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HARTE
RESEARCH INSTITUTE
FOR GULF OF MEXICO STUDIES



ONEGULF

ANNUAL REPORT 2016

FROM THE EXECUTIVE DIRECTOR

Each year that I am privileged to be part of HRI, when I look back on what has been accomplished I am amazed that so much was done in so short a time. As we look forward to the upcoming year and think about our plans, I cannot imagine squeezing it all in. Yet we always do and usually more!

Our staff and researchers have been all over the map this year — from one end of the Gulf to the other — but always with the central theme of building coalitions and partnerships to realize our institute's vision for the Gulf. HRI is even officially on the map in the Gulf now with two new undersea features: the Harte Bank and Tunnell Mound. But just being there is never enough for HRI. EarthCube, a project on which one of our senior researchers, Felimon Gayanilo, is a co-lead, is helping us better understand the waters washing over these and other bottom features. Closer to shore, HRI continues to lead oyster recycling efforts both here and around the US, with practical tools and measurable success. Building partnerships for recycling oyster shell to assessing the health of the entire Gulf — both are within the scope of HRI's capability and capacity. Our RESTORE Center of Excellence, Texas OneGulf, has also moved from planning to implementing this year, and our consortium is already making a difference in understanding the Gulf by aiding the investigation of the mortality event at the Flower Gardens National Marine Sanctuary's East Bank.

Our focus in the upcoming year will build on much of the work we started this year. Our international work in both Mexico and Cuba will expand dramatically. Texas OneGulf will have all activities and projects well underway and producing results. Our singular focus for the first quarter of the new year will be the State of the Gulf Summit in late March. That event will bring together all of the themes central to HRI's purpose and mission. Combined with the launch of our new strategic plan, I can safely say next year will be an exciting one for all of us here at HRI.



Dr. Larry D. McKinney



HARTE RESEARCH INSTITUTE

HRI'S VISION A GULF OF MEXICO THAT IS ECOLOGICALLY AND ECONOMICALLY SUSTAINABLE

OUR MISSION SCIENCE DRIVEN SOLUTIONS FOR GULF OF MEXICO PROBLEMS

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OUTREACH

BLUE ON TOUR

FILM FESTIVAL

HRI found a new, enthusiastic audience for Gulf of Mexico conservation when it hosted its first-ever BLUE On Tour Film Festival Saturday, Jan. 23, 2016 at the American Bank Center. Dr. Sylvia Earle, noted marine conservation expert, Harte Research Institute for Gulf of Mexico Studies Founding Advisory Board Chair and National Geographic Society Explorer-in-Residence, served as a guest speaker at the event.

BLUE On Tour is a traveling festival and conservation initiative dedicated to screening featured films that highlight the importance of the ocean. BLUE On Tour–Corpus Christi was organized by a committee of two recent HRI Ph.D. graduates and two HRI doctoral candidates with diverse Gulf of Mexico research interests: Dr. Brittany Blomberg, who focuses on oyster reef restoration; Dr. Lauren Hutchison, who studies ecosystem services provided by marshes and mangroves; Elena Kobrinski, who examines the policies pertaining to offshore oil rig decommissioning; and Travis Washburn, who studies the Gulf seafloor and the effects of the Deepwater Horizon oil spill.

“I am very proud of our HRI graduate students for not only coming up with this idea but also executing it. My goal was for our students to develop a project where they would work as an interdisciplinary team and, as usual, they have far exceeded expectations,” said Dr. Larry McKinney, Executive Director of the Harte Research Institute.

The festival also allowed local filmmakers to screen their works alongside acclaimed filmmakers. The first-ever companion BLUE Gulf Film Competition and screening, held at TAMU-CC in November, showcased a dozen Gulf of Mexico-related short films submitted from across the region. The audience and student committee chose the top entries to be honored, awarded and highlighted during BLUE On Tour–Corpus Christi.



FILM FESTIVAL

The mission of the Blue Gulf Film Competition is to engage the Gulf of Mexico community through education and film and to showcase the work of local citizens and filmmakers.

- Viewer's Choice Award: Illusions of Plenty: Spawning Aggregations.
- Making Waves Award: All the Cups.
- Making Waves Award: Seagrass Savanna.

ABOUT THE WINNERS

Illusions of Plenty: Spawning Aggregations

Directed by: Jaime Rojo, Produced by: Brad Erisman & Octavio Aburto

Spawning aggregations are massive gatherings of fish for breeding, yet we are only beginning to understand their value for marine ecosystems and food security. A large marine fish known as Gulf Corvina offers insight into the importance of this behavior to fisheries and healthy marine ecosystems.

All the Cups

Directed & Produced by: Jace Tunnell

Six year old Jack narrates a short film about storm water debris flowing into Corpus Christi Bay, Texas, after a one-inch rainfall event. His message: "Please don't throw trash on the ground."

Seagrass Savanna

Directed & Produced by: Michael and Chelsey Crandall

Seagrass Savanna is a film about a graduate student named Savanna who studies seagrass in the Gulf of Mexico. In this film, we follow Savanna as she conducts her research in the lab and out in the seagrass beds.





SINK YOUR SHUCKS

"Sink Your Shucks," an oyster recycling program managed by HRI and the College of Science and Engineering (COSE) at TAMU-CC, celebrated its millionth pound of oyster shell rescued from the landfill to be repurposed as productive estuary habitat. To commemorate the occasion, "Sink Your Shucks" organizers, participants and HRI officials gathered at Groomer's Seafood in downtown Corpus Christi on Aug. 16, to dedicate a new trailer donated by the business to the recycling program.

"The program started off with a very selfish motivation," said Brad Lomax, President and CEO of Water Street Market, a restaurant and attraction conglomerate, and one of the program's founding partners. "I was throwing away 75 tons of oyster shell a year and I thought there had to be something we could do with this. For me, as a seafood operator, it's the perfect program. It's taking the waste of a product we use everyday to continue the life cycle of the product itself."

Founded in 2009, the oyster recycling program was the first in Texas that reclaims oyster shells from restaurants and returns them to our local

waters, providing the base structures necessary to form new reefs and habitat for fish, crabs and other organisms. With the help of volunteers, "Sink Your Shucks" has restored about 14 acres of oyster reef in the Copano and Aransas Bays.

"We've been in the business for a long time, and as we've gotten older, we've looked for sustainability projects to invest in," Groomer's Seafood President Rick Groomer said. "When we opened our facility in Corpus Christi, we were introduced to the 'Sink Your Shucks' oyster recycling program and it was perfectly up our alley. Oysters are the backbones of our bay system. It's what keeps it clean. It's what supports the fish population. We've done a million pounds of shell now and it can only get better from here."

The oyster recycling program was founded by Dr. Jennifer Pollack, Assistant Professor in the COSE Department of Life Sciences at Texas A&M-Corpus Christi and Dr. Paul Montagna, HRI's Endowed Chair for Ecosystems and Modeling. Today, Pollack runs the program with HRI Chief Operating Officer Gail Sutton.



DR. BRITTANY BLOMBERG



HRI Ph.D graduate Dr. Brittany Blomberg was honored as Outstanding Doctoral Student by the College of Graduate Studies at Texas A&M University-Corpus Christi at their awards luncheon in April.

The luncheon was a part of the third annual Graduate and Professional Student Appreciation Week (GPSAW) April 4–8, a week-long series of campus-wide events to honor and recognize the contributions of our graduate students. She was one of 9 students honored.

Blomberg, a student under HRI Ecosystems and Modelling Chair Dr. Paul Montagna and TAMU-CC Assistant Professor Dr. Jennifer Pollack, graduated in December 2015 and published her dissertation, “Evaluating the Success of Oyster Reef Restoration,” which queried the National Estuaries Restoration Inventory, a database established with the 2000 Estuary Restoration Act (ERA) and found issues in the reporting of restoration monitoring data. She is a Postdoctoral Researcher at Alabama’s Dauphin Island Sea Lab.



NEW FINDINGS IN RESTORATION MONITORING

The settlement of the Deepwater Horizon oil spill fines — the largest pollution penalty in history — will bring an unprecedented opportunity to spend billions of dollars on restoration projects in the Gulf of Mexico region. But new research by HRI graduate Dr. Brittany Blomberg has found that the fate remains unknown of hundreds of previous oyster reef restoration projects performed around the United States, an investment of more than \$45 million and thousands of hours of labor.

Blomberg’s dissertation, “Evaluating the Success of Oyster Reef Restoration,” queried the National Estuaries Restoration Inventory, a database established with the 2000 Estuary Restoration Act (ERA). The act made the nationwide restoration of degraded marine habitats a priority and required the tracking and dissemination of data related to those projects.

Blomberg reviewed database entries for more than 192 oyster restoration projects entered into the National Estuaries Restoration Inventory and found that despite federal requirements to the contrary, monitoring data for those projects were not available. Without that data, it is impossible for researchers to get a big-picture view of the effectiveness of oyster restoration projects over the last decade and develop better strategies for future projects, Blomberg said.

Oyster reefs, once dominant habitats in estuaries worldwide, have experienced greater losses than any other marine habitat. It’s estimated that 90 percent of oyster reef habitats have been lost, compared to historic abundance, Blomberg said. In the Gulf of Mexico, oyster habitat losses number anywhere from 50 to 80 percent. Because of this loss and the many benefits potential benefits oyster reefs offer, oyster reef restoration has become an increasingly popular coastal project.

Evaluating the effectiveness of restoration becomes especially urgent in light of the \$20.8 billion Deepwater Horizon oil spill settlement reached with BP in July. That settlement will send billions to the five Gulf States for restoration projects, with more than \$160 million earmarked for oyster restoration projects.

REPORT CARD & HEALTH

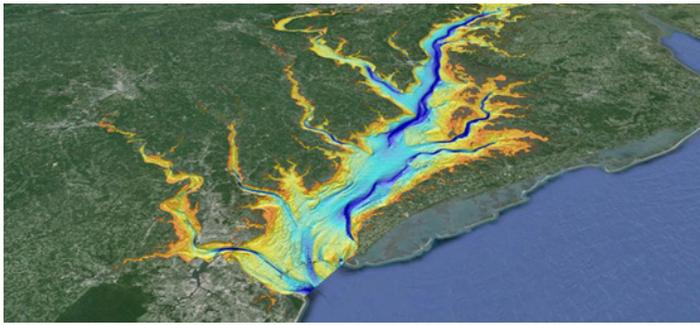
HEALTHY GULF INDICATORS

Scientists with HRI received a \$398,349 NOAA Restore Act Science Program grant to develop a framework for evaluating the health of the Gulf of Mexico ecosystem and its ties to the well-being of coastal residents. The work will be conducted in the Mission-Aransas National Estuarine Research Reserve to evaluate its large-scale application in the Gulf of Mexico.

HRI Executive Director Larry McKinney will lead a team of six co-investigators on a two-year project to identify a matrix of scientific indicators, conditions that can be measured to capture a picture of the overall health of the Gulf of Mexico ecosystem and the ecosystem services it provides. Ecosystem services are benefits that residents gain from the environment. They include recreational activities like fishing and surfing to the pure personal enjoyment derived from living on the coast.

Researchers will use these indicators to survey and evaluate current ecological health of the Gulf of Mexico and its ties to human well-being. Researchers plan to develop an assessment and decision framework that can be used by federal, state and local agencies, non-governmental organizations and other groups in support of ongoing restoration and protection projects in the Gulf of Mexico.

Co-investigators on the project include HRI Associate Director and Socio-economics Chair Dr. David Yoskowitz; HRI Associate Research Scientist Cristina Carollo; Mark A. Harwell and John H. Gentile of Harwell Gentile & Associates, LC; and Jace W. Tunnell and Kiersten Madden Stanzel of the Mission-Aransas NERR.



GULF OF MEXICO REPORT CARD

More than 40 scientists from across the Gulf Coast gathered at the HRI to kick off a new initiative that will assess the health and wellbeing of the Gulf of Mexico and develop a report card that tracks it.

The Gulf of Mexico is among the most ecologically diverse and valuable ecosystems in the world, but its health is being challenged by habitat loss, overfishing, oil spills, hypoxia off the coast of the Mississippi River, and global climate change, among other things. Gulf EcoHealth Metrics will be a scientifically-based representation of the environmental condition of the Gulf designed to be widely accessible and readily understandable by policy-makers, stakeholders, scientists, and most importantly, the American public.

The opening workshop, hosted in March 2017, brought a diverse group of researchers from across the Gulf Coast to HRI to discuss the framework for this Gulf report card and dive deeper into four metrics that will give a picture of Gulf health, including coastal birds, fisheries, oyster reefs, and seagrasses.

Dr. Mark Harwell, of Harwell Gentile & Associates, LC., led the workshop. Harwell and Dr. John H. Gentile have been involved in system-wide assessment and restoration efforts in the Florida Everglades. Also assisting with the project are Dr. William C. Dennison and Dr. R. Heath Kelsey of the University of Maryland Center for Environmental Science, who created a report card ranking the health of the Chesapeake Bay system, the Great Barrier Reef and, most recently, the Mississippi River.

The report card is scheduled for completion by August 2017.

ACIDIFICATION IMPACTS

A team of researchers led by HRI Ecosystems and Modeling Chair Dr. Paul Montagna received funds from the National Oceanic and Atmospheric Administration (NOAA) to investigate how drought and land use change affect coastal acidification. They will then use that information to predict how future acidification and changes in rain patterns will impact the estuarine ecosystems of Texas.

Oceans are becoming more acidic as a result of carbon dioxide (CO₂) seeping into open ocean surface waters. Add to that the stressors of low oxygen levels and increased nutrient runoff from land into coastal waters. Local estuaries in Texas have been experiencing short term coastal acidification events. These nearshore waters provide important habitat and act as nurseries for some of the Gulf's valued fish and shellfish species.

Texas A&M-Corpus Christi will receive \$482,381 to understand how changes in water flow may cause low-oxygen events, called hypoxia, and short-term ocean acidification in Texas estuaries.

HEALTHY ESTUARIES

With climate change looming, the pressure to properly manage freshwater resources in a way that supports growing cities while sustaining a healthy environment has never been greater. HRI Ecosystems and Modeling Chair Dr. Paul Montagna has launched a new ecosystem-based web tool created to educate the public and aid in freshwater management decisions, Freshwater Inflow Tools (FIT).

FIT, which is available free online at FreshwaterInflow.org, is a web-based tool created to support coastal management decisions by providing the best-available science on freshwater inflows, the flowing water from rivers and streams necessary to sustain healthy estuaries. The tool debuted at the Gulf of Mexico Alliance All Hands Meeting, a gathering of Gulf scientists, natural resource managers and agency officials, held June 14-16 in Baton Rouge.

Estuaries are among the most productive ecosystems on the planet, providing an estimated \$14 trillion worth of ecosystem goods and services. With increasing concerns about water quantity issues, a need arose for a clearinghouse of information about freshwater inflows that would be accessible for the public, natural resource managers, scientists and policy makers. Using the Texas estuaries as a study area, FIT provides information on freshwater inflow, our estuarine ecosystems and how these estuaries are affected by changing inflows.

The latest version of FIT was funded by a grant from the Mitchell Foundation. Initial funding to synthesize data and house the tool came from the National Oceanic and Atmospheric Administration (NOAA) and the U.S. Environmental Protection Agency.

PROJECTS



TEXAS ONEGULF

TEXAS ONEGULF RESPONSE

Experts with the Texas OneGulf Center of Excellence responded after a die-off of corals and other invertebrates was observed in the Gulf of Mexico's Flower Garden Banks National Marine Sanctuary off the coast of Galveston in June.

Sport divers aboard the M/V Fling reported the die-off after finding patches of white mat coating the previously vibrant reef. Led by HRI, Texas OneGulf collaborator Dr. Tony Knap, director of the Geochemical and Environmental Research Group at Texas A&M University, traveled with his team to begin the process of sampling and preparing to deploy underwater drones to help determine what could be causing the mortality event.

Knap received a Texas OneGulf grant to operate the underwater gliders primarily to study hypoxia, a phenomenon caused by freshwater and excess nutrients that create pockets of low oxygen that can kill less mobile marine species and drive others away from habitats. Knap deployed the gliders to patrol the Flower Garden Banks to collect data on water salinity, oxygen, temperature and chlorophyll levels and help research the cause of the die-off.

"These incidents are what the Texas OneGulf Center of Excellence was built for," Dr. Larry McKinney said. "We have a wide pool of experts with a variety of specialties that can be assembled and deployed to ensure that the best science is available to quickly respond to any challenges our Gulf might face."

TEXAS ONEGULF GRANTS

In June, the Texas OneGulf Center of Excellence funded more than \$2 million in research projects to address priority problems affecting the health and wellbeing of the Gulf of Mexico and those who depend on it.

These projects, funded by the Office of the Governor, represent the first major allocation of research dollars from the Texas OneGulf consortium, which was created after the Deepwater Horizon oil spill to direct funding in support of programs, projects, and activities that restore and protect the environment and economy of

the Gulf Coast region. The projects tackle a variety of issues that directly impact the Gulf of Mexico and its residents, from studying the impact of red tide blooms on human health and the health care infrastructure to using underwater gliders to search the coast for hypoxic dead zones.

A consortium of nine Texas institutions led by HRI, Texas OneGulf is a unique multi-disciplinary team of marine science, socio-economic and human health researchers united to promote collaborative research and problem-solving actions.



iSNAPPER

iSnapper, the Center for Sportfish Science and Conservation's mobile application for iOS and Android launched to give anglers an easy, secure method of reporting their catch, had a successful second Red Snapper season this year. The 2016 Red Snapper season opened on June 1 and lasted 9 days.

In 2015, the newly launched app was a resounding success, providing researchers with important data about the fishing season. Nearly 400 anglers downloaded iSnapper, reporting 171 fishing trips during the federal season. Of those trips, 163 were from Texas recreational anglers. Of the 2,012 fish reported, more than 75 percent, or 1,519 fish, were Red Snapper. Other popular catches include Dolphinfin, King Mackerel, Vermilion Snapper and Blackfin Tuna.

The idea behind iSnapper is to collect more robust catch data with the long-term goal of providing anglers with a longer season through better science — something desperately needed in

this fishery. The ability to collect timely and accurate catch data from recreational fishermen is a major challenge to fisheries management, which is designed to keep fish populations stable and prevent overfishing that can diminish a species' population. Because of these problems, the Red Snapper quota for the recreational sector includes a 20 percent buffer to ensure that quota is not exceeded, which would violate federal laws. With more accurate data sourced directly from fishermen in near-real time, this buffer could be reduced or even eliminated, allowing a greater amount of fish to be harvested.

The app may be downloaded at isnapper.org.



INTERNATIONAL



EXPANDING INTO CUBA

HRI is moving forward with cooperative endeavors with Cuban scientists and students as the United States government reestablishes diplomatic ties with the island nation with an eye towards environmental protection initiatives.

As one of the few academic institutions licensed to work in Cuba, HRI has been engaged with the Cuban marine science community since its inception in 2002.

HRI is moving forward with two initiatives in Cuba:

- A two-day coastal and ocean monitoring and conservation research and integration workshop aimed at advancing coastal and ocean monitoring in the nation through research and network development and integration activities.
- The Furgason Fellowship International Student Workshop aimed at providing students with an integrated understanding of national and international resource management and conservation policies in the Gulf of Mexico region through an educational and cultural experience.

HRI has worked to build a relationship with Cuba since its inception. It was a founding participant in the Trilateral Initiative, a historic meeting organized with the goal of establishing a framework for collaboration between Cuba, Mexico and the United States for ongoing joint scientific research and to develop a regional plan of action designed to preserve and protect shared waters and marine habitats. Top HRI administrators have also given keynote addresses at several MarCuba scientific meetings, which attract Cuba's leading marine scientists.

"Our institute's mission is to promote excellence in conservation, research and innovative public policy in the Gulf of Mexico through a tri-national relationship between scientists from the United States, Mexico and Cuba," Dr. Larry McKinney said. "Up until this point, we've had more progress in Mexico due to the official barriers in Cuba, but those barriers are dropping now and I'm really excited to see what we can accomplish as we move forward."



BIODIVERSITY

The Biodiversity in the Southern Gulf of Mexico project, led by HRI Chair for Biodiversity and Conservation Science Dr. Wes Tunnell, completed Year 1 of a three-year project examining the little-studied environments of the Mexican southern Gulf, particularly the Campeche Bank.

The first year of the project was filled with milestones. UNAM and HRI/TAMU-CC signed a cooperative agreement to work on the biodiversity project in January 2016. HRI's partner on the project and our representative in Mexico, Dr. Nuno Simoes, an associate professor at UNAM-Sisal, currently has 6 postdoctoral researchers, 2 Ph.D. students, 11 master's students and five undergraduates working on the Southern Gulf of Mexico Biodiversity project.

"After only one year of study Dr. Nuno Simoes and his biodiversity team have added significantly to our knowledge of one of the least known areas in the Gulf of Mexico," Tunnell said.

In Year 1, Simoes and his team have published or are in the process of publishing numerous papers and have made presentations at meetings, workshops and conferences, with more planned. They also hosted a coral reef working group in Merida in May.

Simoes is developing a GIS map of crustaceans collected in the southern Gulf of Mexico to demonstrate what can be done with biodiversity and geographic data. In addition, over 620 illustrations on the biodiversity of the southern Gulf were produced during Year 1, with only 200 planned. More than 500 underwater photographs have been selected, edited and cataloged for CONABIO. Five scientific collection permits have been requested and secured for expeditions and cruises.

In addition to gaining a better understanding of the diversity of life in the Gulf, the project will also help to train future Mexico biodiversity experts, and produce high-quality public outreach materials in both Spanish and English to foster education of biodiversity.



REACHING OUT

COASTAL BEACHES

Texas researchers, managers, nonprofits and local government officials gathered at the Harte Research Institute for the first-ever “Texas Beaches and Dunes: Science and Management Forum,” a unique forum sharing the latest shoreline science and fostering collaboration for the management of Texas’ beloved beaches.

The forum’s mission was to bring together a diverse group of individuals who are working to improve and maintain the health of Gulf beaches and dunes to discuss ongoing research and monitoring, beach management practices, policy and economics. The forum also aimed to develop a network of collaborators who can work together for the betterment of the Texas coast.

“The conference zeroed in on the significant management issues and research needs for Texas’ Gulf beaches and dunes,” said Dr. Jim Gibeaut, HRI Endowed Chair for Geospatial Sciences and Forum Organizer. “We had good discussions amongst researchers, resource managers, and experts on the economic impact and policy of beaches and dunes, as well as public outreach. We will be taking steps to keep the interaction going.”

Texas has a unique relationship with its beaches and dunes, which provide residents with storm protection and ample recreational opportunities. As the only state with its one-of-a-kind open beach law, free and unrestricted access to beaches is considered a constitutional right. This creates unique management challenges for the state’s 350-plus miles of coastline.

Issues addressed at the conference included ways sea level rise could affect future beach management, the effects of Hurricane Ike and other big storms on the environment, regulatory challenges facing beach managers, data gaps that need to be addressed and obstacles to collaboration and potential solutions.

MEXICAN ENERGY REFORM

The Harte Research Institute co-hosted a symposium on Mexican energy reforms, bringing U.S. and Mexican officials together to serve as a catalyst for transboundary cooperation in managing increased offshore energy production in the Gulf of Mexico.

The symposium, entitled “Improving Cooperation for a Sustainable Gulf of Mexico after the 2014 Mexican Energy Reforms,” included leading government officials from key regulatory agencies in Mexico and the United States, academics and industry representatives. In addition to HRI, the symposium was sponsored by the University of Houston Law Center’s Center for U.S. and Mexican Law and the National Sea Grant Law Center.

In 2013, after more than 70 years of monopoly by the Mexican-state owned energy company PEMEX, Mexico decided to open oil and gas drilling to new competition. Gulf of Mexico oil and gas exploration has increased as a consequence of these energy reform efforts and continues to move into deeper waters, making it necessary for authorities to explore the legal issues that surround transboundary finds, oil and gas discoveries that straddle the border shared by the U.S. and Mexico. In fact, immediately before the symposium, said HRI Endowed Chair for Marine Policy and Law and organizer Dr. Richard McLaughlin, oil and gas



finds right along the boundary were announced that could trigger the countries’ transboundary hydrocarbon agreement brokered in 2012, much of which still needs to be clarified.

“There could be safety impacts, environmental impacts and also coastal community impacts. It is not clear how these potential impacts and the economic benefits of increased levels of hydrocarbon development will affect the Gulf of Mexico.” McLaughlin said.

There’s also an obvious need after the Deepwater Horizon explosion and spill for the U.S. and Mexico to share best practices and promote collaboration when dealing with changes in coastal zone management.

LIONFISH SYMPOSIUM

In February, HRI and the Texas Parks and Wildlife Department cohosted the Lone Star Lionfish Symposium, which brought partners from around Texas and the Gulf of Mexico together to develop a unified, proactive and multifaceted approach to managing Texas’ lionfish invasion. The symposium also held a public forum to inform residents about lionfish management issues at the Texas State Aquarium.

Other sponsors include The Nature Conservancy, the Texas State Aquarium, the Coastal Conservation Association of Texas, Texas Sea Grant, the Saltwater-fisheries Enhancement Association, the Houston Advanced Research Center, the Florida Fish and Wildlife Commission, the National Oceanic and Atmospheric Association, REEF, and the Environmental Law Institute. Participants include private industry, universities, government agencies and various non-governmental groups.

Lionfish have become a problem in recent years as they degrade coastal and marine ecosystems in the Caribbean and Gulf of Mexico. With few natural predators, they have spread throughout the region, reducing the number of fish, shrimp and crab species and degrading reefs. In areas of high density, they are causing both ecological and economic damage.



OIL SPILL SCIENCE SEMINAR

HRI hosted “Oil Spill Science Seminar: Exploring Oil Spill Impacts in the Deep Gulf of Mexico” on December 8, 2015. Organized by the four Sea Grant programs of the Gulf of Mexico, the program featured a panel of experts to speak about the emerging science, emergency response, and natural resource management relative to the oil spill and its impacts in deep Gulf waters. Among the speakers was HRI’s Chair for Ecosystems and Modeling Dr. Paul Montagna, who spoke about the deep ocean “footprint” left by the spill and its impact on deep, soft sediment communities.

Several of the scientists speaking at the event conducted their research with support from the Gulf of Mexico Research Initiative (GoMRI), a 10-year research program that aims to mitigate the impacts of hydrocarbon pollution and stressors on the marine environment and public health from the spill, as well as improve society’s understanding of oil spill issues. GoMRI provides support to the Sea Grant programs of the Gulf of Mexico (Florida, Mississippi-Alabama, Louisiana and Texas) for an extension and outreach effort to increase the use of oil spill science by people whose livelihoods depend on a healthy Gulf. To learn more about Sea Grant’s oil spill science seminars, visit gulfseagrant.org.

OUR PEOPLE

DR. PAUL MONTAGNA

NAMED REGENTS PROFESSOR



Dr. Paul Montagna was named a Regents Professor by The Texas A&M University System Board of Regents, which honors professors whose performance as faculty members has provided exemplary service not only to their institution, but also to the community, the State of Texas and at the international level.

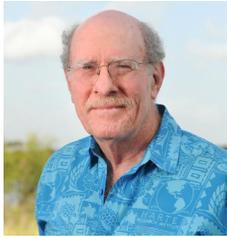
Montagna, HRI's Endowed Chair for Ecosystem Studies and Modeling, has had an accomplished research and education career, receiving more than 150 research awards totaling nearly \$20 million since becoming an Assistant Professor in 1986. He has 222 publications; including one book and 121 peer-reviewed articles. He also has directly supervised 41 graduate students and 21 post-doctoral scientists during his 29-year career.

Montagna's research is focused on two main topics: environmental flows, and the fate and effects of offshore oil and gas development. He has performed freshwater inflow studies in all Texas estuaries; acted as a consultant to set environmental flow standards in California, Florida and Texas; worked with the U.S. State Department, Agency for International Development to develop inflow guidelines to protect the coastal zone of developing countries; and has been a member of the Texas Science Advisory Committee for the Texas Environmental Flows Advisory Group since 2004. He has broad experience assessing ecological effects of offshore oil and gas exploration and production on continental shelves and the deep sea, having worked in Alaska, California, and the Gulf of Mexico. Most recently, he led the technical assessment of the effects of the Deepwater Horizon blowout on deep-sea bottom communities as part of the Natural Resource Damage Assessment process.

Previously, Montagna spent 20 years at the University of Texas Marine Science Institute, located in Port Aransas, where he led the effort to establish the Mission-Aransas National Estuarine Research Reserve.

DR. WES TUNNELL

UNDERSEA LANDMARKS NAMED AFTER TUNNELL



A newly mapped area of the Gulf of Mexico sea bottom will include geographic features named for HRI and its Endowed Chair for Biodiversity and Conservation Science Dr. Wes Tunnell. Texas A&M University Department of Oceanography researchers Drs. Troy Holcombe and Bill Bryant submitted

the latest proposal of more than 130 names, including Harte Bank and Tunnell Mound.

Tunnell Mound is located on the upper continental slope south of Louisiana, and Harte Bank is located on the outer continental shelf among the South Texas Banks off southern Texas. Both were approved by the United States Board on Geographic Names in fall 2015.

Tunnell Mound was discovered during an extended mapping effort by the National Oceanic and Atmospheric Administration (NOAA) conducted between 1988 and 1992 on the Northwest Gulf of Mexico Continental Slope which revealed, for the first time, the great number of mounds, domes, basins, ridges, valleys and fans spanning the sea bottom.

HRI later led an effort to explore the South Texas Banks — where Harte Bank is located — onboard the 2012 inaugural expedition of the Schmidt Ocean Institute's R/V Falkor.

Tunnell was on board and researchers collected high-resolution, multibeam bathymetric data at most South Texas Banks.

DR. RICHARD MCLAUGHLIN

NAMED TO FEDERAL OCEAN ENERGY COMMITTEE



Dr. Richard McLaughlin was appointed by the National Academy of Sciences to serve on its Committee on Environmental Sciences and Assessment for Ocean Energy Management. This committee will provide independent oversight and assistance in the management of the country's offshore energy resources.

energy resources.

McLaughlin is HRI's Endowed Chair for Marine Policy and Law, specializing in marine and coastal law and policy. He

is an expert on legal issues including the international law of the sea, ocean energy policies, transboundary resource management and marine ecosystem-based management.

McLaughlin was one of 14 academic, industry and other experts selected to provide ongoing independent expertise and assistance to the Bureau of Ocean Energy Management (BOEM) to ensure the nation's offshore energy resources are managed and developed in an environmentally and economically responsible way.

DR. DAVID YOSKOWITZ

GREEN INFRASTRUCTURE FOR COASTAL RESILIENCE



To mark the 10th anniversary of Hurricane Katrina, the White House announced the release of a new report supporting the integration of coastal green infrastructure like wetlands and reefs into risk reduction strategies, resilience planning and decision making.

The report, "Ecosystem-Service Assessment: Research Needs for Coastal Green Infrastructure," recommends prioritized areas for federal research to support coastal green infrastructure that will enhance the coastal United States' natural defenses, particularly as climate change will contribute to an increased frequency and intensity of weather events.

Dr. David Yoskowitz, HRI Associate Director and Endowed Chair for Socio-Economics, served as co-chair of the task force that authored the report during his appointment as Chief Economist for the National Oceanic and Atmospheric Administration.

Coastal areas are among the most populated, economically valuable, and ecologically productive regions in the United States. And while many are protected by so-called "gray infrastructure" like levees, seawalls and bulkheads, these can be expensive to maintain and can even damage the ecosystems around them. Protecting and restoring natural defenses like the Coastal Bend's wetlands, barrier islands and oyster reefs can aid in buffering waves, reducing soil erosion, enhancing community resilience and even enhancing recreational opportunities.

Enhancing preparedness for coastal-climate related events was a priority of the Obama Administration. Federal recommendations made after Hurricane Sandy highlighted the use of green infrastructure to increase protection and resilience of coastal communities, and called on agencies to advance their integration into disaster readiness strategies.

SPOTLIGHT ON OUR STAFF

KATERYNA “KATYA” WOWK



The Ecological Society of America honored HRI Senior Associate for Strategic Planning and Policy Kateryna “Katya” Wowk with the Innovation in Sustainability Science Award. The award recognizes the authors of a peer-reviewed paper published in the last five years exemplifying leading-edge work on solution pathways to sustainability challenges.

Wowk won with co-authors Holly Bamford and Ariana E. Sutton-Grier for the paper, “Future of our coasts: The potential for natural and hybrid infrastructure to enhance the resilience of our coastal communities, economies and ecosystems” published in the journal *Environmental Science & Policy*.

In the United States, Hurricane Sandy brought unprecedented attention to building resilience of coastal communities and ecosystems to the growing threats of storm surge and erosion. This has led to a focus on how both “natural infrastructure” and “hybrid infrastructure” that incorporates both natural and engineered features, can increase coastal protection.

Drs. Sutton-Grier, Wowk, and Bamford provided an exemplary example of how the integration of ecological and social science can inform and increase the sustainable management of coastal ecosystems worldwide. They synthesize available socio-environmental science about natural and hybrid infrastructure, including an analysis of the state of the U.S. policy landscape for coastal resilience, and lay out the key policy opportunities and the challenges to implementing natural and hybrid approaches. The paper reached a wide-audience and promoted discussions about coastal resilience and sustainable management among a wide range of stakeholders.

Wowk is an expert in using multidisciplinary approaches to achieve sustainable management of human impacts on coastal and marine areas, with a focus on coastal hazards and resilience. At HRI, she leads strategic planning for the institute and helps link science to policy, decision-making and societal outcomes. Prior to her position with HRI, Wowk served as Senior Social Scientist to the Chief Economist for the U.S. National Oceanic and Atmospheric Administration (NOAA), as well as Senior Policy Officer to the Assistant Secretary of Commerce for Conservation and Management. Wowk holds a PhD in International Marine Policy from the University of Delaware and a Master of Public Administration from Columbia University.

FELIMON GAYANILO



On any given day, there are some 1,900 sensors collecting data about the Gulf of Mexico and many thousands more outside the region, feeding it back to researchers throughout the world. The information collected is used to enhance weather and boating forecasts, aid shipping and navigation and even track harmful algal blooms that could affect the health of coastal residents. The data is also used to track long-term trends such as sea level rise and climate change.

The Gulf of Mexico Coastal Ocean Observing System (GCOOS) is one of many data centers that gathers this information in central data portals and streams it out to industry, researchers, resource managers and the public with the goal of providing timely, reliable and accurate information about coastal and open ocean waters.

But how do the people putting the data to work judge the accuracy and reliability of the information they’re using? A new National Science Foundation (NSF)-funded project will develop the tools and the social and technical infrastructure to gather this “metadata” — the data about the sensors — so end users know where the information came from and how it was collected. The project will make this metadata easily discoverable, searchable and available to be incorporated into automated archival systems so users have a better understanding of the data’s quality and can use it appropriately.

The two-year pilot project, called EarthCube IA: Collaborative Proposal: Cross-Domain Observational Metadata Environmental Sensing Network, or X-DOMES, is being co-led by GCOOS and HRI Systems Architect Felimon Gayanilo, and includes researchers from Woods Hole Oceanographic Institution and research partners from GCOOS/Texas A&M University-Corpus Christi, the University of California, Santa Barbara, the Monterey Bay Aquarium Research Institute and Botts Innovative Research, Inc., and builds upon a previously developed model (called Q2O).

The project is part of a wider initiative between the NSF Directorate for Geosciences and the Division of Advanced Cyberinfrastructure called EarthCube. EarthCube is a community-led cyberinfrastructure initiative for the geosciences that supports teams who create, assess and align frame-

SPOTLIGHT ON OUR STUDENTS

DIANA DEL ANGEL



After spending a year in Florida working to implement coastal management programs, HRI Doctoral Student Diana Del Angel has returned to finish her Ph.D. under Socio-Economics Chair Dr. David Yoskowitz.

Del Angel was one of four fellows chosen for the National Academy of Sciences' Gulf Research Program's Science Policy Fellowship Program and recently wrapped up a year working on coastal zone management projects with the Florida Department of Environmental Protection in Tallahassee.

The Gulf Research Program's Science Policy Fellowship Program is focused on developing leaders and increasing the skillsets of graduate students and professionals working in sectors where science and public policy interact. The fellows spent a year on the staff of a state environmental agency and regional offices of relevant federal agencies in the Gulf region paired with a professional mentor.

Del Angel spent her fellowship with the Florida Department of Environmental Protection's restoration branch

working with the submerged lands program, which manages the state's tidal lands, islands, sandbars, shallow banks and lands below the water line. During her time there, Del Angel said she helped the program to build the framework for a project that was being implemented under the federal Coastal Zone Management Act, which required her to work with local stakeholders, state and federal officials.

The project, a statewide ecosystem assessment for submerged lands, would develop a framework better understand whether the program is fulfilling its federal mandate to protect and maintain these coastal ecosystems in pristine condition, Del Angel said.

"One of the most important lessons I learned was how important it is to be flexible as a researcher," she said. "We're always looking to be on the cutting edge of research, but agencies and nonprofits often look for standardized methods that are tried and true. To make our science relevant we need to better understand their protocols."

At HRI, she will be researching evaluation metrics to for determining the success of environmental projects in terms of ecosystem services — the benefits people are receiving from these projects.

HEATHER WADE



HRI Doctoral Student Heather Wade has been appointed Associate Director of the Texas Sea Grant College Program.

At Texas Sea Grant, Wade will lead strategic planning, reporting and database management for the program. She is also responsible for the organization's sponsored projects portfolio. Wade began her work at Texas Sea Grant in June 2011 as the program's and the state of Texas's first Coastal Planning Specialist, helping coastal residents balance community needs while protecting and sustaining the natural systems. She also helped to develop and implement coastal planning programs and helped communities to assess their risk to natural hazards like coastal flooding, sea level rise and more intense storms.

Wade was also part of a team that worked on the Texas General Land Office's newly-launched app, Texas Coasts, a Web-based app to help vacationers find the perfect beach, picnic park, or RV park for their next outing. To build the database, Wade gathered a team to survey more than 650 beach access sites on the Texas coast to build a comprehensive digital database of public beach access in the state. That app launched in June.

Wade began her Ph.D. under HRI Chair for Marine Policy and Law Dr. Richard McLaughlin in 2013, her research interests include exploring how coastal planning can be used to increase resiliency for both communities and ecosystems.

In 2015, Wade left Texas behind and took a position with the State of Oregon as the Coastal State-Federal Relations Coordinator for the Oregon Coastal Management Program and Department of Land Conservation and Development. In that role, she managed a statewide database on coastal development and restoration projects, performed federal consistency reviews, managed grant projects, and networked with local, state, and federal governments to reach solutions to conflicts on the Oregon coast.

When she saw the associate director position open at Texas Sea Grant, she decided it was time to come home to Texas. Wade will continue working on her Ph.D. under Dr. McLaughlin from College Station, where she is now living with her husband, Alex and her children, Isaac and baby Isabel.

At Sea Grant, Wade said, she hopes to help the organization create a strategic plan that reflects the needs of coastal stakeholders, from the universities to coastal visitors and communities, tackle current and future coastal issues, and continue to be a leader in Texas coastal science.

REACHING MILESTONES

DOCTORATE

Brittany Blomberg, Ph.D. Coastal and Marine Systems Science, December 2015 under Dr. Paul Montagna

MASTER'S DEGREE

Marissa Dotson, M.S. Environmental Science, May 2016 under Dr. Jim Gibeaut

Amanda Gordon, M.S. Fisheries and Mariculture, August 2016 under Dr. Paul Montagna

Elizabeth Del Rosario, M.S. Environmental Science, May 2016 under Dr. Paul Montagna

Crystal Chaloupka, M.S. Environmental Science, May 2016 under Dr. Paul Montagna

Meredyth Herdener, M.S. Marine Biology, December 2015 under Dr. Paul Montagna

Quentin Hall, M.S. Marine Biology, December 2015 under Dr. Greg Stunz

Maria Rodriquez, M.S. Environmental Science, May 2016 under Dr. John W. Tunnell, Jr.

Mayra Lopez, M.S. Environmental Science, December 2015 under Dr. David Yoskowitz

STUDENT AWARDS

AWARDS

Travis Washburn

C-IMAGE Student of the Month, January 2016

Travis is Ph.D. student under Dr. Paul Montagna. Travis looks to take a seemingly isolated region, the deep ocean benthic communities, and link it to human benefits and the impact of future spills to the seafloor. Travis' work makes him the C-IMAGE Student of the Month for January 2016.

Brittany Blomberg

Outstanding Doctoral Student College of Science and Engineering

The College of Graduate Studies at Texas A&M University-Corpus Christi honored graduate professional and educators. Dr. Blomberg got her Ph.D. under Dr. Paul Montagna.

POSTERS

12th Annual Texas Bays and Estuaries Meeting

Rachel Edwards

2nd, Texas A&M Corpus Christi, Harte Research Institute

Rachel is M.S. student under Dr. James Gibeaut

NOAA Educational Partnership Program Forum 2016

Charles Downey -

1st place poster Healthy Oceans-tied

Alex Tompkins

1st place poster Healthy Oceans-tied

Both M.S. students under Dr. Greg Stunz

Elizabeth Del Rosario was selected to participate in the 69th Annual Conference of the 2015 Southeastern Association of Fish and Wildlife Agencies (SEAFWA)/Minorities in Natural Resources Conservation (MINRC). She was M.S. student under Dr. Paul Montagna.



TEXAS BAYS AND ESTUARIES MEETING

HRI Master's Student Rachel Edwards, a graduate research assistant for Endowed Chair Dr. Jim Gibeaut in the Coastal and Marine Geospatial Lab, received a second place prize for her poster presentation at the Texas Bays and Estuaries Meeting.

Rachel's thesis research attempts to find a nexus between science and coastal planning in the Galveston Bay region to minimize sea level rise hazards in the future. She is a NOAA Environmental Cooperative Science Center (ECSC) Fellow and spent six weeks aboard the R/V Falkor sailing from Honolulu to Guam.

SOUTHEASTERN ASSOCIATION OF FISH AND WILDLIFE

HRI doctoral student Elizabeth Del Rosario was selected to present a poster at the 69th annual conference of the Southeastern Association of Fish and Wildlife Agencies (SEAFWA)/Minorities in Natural Resources Conservation (MINRC), November 1-4, 2015 in Asheville, North Carolina.

Elizabeth's research focus is in marine policy with HRI Endowed Chair for Coastal and Marine Policy and Law Dr.

TRAVIS WASHBURN



Travis Washburn, an HRI doctoral student studying under Dr. Paul Montagna, Endowed Chair for Ecosystems Studies and Modeling, was honored in January 2016 as C-IMAGE's student of the month. C-IMAGE is a research consortium of 19 U.S. and international partners that was funded by the Gulf of Mexico Research

Initiative after the Deepwater Horizon disaster focused on studying the effects of oil spills on marine environments. Washburn was profiled by C-IMAGE for their newsletter, the following is an excerpt from that interview:

What is your research focused on, how will your results contribute to improve understanding of oil spills?

My research is focused on assessing how the Deepwater Horizon blowout affected benthic communities in the deep Gulf of Mexico as well as effects of natural seepage. I am also looking at specific benefits that the deep-sea communities provide humans, such as trophic transfer of nutrients and chemicals up the food chain or pollutant burial. My results should prove very useful in determining the extent and effects of future deep-sea blowouts on the seafloor. They will also show if and how human-caused hydrocarbon releases differ from areas where hydrocarbons naturally enter the environment. The examination of ecosystem services provided by the deep-sea will try to partly answer the question "Why does the deep sea matter?" as well as help to put some value on damages there.

Richard McLaughlin and co-chair Dr. Paul Montagna, Endowed Chair for Ecosystems and Modeling. Her emphasis area is in water resources management, freshwater inflow policy and regulation. Elizabeth has received the NOAA Educational Partnership Program Center for Coastal and Marine Ecosystems (CCME) fellowship to support her research.

EDUCATIONAL PARTNERSHIP PROGRAM

HRI students took home honors at the National Oceanic and Atmospheric Administration (NOAA) Educational Partnership Program (EPP) with Minority Serving Institution (MSI) Eighth Biennial Education and Science Forum August 28-31, 2016 in New York City. The Biennial Education and Science Forums provide opportunities to showcase the results of collaborative research and education projects between students at NOAA EPP/MSI funded academic institutions and NOAA scientists; to generate new engagement opportunities; and, to promote professional development for (STEM) undergraduate and graduate students.

HRI master's students Chas Downey and Alex Tompkins of the Center for Sportfish Science and Conservation tied for first place in the Healthy Oceans poster competition.



Which of your findings or research has been most eye-opening? Were there any moments or facts that just made you say, "Wow! I did not expect that"?

My work on ecosystem services of the deep sea has been very eye-opening. I have always focused on questions that can be answered by scientific research and why the questions were important to people; however, I never gave much consideration to why the environment itself was important to people. It was very easy to take for granted that science and the environment are just important, especially when you make a career out of them. When my advisor asked me why people should care about the deep sea I was at first somewhat at a loss for words. After doing plenty of research on ecosystem services I gained a whole new appreciation for what nature provides humans and a totally different way to help answer and interpret ecological problems. And I can honestly say that I had no clue how many benefits nature provide or how much money it would cost to perform even a fraction of what it does.

PARTNERSHIPS



CORAL REEF WORKSHOP

Written by HRI Partners Katie Thompson, Fernando Bretos, and Daria Siciliano.

After the December 17, 2014 announcement by Presidents Barack Obama and Raul Castro to normalize relations between the U.S. and Cuba, CubaMar has found itself in a unique position to advance joint marine research between our countries.

Yet even before the 2014 announcement, CubaMar was hard at work building bridges through marine science through the Trilateral Initiative (TNI), a collaborative platform founded by CubaMar, Harte Research Institute for Gulf of Mexico Studies (HRI) and the Cuban Ministry of Science, Technology and Environment in 2007. Through this platform, every year, scientists from the three countries that share the Gulf of Mexico (Cuba, Mexico and USA) have met to discuss research plans and chart the course forward for targeted research projects that help solve some of the regional problems facing the Gulf of Mexico and Western Caribbean. The last TNI meeting took place in November 2015 in Havana and had the largest participation since this platform was established in 2007.

The first week of May, CubaMar, in collaboration with our partners at the Universidad Nacional Autónoma de México (UNAM) and HRI, organized a workshop that brought together again members of the Coral Reef Working Group of the Trilateral Initiative. Twenty-eight participants from the U.S., México, and Cuba representing 14 different government agencies, NGOs, and academic institutions met to define coral reef research priorities for the Gulf of Mexico and Western Caribbean region. The workshop was hosted by UNAM and funded by HRI and CubaMar.



Participants first brainstormed research priorities and gaps, then met in breakout groups where they developed specific projects based on the expertise of the participants and the research gaps identified, and specifically discussed projects related to coral restoration, genetic and larval connectivity, population dynamics, ecosystems services valuations of coral reefs, human impacts on the reefs, and mapping of shallow and mesophotic reefs. Workshop participants are working together to further develop these projects and will get together again to update on the progress during the ICRS conference in Honolulu in June.

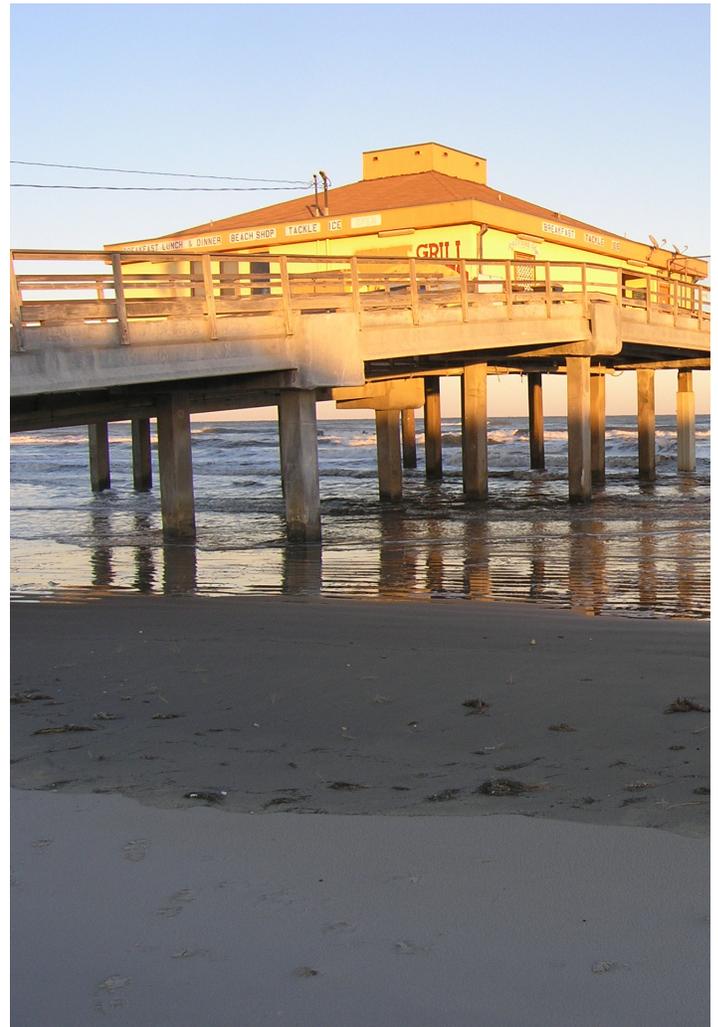
Outside of the workshop, participants enjoyed the wonderful food and unique sights of Mérida and México's Yucatán Peninsula. Some participants even went night diving in a cenote!

This was an exciting meeting because it was the first meeting of any of the Trinational Initiative working groups (there are six of them) outside of the larger annual Trinational Initiative workshop. The idea came about during the last TNI meeting in November when members of the Coral Reef Group realized that the interest, the ideas and the projects generated by a much larger group than previous years deserved more time to be discussed. Thus, shortly after returning from Havana, CubaMar and our colleagues at UNAM started planning the Mérida workshop, to focus on developing research topics and specific objectives for coral reef research in the area.

The objectives of the workshop were:

- Identify bi- or tri-national coral reef projects for the region with specific objectives that answered participant's interests, as well as their institutions and national priorities (e.g., connectivity, coral restoration, spatially explicit biodiversity database, etc.)
- Identify uniform and comparable sampling methodology for coral reef ecological assessments to be used by collaborating institutions across the three countries (e.g. alternatives to AGRRA protocol, resilience assessment protocols, etc.)
- Identify potential funding sources for each project
- Develop a plan to document the actions of the TNI coral reef group in English & Spanish, adapting the Trinational Initiative Plan of Action, and the new research priorities identified at TNI 2015 in Havana

The workshop opened with presentations on an overview of new coral reef research priorities in Cuba; a recent assessment of coral reefs at two MPAs in Cuba and Mexico; CONABIO's information system of Mexico's biodiversity; and an overview of the assessment methodology adopted by NOAA's National Coral Reef Monitoring Program. There was also a panel on identifying funding opportunities for Trinational projects led by HRI, NOAA, and CubaMar.



Overall, the workshop was a resounding success. Participants were able to collectively develop Trinational coral reef projects and we believe this work will be particularly meaningful in the coming months and years, in light of the changes that normalizations of relations between Cuba and the US will bring about. We're excited to see the Trinational Coral Reef Group's next steps!

For more information and writings from the field, visit the CubaMar blog at www.CubaMar.org.

WHITE HOUSE HONORS

The Texas Environmental Flows Initiative has been recognized by the White House for its efforts to use science and market analysis to address looming water challenges and keep Texas rivers flowing for the benefits of bays and estuaries. The Texas Environmental Flows Initiative is a joint effort of the Harte Research Institute for Gulf of Mexico Studies, Meadows Center for Water and the Environment, National Wildlife Federation, The Nature Conservancy, Ducks Unlimited and the National Fish and Wildlife Foundation.

President Barack Obama hosted the first-ever White House Water Summit to recognize World Water Day in light of water challenges facing communities and regions across the United States. These issues are impacting millions of lives and costing the nation billions of dollars. Recent events including record-breaking drought in the West, severe flooding in the Southeast and the water quality crisis in Flint, Michigan, have elevated the dialogue on the state of the nation's water resources and infrastructure.

Environmental flows represent the flowing waters necessary to sustain a river, wetland or coastal zone and associated fish and wildlife that depend on it. These flows are increasingly threatened in Texas by climate change and the pressures of economic and residential growth.

Texas is growing faster than any other state in the nation, and the state's population may double by mid-century. Projections indicate that many of the state's estuaries could end up deprived of adequate freshwater on a frequent basis, particularly in drier years, if we do not take aggressive action to implement sufficient environmental flow protections.

Over the next two years, the Texas Environmental Flows Initiative will develop a water transaction market in Texas, executing at least one significant water transaction with a demonstrable benefit to resources impacted by the Deepwater Horizon oil spill. Groundwork will also be laid for market development in three bay systems whose ecological health and commercial fishing productivity are endangered by declining freshwater inflows.

OCEARCH EXPEDITION

In November 2015 HRI teamed up with leading shark-tracking nonprofit OCEARCH to build the most extensive shark-tagging program in the Gulf of Mexico region. OCEARCH brought its unique research vessel, the M/V OCEARCH, to the Gulf for the first time for a multi-species study to generate previously unattainable data on critical shark species, including Hammerhead, Tiger and Mako sharks.

Despite the intense weather conditions, OCEARCH and its collaborative team of multi-institutional scientists tagged seven sharks – two tigers, two hammerheads, two sandbars and one bull shark. "The weather during the expedition was challenging to say the least," said HRI Endowed Chair for



Fisheries and Ocean Health Dr. Greg Stunz. Stunz, director of HRI's Sportfish Science and Conservation, who served as lead scientist for the Gulf expedition.

What makes the OCEARCH unique is its lift system. Specifically designed to safely raise large sharks from the water, the lift — which works almost like a shark elevator attached to the side of the OCEARCH vessel — gives researchers unprecedented access to these fascinating animals. Researchers have a limited amount of time, about 20 minutes, to safely handle the shark before returning it to the water and must work almost as a science pit crew, rapidly and carefully drawing blood, tagging the animal, attaching instrumentation like accelerometers and performing an ultrasound on female sharks.

Joseph, a ten-foot tiger, and Buddy, a seven-foot hammerhead shark, both named by Caterpillar Inc., are part of four sharks caught and tagged with satellite transmitter tags. As the sharks' fins break the surface, the satellite tags will transmit their locations, allowing anyone and everyone to follow their movements by accessing the near-real time, free online Global Shark Tracker or by downloading the Global Shark Tracker App available for Apple and Android platforms.

With the help of these tagged HRI can begin to understand the sharks' migration patterns in order to affect policy and conserve these critical species. Divided among three nations — the U.S., Mexico and Cuba — each with different regulations, the Gulf is a large marine ecosystem where policy development and enforcement requires multinational cooperation. Sharks are a highly mobile species that can travel hundreds of miles a day, heedless of international boundaries, and little is currently known about their movements in the Gulf.

Scientists also hope to understand the interaction between these sharks and the oil and gas platforms currently present in the Gulf, and how this relationship compares to natural reefs and other ocean features.

CSSC runs a number of tagging programs to monitor shark populations in the Gulf of Mexico, including passive, acoustic and satellite tagging, and has tagged thousands of sharks to help fill information gaps about their lives in the Gulf. Meanwhile, through its online Global Shark Tracker, OCEARCH has helped millions of adults and children to gain a much closer and comprehensive look at one of the Gulf's more important indicator species.



SHARK WEEK

HRI researchers traveled to Southern California to study Mako sharks with monster appetites to open the 29th season of Discovery Channel's summer television event, "Shark Week."

Shark experts from HRI's Center for Sportfish Science and Conservation (CSSC) set out on a 7-day expedition to tag and study the over 1,000-pound Mako sharks that feed off the Southern California coast for a special called "Return of Monster Mako."

The group has tagged Shortfin Mako sharks in the Gulf that were up to 400 pounds, but these Pacific sharks were triple the size and awe-inspiring to see in person. Working with the Discovery Channel allows the CSSC to engage in "high risk, high rewards" science, HRI Fisheries and Ocean Health Chair Dr. Greg Stunz said, capturing amazing footage of natural shark behavior that's both valuable to researchers and thrilling to watch.

"Return of Monster Mako" is a sequel to last year's hit special, "Monster Mako," which drew 3.265 million viewers and the highest TV ratings of the night in its Sunday premiere slot.

"Return of Monster Mako" sends the HRI crew with an improved camera tag, the "Shark Eye 2," to the waters off Southern California where Mako sharks grow to more than 10 feet long and 1,000 pounds — what fishermen call a "grander" — and feed on large, hard to catch prey like seals.

The Mako shark has captivated humans with its dramatic feeding behavior, breaching the water at high speeds with amazing aerial displays while hunting prey. With their new instrumentation, scientists hoped to document the predation behavior of these massive grander Mako sharks for the first time, as well as study and compare the behaviors of Pacific Makos to their Gulf of Mexico counterparts.

"How do these sharks behave when their prey is a once-in-awhile meal of seal versus feeding non-stop on fish in the Gulf? There's an opportunity to gain unprecedented social and behavioral insights, the kind of things we can't get from having one boatside," Stunz said.

HARTE'S HEROES



HARTE'S HEROES 2016

Seven individuals who have dedicated their talents in art, writing, photography and videography to promoting the long-term sustainable use and conservation of the Gulf of Mexico were honored as recipients of the 2016 "Harte's Heroes" Award.

Each year, the Harte Research Institute commemorates "World Oceans Day" by recognizing individuals and groups who have demonstrated their passion for protecting and preserving the vast natural resources of the world's ninth-largest body of water. This year's recipients included individuals in the arts and media who have used their mediums to tell compelling stories about the importance of Gulf of Mexico conservation.

"We are very pleased to recognize those individuals with the talent and desire to translate and communicate science through art," said Dr. Larry McKinney, HRI Executive Director. "We marvel at what they do as Harte's Heroes. Their efforts motivate and inspire us to take action to protect what we all love and depend upon — the Gulf of Mexico."

The 2016 Champions for the Gulf are:

JESSE CANCELMO

Jesse Cancelmo is an accomplished underwater photographer, author and photojournalist. His articles and photographs have appeared in numerous diving and wildlife publications. His books include "Diving Cayman Islands," "Diving Bermuda," "Texas Coral Reefs" and his most recent work, "Glorious Gulf of Mexico: Life Below the Blue," published by Texas A&M Press in February 2016. Jesse is a contributing editor/photographer for Dive Training Magazine, and his photos have appeared in Texas Parks & Wildlife and other dive and wildlife magazines. He also leads group dive adventures in Gulf of Mexico and Indo-Pacific waters.

HENRY "HANK" COMPTON & DAVID A. MCKEE

Henry "Hank" Compton and David A. McKee worked together on the books "Fire in the Sea: Bioluminescence and Henry Compton's Art of the Deep" and "Fishes of the Texas Laguna Madre: A Guide for Anglers and Naturalists." McKee is the author of both books with illustrations provided by Compton. McKee is a retired professor of biology at Texas A&M University-Corpus Christi, where he taught marine biology courses for nearly 30 years. McKee, an experienced bay angler, also authored "Saltwater Fishes of Texas, a Dichotomous Key." Compton was a career marine biologist with Texas Parks and Wildlife Department (TPWD) and worked out of the Rockport Marine Laboratory. Compton participated in some of the first TPWD research in the Gulf of Mexico, working aboard the R/V Western Gulf. Although he had no formal training as an artist, he could paint wildlife with great accuracy and attention to detail.

RICHARD "SKIP" DAVIS, JR.

Richard "Skip" Davis, Jr. is a Visiting Scientist at the HRI and Distinguished University Professor Emeritus from the University of South Florida. He is a coastal geologist who has specialized in beaches, barrier islands and tidal inlets. Davis has authored or edited more than 20 books in sedimentary geology, the most recent is "Beach-

es of the Gulf Coast" with TAMU Press. Dr. Davis has been a senior Fulbright Scholar in Australia and has held visiting professorships in Denmark, Spain, Australia and New Zealand as well as Duke University and the University of North Carolina.

GREG REUTER

Greg Reuter, Professor of Art at Texas A&M University-Corpus Christi, has been working with sculpture-making processes for over 40 years. During this time he developed unique ways of capturing textures and images from nature and molding them into sculptural forms. The bronze, iron and wood works of art allow the viewer to experience nature in a way like never before. His works are displayed at HRI and the Art Museum of South Texas.

TODD RICHARD

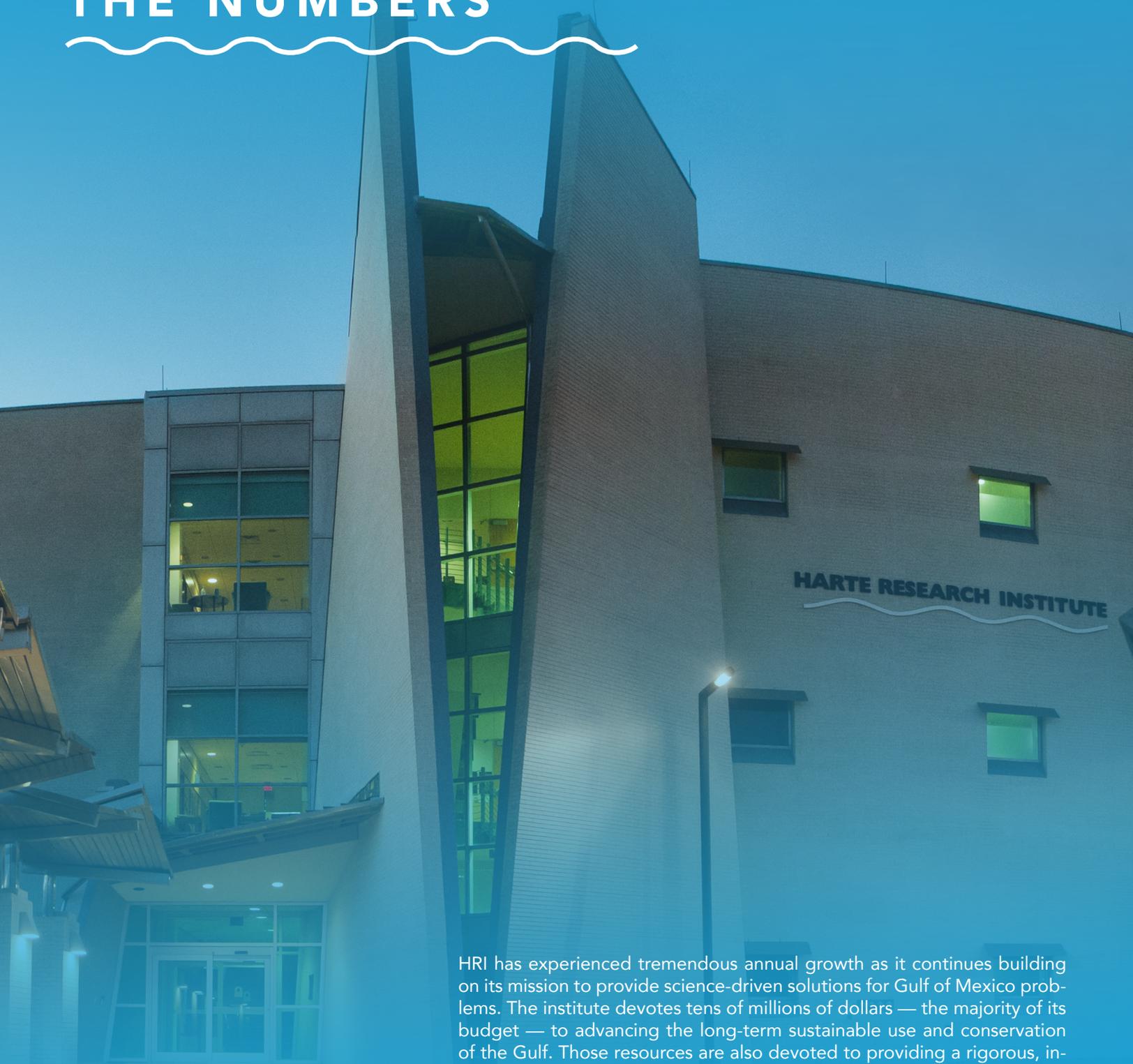
Todd Richard is the owner of Baton Rouge-based Synergy Productions, Inc., a video production company specializing underwater and aerial imaging. Introduced to video during his high school years, Richard refined his skills with Cablevision of Baton Rouge and Louisiana Public Broadcasting while also freelancing for ESPN and CBS Sports. His underwater video work has showcased the unique environment of the Flower Garden Banks National Marine Sanctuary off the Texas coast.

SHELIA ROGERS

Shelia Rogers is a fine art photographer and mixed media artist. Her life's work communicates the complexities and the attractions she finds in her environment, including "Oceans of Plastic," an exhibition that used found plastic from area beaches to raise awareness of one of the most pressing consumer and environmental issues we face today — plastic in our oceans. Rogers received her Bachelors of Arts degree at the University of Texas in Austin and conducted post-graduate work at Texas A&M University-Corpus Christi. Rogers has attended several workshops with art masters around the world. She has studied abroad in France, Hungary, India, Morocco, Russia, Spain, and in the U.S. including California, New Mexico, New York, Texas and Washington.



SCIENCE BY THE NUMBERS



HRI has experienced tremendous annual growth as it continues building on its mission to provide science-driven solutions for Gulf of Mexico problems. The institute devotes tens of millions of dollars — the majority of its budget — to advancing the long-term sustainable use and conservation of the Gulf. Those resources are also devoted to providing a rigorous, interdisciplinary training environment, enabling our students to become the next generation of researchers devoted to a sustainable Gulf of Mexico.

HOW WE PUT IT TO WORK

\$15.5M
PROPOSAL
SUBMISSIONS

\$7.5M
SUBMISSIONS
AWARDED

\$19.9
MILLION
OPERATING
BUDGET(FY 2016)

57
STUDENTS
FUNDED

75
STAFF
MEMBERS

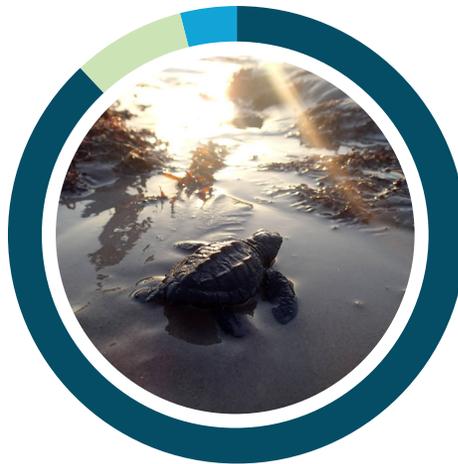
\$157K
TUITION
PAID

OUR REVENUE SOURCES



Grants/
Contracts State Private

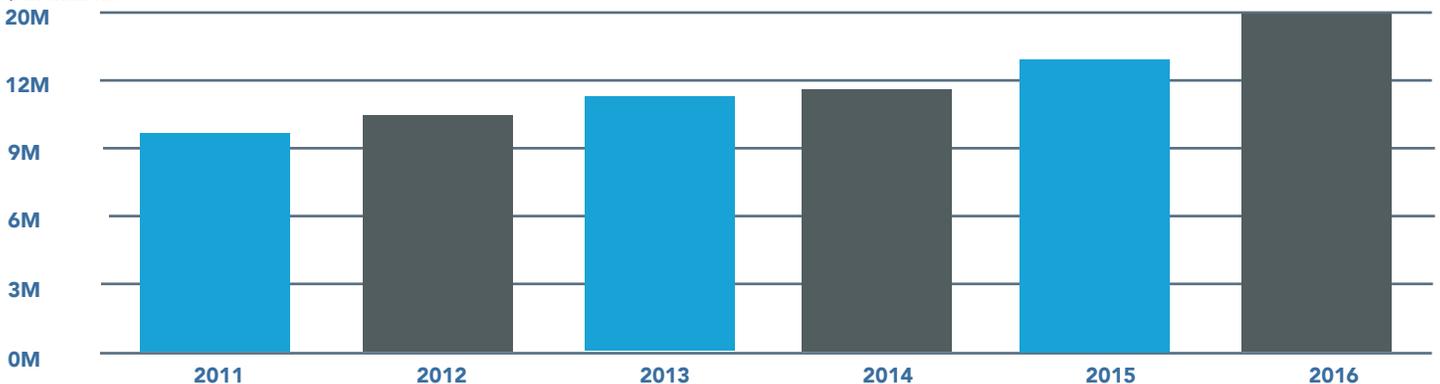
HOW WE INVEST



Engagement Admin Research

GROWTH IN OPERATING BUDGET

\$ in millions
20M



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Mr. Big Trout Scholarship Tournament

O'Donovan Family Foundation
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Sharkathon
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ENDOWMENT HONORS

DR. WES TUNNELL

A new fellowship has been established to continue the teaching legacy of long-time educator, author and marine scientist Dr. Wes Tunnell, HRI Endowed Chair for Biodiversity and Conservation Science.

Inspired by Tunnell's commitment to his students and to Mexico, the Harte Charitable Foundation has committed to funding the Dr. Wes Tunnell Gulf of Mexico Fellowship Program. The fellowship will support a Mexican or American graduate student with a commitment to research in Mexico while he or she pursues graduate education at the Harte Research Institute for Gulf of Mexico Studies at Texas A&M University–Corpus Christi. The Harte Charitable Foundation will establish the fellowship program in perpetuity, funding the program at \$50,000 per year for the first eight years before establishing a \$1 million endowment.

"My family and I are deeply and sincerely appreciative of this designation and honor, but like my career working on the Gulf, and especially in Mexico, I am really happy for the opportunities this will provide to future generations of students," Tunnell said. "I am also particularly gratified by the widening and deepening influence of TAMU-CC, HRI, and the Harte family on the education, science, research, and conservation all around the Gulf of Mexico in the U.S., Mexico and Cuba."

Tunnell is a marine ecologist and biologist focusing primarily on coastal and coral reef ecosystems, and has been studying the banks off South Texas since his graduate research work in the late 1960s. He is founder and former Director of the Center for Coastal Studies, and he assisted in the development of the Harte Research Institute, served as its first Associate Director and helped design its building. Tunnell also assisted in the development of two Bachelor of Science degree programs along with four master's degree and two doctoral programs at Texas A&M-Corpus Christi. Tunnell was also instrumental in establishing seven graduate student scholarships in the Center for Coastal Studies and has advised or co-advised 70 M.S. students, 7 Ph.D. students and 4 post-doctoral research associates.

"Through his efforts, our understanding and appreciation of the Gulf of Mexico has significantly increased," said Dr. Larry McKinney, HRI Executive Director. "While TAMU-CC and its predecessor institutions have a distinguished lin-



age of well-known marine experts, Dr. Wes Tunnell easily stands first among them."

For 32 years, Tunnell taught Coral Reef Ecology, taking students on two-week field trips to Veracruz and the Mexican Caribbean as part of an international teaching and research program. One of 18 classes Tunnell taught over the course of his career, he was known for making classrooms out of the deck of a boat and conducting his lectures while wearing scuba gear.

Dr. Kim Withers, TAMU-CC assistant professor of biology, was a student of Tunnell's and later came to work for him in the Center for Coastal Studies, handling logistics for the Coral Reef Ecology class. A Renaissance man with varied interests, Withers said, Tunnell taught his students to look at the system as a whole, studying the mangroves, the birds, the invertebrates and even the local people as well as the reefs that supported them.

"I learned so much from him, but I think the biggest lesson that I took away was that it's about an education, not just a course," Withers said. "In any lesson there's always room for history, geography, archaeology, botany, because everything connects. I wouldn't be where I am today without him."

The Harte Charitable Foundation established the fellowship program with the goal of continuing his work enriching the lives of students and scholars in pursuit of the conservation and study of the Gulf of Mexico.

"The Harte Charitable Foundation is deeply appreciative of the leadership that Dr. Wes Tunnell has provided to conceive and develop the Harte Research Institute," said Don Perkins, Executive Director of the Harte Charitable Foundation. "First and foremost, Wes is a teacher. He has been dedicated to his students over the years. As a scientist, Wes has led HRI's research initiatives in Mexico. We look forward to these students following in his footsteps."





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