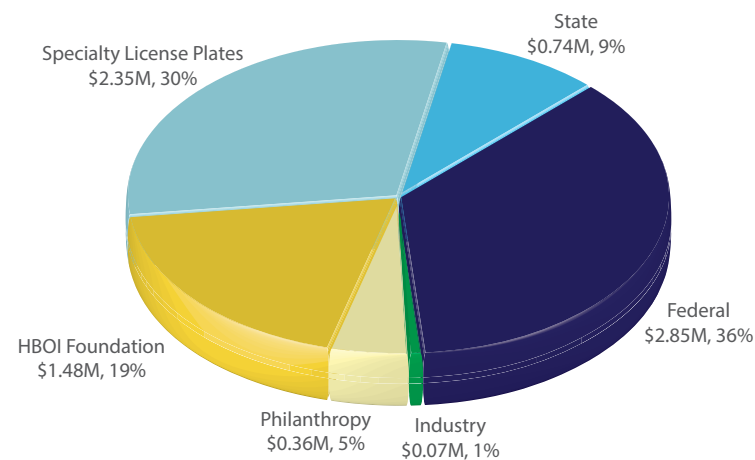
Legacy or planned giving ensures future income streams for special projects and initiatives for Harbor Branch. For more information contact Katha Kissman, President & CEO, Harbor Branch Oceanographic Institute, at kkissman@hboifoundation.org or 772-466-9876, ext. 200.

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See pages 16-17 for information on funding programs

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SPECIALTY LICENSE PLATE FY 2015 UPDATE

These four Florida specialty license plates provide funding for the innovative research conducted by the scientists and engineers at FAU Harbor Branch Oceanographic Institute. Proceeds from plate purchases support important research that brings solutions to needs expressed by Florida residents.



Established July 1, 2004

AQUACULTURE • \$346,620 FY2014 Revenue

The U.S. imports 91% of its seafood, about half of which is from aquaculture. Designed by marine life artist Guy Harvey, the Aquaculture plate supports FAU Harbor Branch researchers who advance the frontier of aquaculture innovation with cleaner, more efficient land-based systems, as well as vocational training to increase aquaculture's contribution to Florida's economy.



Established July 1, 2002

PROTECT FLORIDA WHALES • \$375,100 FY2014 Revenue

Several whale species can be found in Florida waters, including the most endangered of all great whales: the North Atlantic right whale. Designed by marine life artist and conservationist Wyland, the Protect Florida Whales plate supports FAU's study of right whale communication and behavior to minimize ship strikes, as well as Harbor Branch's 24/7 emergency response for whales that become stranded.



Established July 1, 1998

PROTECT WILD DOLPHINS • \$1,123,380 FY2014 Revenue

The Protect Wild Dolphins plate, which was designed by Istvan "Steve" Diossy, was the first specialty license plate to benefit Harbor Branch in 1998. In addition to enabling 24/7 emergency response for dolphins that become stranded or entangled in fishing gear or other debris, this plate supports FAU Harbor Branch dolphin research that sheds light on human health threats such as high levels of mercury or antibiotic-resistant bacteria in the water. This plate also supports dolphin life history and population biology and behavioral ecology.



Established July 1, 2004

SAVE OUR SEAS • \$769,205 FY2014 Revenue

The Indian River Lagoon generates an estimated \$3.5 billion economic impact yearly, but a variety of factors are damaging its vitality. The Guy Harvey-designed Save Our Seas license plate funds FAU Harbor Branch research in the lagoon and the Indian River Lagoon Observatory program (for more info, see page 7). The Save Our Seas plate also supports Harbor Branch coral reef research as well as microbial source tracking in the Indian River Lagoon.

To learn more about the Specialty License plates visit www.MYFLORIDAPLATE.COM

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- GIGA Community of Scientists (includes Pomponi, S.) (2014). The Global Invertebrate Genomics Alliance (GIGA): developing community resources to study diverse invertebrate genomes. **Journal of Heredity**, 105(1):1-18. doi:10.1093/jhered/est084
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