

Belugas and Birds

Belugas on the horizon

Every summer for the last five years, Associate Research Professor Greg O’Corry-Crowe, Ph.D., has left Florida’s tropical heat for Alaska. This year he went as far north as one can go in Alaska, spending part of the summer on the Chukchi Sea, the body of water hemmed in by the Arctic Ocean to the north and the Bering Strait to the south. The objective was to continue the beluga whale population study that he has been conducting for 18 years. At first it didn’t look promising. For weeks, Dr. O’Corry-Crowe and his colleagues anxiously watched precious time slip away as erratic pack ice kept the belugas out of reach. Eventually, the rest of the team had to leave, but Greg stayed on and waited for conditions to improve. His patience was rewarded, allowing him to work with the native community and Dr. Robert Suydam (North Slope Borough Department of Wildlife Management) to collect precious samples from northbound migrating whales that will support a suite of studies on genetic

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Dr. O’Corry-Crowe with Guillemot chicks



Sabine's gull at nesting colony on Cooper Island, the Beaufort Sea

structure, foraging ecology, health, contaminants and adaptation – key elements of a multidisciplinary program to understand the effects of a changing Arctic on marine apex predators and the communities who depend on them.

Birds in boxes

Finished with this year's beluga field work, Greg went from the Chukchi Sea to the Beaufort Sea to work with Dr. George Divoky on seabirds at his remote research outpost on Cooper Island, 25 miles east of Barrow. If the Chukchi Sea study sites are seriously remote, Cooper Island is positively desolate. Other than Drs. Divoky and O'Corry-Crowe, the only mammals on that island were the occasional polar bears. In fact, to protect the birds from polar bears, Dr. Divoky sets out hardened-plastic camera cases that are used by the black guillemots as nesting

Broken summer pack ice in the Chukchi Sea

boxes. Dr. Divoky, who has spent 40 years conducting behavioral studies of this rare bird, invited Dr. O'Corry-Crowe to spend time observing the birds. The intent was to determine how genetic and ecological tools can complement Dr. Divoky's longterm study.

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Guillemot chicks



Three adult black guillemots on breeding colony, Cooper Island: note the leg bands used as individual identifiers

If there are no humans, can there be human impact?

By understanding more about the fitness of individual birds Drs. Divoky and O'Corry-Crowe can begin to unlock the factors that influence fitness and population viability and ultimately ecosystem structure and function.

The objective – whether studying belugas or birds – is to assess the extent of human impact, in these, some of the most remote corners of the planet.

Executive Director's Report



Margaret S. Leinen, Ph.D.

Momentum has been building this year. We moved back into the renovated Edwin A. Link building, we have envisioned what Harbor Branch can contribute to science and society in the next five years in a new research plan, we hosted an open house on National Estuaries Day, and soon thereafter we joined Florida Atlantic University in celebrating the 50th anniversary of the university and the 40th anniversary of Harbor Branch. And that's just the beginning; there's a lot more on the horizon.

FAU-Harbor Branch scientists and engineers have been doing much more than attending events and planning for the future. Their work continues from the poles to the tropics, as you will see in these pages. For instance, on the North Slope of Alaska, our scientists studied beluga whales. On the continental slope off Florida's southwest tip, our researchers discovered deep coral reefs. Our engineers, working with unmanned, autonomous vehicles provided by Battelle Memorial Institute's Bluefin Robotics, logged over 450 miles to develop long term, wide ranging understanding of critical marine habitats in the Gulf of Mexico.

The faculty and staff of Harbor Branch join me in wishing you all the best for the season and the new year. We also look forward to seeing you at our Ocean Science Lecture Series, the dedication of the new marine science building on January 24, and our first gala event, *Love Your Lagoon*, on February 10. Momentum is building.





This rocky reef found off the Florida Keys, 800 ft deep, is millions of years old and provides habitat to a variety of fish and invertebrates including roughy fish, venus fly-trap anemones, crinoids, seastars, black corals, sea whips and sponges

Florida Shelf Edge Exploration (FLoSEE) Expedition Discovers New Deep Coral Habitats

Recently, scientists from FAU's Harbor Branch Oceanographic Institute led an expedition to collect samples, environmental data and images from some of Florida's previously unmapped and unexplored deep coral ecosystems. The NOAA Cooperative Institute for Ocean Exploration, Research and Technology (CIOERT) expedition was co-funded by NOAA's Office of Ocean Exploration and Research and the NOAA Deep Sea Coral Research and Technology Program.

The goal of the Florida Shelf Edge Exploration II (FLoSEE II) expedition, carried out aboard NOAA's

R/V *Nancy Foster* between September 19th and September 30th, was to map and characterize the fish communities of some of Florida's deepest coral reefs. In order to study these ecosystems—some at depths reaching 600 meters—Harbor Branch scientists and colleagues from the University of Connecticut utilized the *Kraken 2 (K2)* remotely operated vehicle (ROV). *K2* completed 26 dives, overcoming not only the challenges of ocean depth but also the challenges of working in the strong flow of the Florida Current.

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*The fragile coral (white bush) **Lophelia pertusa** grows as bushes up to 3 ft which cap this newly discovered 150 ft reef off Marathon Key at a depth of 1,800 ft; the coral provides habitat for hundreds of species of invertebrates and fish such as this morid codling*

The first leg of the cruise focused on the Pulley Ridge region off Naples, Florida – the deepest known tropical coral reef ecosystem off the southeast US. Through sonar mapping and the use of the ROV's high-definition camera, FLOSEE scientists discovered extensive essential habitat along Pulley Ridge for various grouper species. They also collected evidence suggesting that the live coral cover in the area has declined dramatically since the 1990s when the US Geological Survey performed photographic transect surveys there.

The Marine Protected Areas (MPAs) off the Florida Keys were studied during the second leg of the expedition, including the East Hump Marine Protected Area and Pourtales Terrace.

K2 collected 100 hours of high-definition video and nearly 6,000 digital photographs over the course of the cruise, in addition to over 150 samples of invertebrates, fish and algae. Water quality data collections, plankton tows, laser optic plankton sensing and multibeam sonar surveys of the study areas were also conducted aboard the *Nancy Foster*.

Additionally, Harbor Branch engineers launched an autonomous Bluefin glider (see p. 11) during the mission to embark on a month-long deployment in the Florida Current to swim up and down the water column, sampling the environment, all the while transmitting data back to Harbor Branch via satellite.



These stylaster corals come in a variety of pastel hues and form extensive fields covering deep sea mounds on Pourtales Terrace off the Florida Keys





Why We Love Our Job

What's it like to work at Harbor Branch? Here's how two staffers see it.

By Jennifer Sandle & Brynne Talas

On March 15th, 2010, we stepped into the Marine Science Building for the first time. Not knowing what to expect, we were nervous yet hopeful. Today, we view our experiences with a grateful smile. We are chemistry technicians for the Marine Biomedical & Biotechnology Research Program, administered by Dr. Amy Wright. Using a deep-water marine sponge, our assignment is to extract compounds, purify them via a series of chromatography runs (or separation of mixtures) and enter them into a "library". The compounds are passed on to other team members, whom we hope one day will realize the dream of saving pancreatic cancer victims. So how do we do it?

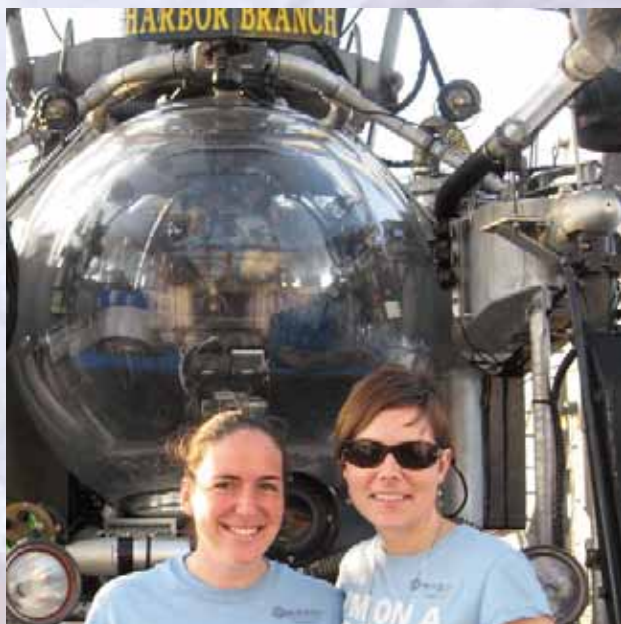
The sponges we analyze were collected years ago, when we were only toddlers. This job, however, afforded us an amazing opportunity to board the *R/V Seward Johnson* for its final Harbor Branch research cruise. We plunged to about 300 feet below the surface in the *Johnson-Sea-Link* submersible and saw what it was like to select and harvest the attractive sponges with the robotic "hands" of the submersible. This was exciting, but the most thrilling part of our job is the opportunity to find a compound that will save lives. *(Story continues on next page)*



Jennifer Sandle holds a collection bucket containing a sea fan during the 2010 Deepwater Horizon Oil Spill Research Expedition

“Any compound can be exciting!”

– Dr. Amy Wright



Sandle and Talas in front of the Johnson-Sea-Link submersible

WHY WE LOVE OUR JOB, CONTINUED

In order to analyze the compounds, we first use chromatography equipment to see if the sponge contains any compounds. If it does, we use a liquid chromatography mass spectrometer to determine the molecular weights of the compounds. With these molecular weights, we search a “compound database” to try to identify the compounds. For new compounds, we want to know their structures, which brings us to the nuclear magnetic resonance instrument (NMR). After running a small sample on the NMR, we analyze the data, which comprises many “peaks” at different numerical values (chemical shifts). These peaks are characteristic for the chemical compounds and help define the structures. Dr. Wright and our amazing postdoctoral investigators continue the quest from here. While we hope that someday we will find the cure, we also agree with Dr. Wright: “Any compound can be exciting!”

Young Alumnus of the Year: Josh Voss

Dr. Joshua Voss was one of 10 Elon University alumni who were honored by Elon’s alumni association at a ceremony on October 22. Josh was one of two honorees in the Young Alumnus category. **Congratulations, Josh!**

Below is the Elon University Alumni Association’s announcement of Dr. Voss’ award:

Young Alumnus of the Year Award: Dr. Joshua D. Voss '01

A Florida native, Josh Voss spent much of his childhood on the shores of the Sunshine State and he has dedicated his career to conducting significant marine research that protects and preserves his beloved coastline. Josh currently serves as an assistant research professor as part of the Robertson Coral Reef program team at Florida Atlantic University’s Harbor Branch Oceanographic Institute, where he has developed cutting-edge techniques

that assess the impact of climate change and oil exposure on corals. The techniques were invaluable in the summer of 2010, when Josh was assigned to lead a project to study how the corals in the West Florida Shelf were affected by the Deepwater Horizon oil spill.

During his work, Josh was featured in segments that aired on NBC’s “Today” and “Dateline” news shows, as well as The Weather Channel and MSNBC. The important work undertaken by Josh and his team will be used in the coming years as a baseline to determine the effect of the oil spill on marine environments and to support individual and government efforts to recoup damages.



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*This sponge, **Aphrocallistes beatrix**, is the source of **aphrocallistin**, a compound that inhibits the growth of a resistant breast cancer cell line, and that has served as a one-of-a-kind research topic for a student intern working under Dr. Amy Wright*

THE POWER OF YOUR DIRECT RESEARCH SUPPORT

Your response to last year's Deepwater Horizon disaster appeal is serving two very important ends: Helping advance our research and understanding of perhaps the most significant environmental tragedy of our time, and providing rare and dynamic educational opportunities to young scholars who may join the next generation of marine science researchers. Two Harbor Branch Scholars Awards – one In Memory of Donald Antaya and one In Memory of John J. and Cornelia V. Gibson – have fostered research into the effects of oil and dispersant on crustaceans, mollusks and coral. Two additional research assistantships funded by many generous donors have enabled investigations of sponge microbial populations and oyster reef communities.

As you may have read earlier in this issue, both legs of the recent FLOSEE II expedition included graduate students who had the opportunity to hone their lab and field skills through active participation and immersion during this six-day, multi-disciplinary research and monitoring cruise. The at-sea experience was followed by a rigorous, laboratory-based research course.

The goal of the Immersion in Ocean Science program is to introduce students to a variety of research techniques used in marine science. To get a sense of the work performed on the cruise and the students' extraordinary experiences, read more about it by going to the FLOSEE website: <http://flosee2.wordpress.com/>

Next year's expedition will not have adequate funds available for this kind of student participation. We are asking for your support. As you consider your year-end giving, we hope you will consider supporting the important work we do to train the next generation of ocean scientists.

For more information, please give Janet Alford a call, 772-466-9876. She can provide more background on how you can make a difference to an aspiring marine science researcher by making a gift to the Harbor Branch Oceanographic Institute – Immersion in Ocean Science program. Or make your gift online at www.fau.edu/hboi/Donate.php

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SPECIALTY LICENSE PLATE UPDATE



Many people are surprised to learn how much the four Florida specialty license plates (SLP) contribute to Harbor Branch research. Those colorful plates do more than dress up your bumper – they fund work that is vital to understanding and conserving our estuaries and seas. Although there are more than 122 Florida SLPs (and counting), and we compete against universities and professional sports teams, two of our plates are among the 10 most popular. Why? We think it's because people know that their investment is making a difference.

For the 2011 fiscal year (7/1/10 – 6/30/11), we are pleased to report the following revenue:

PROTECT WILD DOLPHINS: \$1,265,240 – Supports the rescue and rehabilitation of sick or injured dolphins, and important education and research initiatives that increase awareness about the need to protect wild dolphins and their threatened coastal habitat

SAVE OUR SEAS: \$760,675 – Designed by Guy Harvey, the “shark plate” supports Florida marine ecosystems research and education, with emphasis on the estuary and coral reef ecology that is essential to healthy populations of fish and other marine life

PROTECT FLORIDA WHALES: \$414,825 – This Wyland-designed plate supports research, rescue, rehabilitation and education efforts to conserve the 12 whale species that inhabit Florida waters, including the Northern Right Whale – the most endangered of all great whale species

AQUACULTURE: \$361,000 – Also designed by Guy Harvey, this plate sporting the clownfish supports development of environmentally friendly fish farming to meet the ever-increasing demand for affordable, healthy seafood while easing harvest pressure on wild populations

Funds from every purchase and renewal of these plates support:

1. Postdoctoral Marine and Environmental Initiative Program - Postdoctoral investigators are early-career researchers who bring new perspectives to research programs, and SLP proceeds help bring this valuable resource to Harbor Branch

2. Core programs – These initiatives are at the heart of Harbor Branch marine mammal research, and include the Health & Environmental Risk Assessment; Strandings, Necropsy and Rehabilitation; Epidemiology and Population Health; Population Biology and Behavioral Ecology; and Right Whale Research

3. Competitive programs – A portion of SLP proceeds are awarded to Harbor Branch researchers through a competitive proposal process that evaluates and funds projects based on scientific merit

4. Cost share – Some funding opportunities require the institute to provide a portion of the total project cost, and using SLP proceeds to secure additional resources in this manner is a powerful use of the funds

Please visit www.MyFloridaPlate.org or contact our **Director of Marketing of Specialty License Plates (a.k.a. Plate Lady) Carol Harwood at 772-242-2222 or charwool1@fau.edu**, and she will walk you through the process of getting one of these plates on your vehicle. Plus, you will receive a 2 GB USB drive designed to match your plate.

Harbor Branch SLPs also make great gifts for the ocean lover in your life, as well as for the person who has everything. Purchase gift certificates at www.MyFloridaPlate.org for the gift that keeps on giving. Every plate makes a difference and you can too!

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INDIAN RIVER LAGOON SYMPOSIUM AND GALA

Mark your calendar for the inaugural Indian River Lagoon Symposium and gala at Harbor Branch. The February 9 Symposium will bring together IRL research and stewardship organizations to share information and discuss management efforts via oral presentations, panel discussions and poster sessions. The intent is to establish an annual event that is open to decision makers and the public to help narrow gaps between research and application.

A fundraising gala, **Love Your Lagoon**, will be held the evening of February 10, and will feature dining (sustainable seafood and other fresh-from-the-field items) and dancing under the stars. Come spend a beautiful evening on the Harbor Branch channel with a live auction and special honoree Nathaniel Reed, Vice Chairman of the Everglades Foundation.



We are proud to announce our generous sponsors to date for this inaugural event hosted by The Harbor Branch Oceanographic Institute Foundation:

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Individual tickets are \$125 and are available at www.indianriverlagoon.org. For information about other support and sponsorship opportunities, contact Foundation Executive Director Janet Alford at 772-466-9876 or jmalford@hboifoundation.org.

Harbor Branch and Bluefin Robotics Collaborate to Achieve Enduring Ocean Monitoring Presence



Bluefin Robotics, a Massachusetts-based autonomous underwater vehicle (AUV) provider, is working with Harbor Branch to expand the use of AUVs to carry out monitoring of events, phenomena and processes in the oceans that require greater endurance and continuity than a conventional, episodic research cruise allows. This phase of the project relies on using Bluefin's Spray Glider AUVs.

Six feet long and eight inches in diameter, the torpedo-shaped vehicle has two straight wings amidships and a tailfin holding an antenna and a strobe. The battery powered vehicle has several compartments designed to accommodate instrumentation to support mission objectives. Easily launched by two people from even a recreational vessel, the Spray Glider receives instructions and transmits data when it is at the surface between dives. Missions include following a predetermined track while diving at a set rate, reaching a defined depth, ascending to the surface, sending data, getting new instructions and repeating the cycle. This pattern can be carried out for up to six months, giving this vehicle extraordinary endurance and ability to provide meaningful data

over timespans that provide robust datasets for analyses, modeling and predictions.

With seed funding from Bluefin's parent company, Battelle Memorial Institute, Harbor Branch and Bluefin will advance glider-based marine science, technology and education. Specifically, the partners' engineering challenge is to develop new and better instruments to measure parameters of interest. Harbor Branch will also work with Bluefin to design a new glider design rated to 3,000 meters (9,842 ft).

Of immediate interest and utility is the development of tools that can detect the presence of petroleum in the Gulf of Mexico, Brazilian Basin and offshore Angola. Current trials are assessing the physical environment in Florida's Gulf of Mexico waters in the aftermath of the Deepwater Horizon spill. Other science objectives include developing better ways of making sense of, and seeing the connections between the enormous amounts of data being collected, and beginning to understand the distribution of turbulent layers of water in the ocean.

HARBOR BRANCH

FLORIDA ATLANTIC UNIVERSITY*

Ocean Science for a Better World®

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Florida Atlantic University, a member of Florida's State University System, was established by legislative act in 1961. In addition to its original 850-acre campus in Boca Raton, FAU has campuses in Fort Lauderdale, Davie, Dania Beach, Jupiter, Port St. Lucie and Fort Pierce. Fully accredited by the Southern Association of Colleges and Schools, FAU is currently servicing 28,000 regularly enrolled, degree-seeking students through its 10 colleges. FAU's Harbor Branch Oceanographic Institute is dedicated to exploring the world's oceans—integrating the science and technology of the sea with the needs of humankind. Harbor Branch is involved in research and education in the marine sciences; biological, chemical, and environmental sciences; marine biomedical sciences; marine mammal conservation; aquaculture; and ocean engineering.



Visit the Harbor Branch Ocean Discovery Center!



Gift Shop and Friends of Harbor Branch program office located on site.

Hours: Monday-Friday, 10 a.m. to 5 p.m.; Saturday 10 a.m. to 2 p.m.

Phone: 772-242-2293 • For group tours, please call 772-242-2417 for scheduling.

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