

Advisory Committee Meeting

**April 2-3, 2013
Port Aransas**

Briefing Book



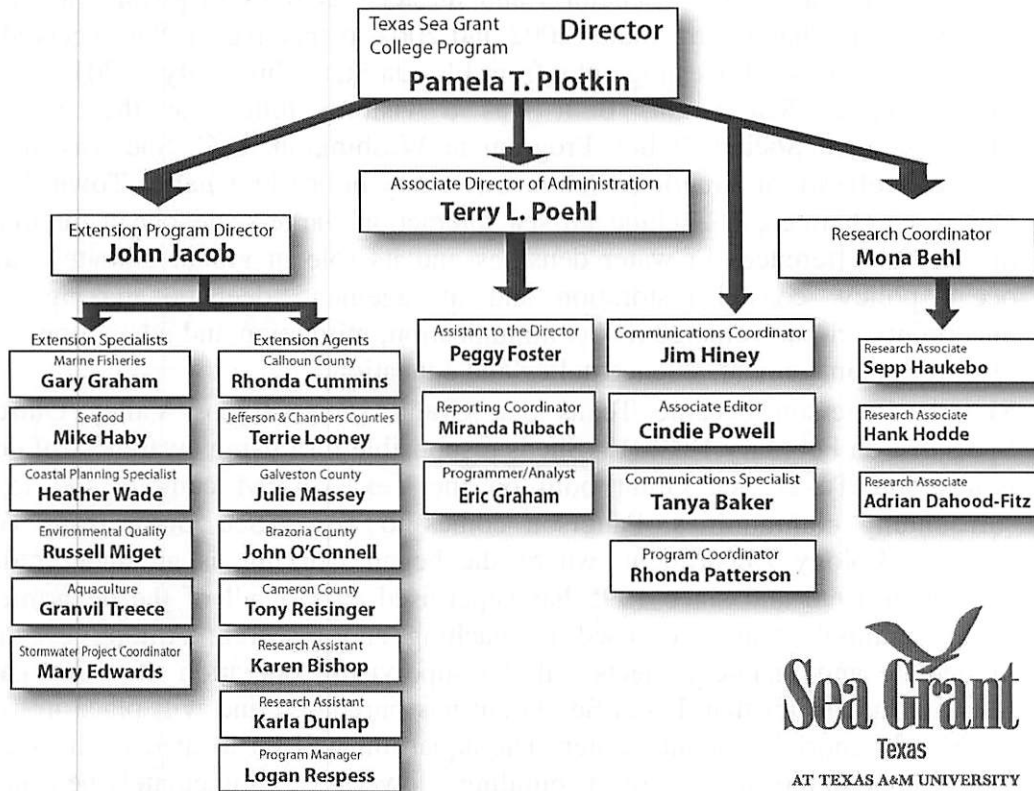
AT TEXAS A&M UNIVERSITY

Briefing Book
Texas Sea Grant Advisory Committee Meeting
April 2-3, 2013

Table of Contents

Texas Sea Grant Organizational Update	Pg. 1
Strategic Plan Summary	Pg. 3
Research Highlights	Pg. 5
Extension & Education Highlights	Pg. 10
Communications & Marketing Highlights	Pg. 14
Staff Awards & Recognition	Pg. 19
Appendix A: Texas Sea Grant College Program Strategic Plan 2014-2017	
Appendix B: National Sea Grant Strategic Plan 2014-2017	
Appendix C: Sea Grant Association FY 2014 Funding Recommendation	
Appendix D: Financial Summary	
Appendix E: <i>The Risk of Rising Sea Level: Texas Universities Ready and Able to Help Coastal Communities Adapt</i>	
Appendix F: <i>Texas Monthly</i> and <i>Texas Aggie</i> magazine ads	
Appendix G: Press releases 2012-13	
Appendix H: Texas Sea Grant in the News	
Appendix I: Texas Sea Grant Publications 2012-2013	
Appendix J: Advisory Committee Member Directory	
Appendix K: Texas Sea Grant Staff Directory	

Texas Sea Grant Organizational Update



Staff Changes

- Dr. John Jacob is the new Director of Texas Sea Grant Extension, effective April 1, 2013. Before assuming his new position, Jacob was Texas Sea Grant's Coastal Communities Development Specialist and a professor in the Texas A&M University Department of Parks, Recreation and Tourism Sciences. Jacob holds B.S. and M.S. degrees from Texas Tech University, and a Ph.D. from Texas A&M University, all in soils and natural resources. He is registered as a Professional Geoscientist with the State of Texas and is a Professional Wetland Scientist. Jacob will administer his new duties from his existing office in Houston.
- Miranda Rubach joined Texas Sea Grant as its Reporting Coordinator in February 2012. She is responsible for compiling information for mandated state and federal reports. Rubach graduated from Sam Houston State University in 2009 with a degree in accounting. Before joining Texas Sea Grant, she worked for Texas A&M's Division of Finance in the Financial Management Operations and Budget and Planning Departments.

- Dr. Mona Behl is Texas Sea Grant's new Research Coordinator, effective Feb. 4, 2013. She oversees the program's research grant, scholarship and fellowship opportunities, and will contribute to Texas Sea Grant's state and federal reporting efforts. Behl earned her bachelor's and master's degrees in physics at Panjab University in Chandigarh, India (2002 and 2004, respectively). She received her doctorate in physical oceanography from Florida State University in 2012. Before joining Texas Sea Grant, Behl was a visiting fellow at the American Meteorological Society Policy Program in Washington, D.C. She was also an adjunct professor at American Public University in nearby Charles Town, W.Va. Her research interests include air-sea interaction, large-scale ocean circulation driven by differences in water densities and its role in global climate change, ocean policy, coastal restoration and management, decision making under uncertainty, climate change risk communication, mitigation and adaptation, water resources management, science policy and education.
- Rhonda Patterson became Texas Sea Grant's new Brazos Valley Outreach Specialist on February 18, 2013. She is responsible for raising awareness of ocean issues and Texas Sea Grant both on the Texas A&M campus and in the surrounding communities. Patterson comes to Texas Sea Grant from Texas A&M's Biology Department, where she began working as an undergraduate student in 1990 and since 1995 has supervised care of all of the department's aquatic animals that were used in teaching and research. Among her more immediate and visible projects will be supervising operation of a 300-gallon saltwater aquarium that Texas Sea Grant has purchased and will place in Texas A&M's Memorial Student Center. The aquarium will be located in the student lounge area on the east side of the building's lower level, immediately beneath the "Memory Cloud" that is now being installed. The aquarium is on track to be installed and operating by early summer of this year. Patterson received a bachelor's degree in Biology from Texas A&M in 1991.
- Karen Bishop and Karla Dunlap were hired as research assistants to work on the Texas portion of a region-wide hydrological restoration project implemented by the Gulf of Mexico Sea Grant Programs. Dunlap received a bachelor's degree in Environmental Biology from Pennsylvania's Clarion University in 2007 and worked for Pennsylvania Sea Grant as a coastal outreach specialist before coming to Texas. Bishop received a bachelor's degree in Biology from Boston University in 2005 and a master's degree in Marine Science from The University of Texas in 2012.
- John O'Connell, who had been the Matagorda County Coastal and Marine Resources Agent for nine years, moved his office 40 miles northeast on SH 35 in early April 2012 to become the new Brazoria County Coastal and Marine Resources Agent. O'Connell replaced Rich Tillman, who retired in 2010 after 14 years on the job.

Texas Sea Grant Strategic Plan 2014-2017

Summary

(See Appendix A for full text)

Texas Sea Grant's mission is to improve the understanding, wise use and stewardship of Texas' coastal and marine resources. The Program will fulfill its mission through research and engagement activities that capture the academic potential of our universities, link universities to the needs of Texans, build knowledge, create innovative tools and services with a public purpose, translate research results to the public, develop the Texas workforce, sustain industries and solve real-world problems to improve human welfare and the health of our natural resources.

To help Texans understand, manage and use Texas Gulf Coast resources wisely, Texas Sea Grant identified four focus areas central to the program's activities that also precisely align with the focus areas identified in the NOAA National Sea Grant College Program 2014-2017 Strategic Plan:

1. Healthy Coastal Ecosystems
2. Sustainable Fisheries and Aquaculture
3. Resilient Communities and Economies
4. Environmental Literacy and Workforce Development

These focus areas reflect America's most urgent coastal needs, NOAA's goals and Sea Grant's strengths and core values. Texas Sea Grant will quantitatively measure the outcomes of its work through the following performance measures, listed by focus area. The four-year target for each performance measure appears in parentheses following each measure:

Healthy Coastal Ecosystems:

- Number of Texas Sea Grant tools, technologies and information services that are used by our partners/customers to improve ecosystem-based management (10).
- Number of ecosystem-based approaches used to manage land, water and living resources in coastal areas as a result of Texas Sea Grant activities (10).
- Number of acres of coastal habitat protected, enhanced or restored as a result of Texas Sea Grant activities (8,000).

Sustainable Fisheries and Aquaculture

- Number of fishermen, seafood processors and aquaculture industry personnel who modify their practices using knowledge gained in fisheries sustainability and seafood safety as a result of Texas Sea Grant activities (300).
- Number of seafood consumers who modify their purchases using knowledge gained in fisheries sustainability, seafood safety and the health benefits of seafood as a result of Texas Sea Grant activities (500).

Resilient Communities and Economies

- Number of communities that implemented sustainable economic and environmental development practices and policies (*e.g.*, land-use planning, working waterfronts, energy efficiency, climate change planning, smart growth measures, green infrastructure) as a result of Texas Sea Grant activities (10).
- Number of communities that implemented hazard resiliency practices to prepare for, respond to or minimize coastal hazardous events as a result of Texas Sea Grant activities (10).

Environmental Literacy and Workforce Development

- Number of Texas Sea Grant-facilitated curricula adopted by formal and informal educators (20).
- Number of people engaged in Texas Sea Grant-supported informal education programs (60,000).
- Number of Texas Sea Grant-supported graduates who become employed in a career related to their degree within two years of graduation (20).

Cross-cutting performance measures

- Economic (market and non-market; jobs and businesses created or retained) benefits derived from Texas Sea Grant activities (\$25 million; 800 jobs created or retained).
- Number of peer-reviewed publications produced by the Texas Sea Grant network (25), and number of citations for all peer-reviewed publications from the last four years (50).

Research Highlights 2012-2013

- Between Feb. 1, 2012, and Jan. 31, 2013, Texas Sea Grant's \$831,000 investment in competitive research projects leveraged \$886,000 in outside funding for its PIs.

Selected Research Project Updates

- A study completed by Jennifer Irish (TAMU & Virginia Tech) provides an improved risk assessment method for coastal flooding. The group developed a surge response function for Corpus Christi, and present day surge and wave conditions for Gulfport and Panama City locations. The parameterized flood elevation and response models developed during this study will be used to quantify the potential impact of sea level rise and hurricane intensification on human-induced economic damages and population dynamics at the coast.
- Irish and Scott Socolofsky (TAMU) collaborated on a second project to conduct laboratory experiments aimed at understanding flow patterns around artificial wetlands. This information can be used to improve wetland design for coastal protection.
- In a separate project, Socolofsky conducted two field experiments to measure the amount of water entering Aransas Pass throughout the flood tidal cycles. This research could not only be used by fisheries ecologists to track the transport of red drum larvae into the bays during recruitment season, but also provide insights on the physical mechanisms controlling transport in the Aransas pass.
- Masami Fujiwara (TAMU) is investigating the population dynamics of shrimp in the Gulf of Mexico. The team has completed a preliminary analysis of white and brown shrimp data from the NOAA SEAMAP cruises. They have also developed a matrix model to explore the growth of shrimp populations that have size or stage structure (populations of shrimp composed of individuals whose birth and death rates differ depending on size and stage). Preliminary results of this research suggest the potential importance of the environmental conditions in estuaries determining shrimp population fluctuation. Such fluctuations have substantial impacts on bycatch as well as other commercially and recreationally important fish stocks that prey upon juvenile shrimp. Funds from this grant have also been used to develop a course on Special Topics in Marine Fisheries (Fall 2012). A few graduate students are working on this project.
- In a project partly funded by the Texas Sea Grant College Program, Bryan Brooks (Baylor) is investigating the bioaccumulation of pharmaceuticals in inland and coastal systems. The group has developed an initial SWAT (Soil and Water Assessment Tool) watershed model for the Guadalupe River and completed an analysis of CECs in various aquatic organisms from sampling sites along the Texas coast. This study is a well-balanced Sea Grant project that includes environmental education activities involving Sea Grant research and extension.
- Jay Rooker (TAMUG) is examining the movement and connectivity of red drum and spotted seatrout at two spatial scales (habitat and estuary scales) within a model estuary. The researchers are utilizing acoustic positioning system and high-

resolution maps of seascapes to obtain information on movement and habitat linkages. Temporal changes in habitat use and movement are being examined to identify habitats and the degree of connectivity among habitat patches within an estuarine seascape.

- Using physiological and visual differences in response to algal exposure, Paul Zimba (TAMUCC) and his research team are currently identifying and isolating toxins using fractionation. In another project funded by Texas Sea Grant, Zimba provided an inventory of dead fish, birds, mammals, and invertebrates and the body burden of brevetoxin from the 2011 red tide.
- Daniel Thornton (TAMU) and his team of researchers have used laser in situ scattering and transmissometry (LISST) as a tool to characterize a large number of Harmful Algal Bloom species. They will continue using LISST as a tool to have a deeper look at measuring *Karenia brevis*.
- George Guillen (UH Clear Lake) collected data that provides insights into Texas diamondback terrapin ecology in Texas. He is analyzing the data to predict population trends, distribution, habitat preference, and sources of mortality for these terrapins. Radio telemetry has also been used to track the movements of 11 individual terrapins and their home ranges. This data has revealed migration between sites, an occurrence that had been undocumented in Texas. This research has implications for future management efforts. In particular, this information can be used to identify areas of high importance for conservation and management.

Call for proposals 2014-2016

Texas Sea Grant received 123 pre-proposals for the grant cycle beginning Feb. 1, 2014 and ending Jan. 31, 2016. Prior to the current call, Texas Sea Grant averaged receiving 59 pre-proposals per funding cycle since 2001.

Pre-proposals were submitted by potential PIs from 18 universities and the Texas Parks and Wildlife Department. The 18 universities are: Texas A&M campuses at College Station, Galveston, Corpus Christi, Kingsville and Laredo; The University of Texas Marine Science Institute and the UT campuses in Austin, Brownsville, Arlington, Tyler, San Antonio and Edinburg; the University of Houston campuses in Houston and Victoria; Texas Southern University; Rice University; Baylor University; and the University of North Texas.

Texas Sea Grant notified 121 applicants that they were encouraged to submit full proposals. Full proposals are due to Texas Sea Grant by June 3. PIs receiving funding will be notified by Sept. 30.

Texas Sea Grant Scholars Program

Launched in September 2012, the Texas Sea Grant Scholars Program is intended to support selected undergraduate students at Texas A&M's College Station and Galveston campuses with the aim of developing a cadre of ocean and coastal leaders in Texas. The program is a partnership between Texas Sea Grant and Texas A&M's Office of Honors and Undergraduate Research.

The students chosen for the program undertake independent research projects of their

own design under the mentorship of Texas A&M faculty members. The students receive \$1,000 in financial support to complete their projects. They are also expected to participate in workshops on research communication, research skills, and thesis writing, attend the annual Marine Science Symposium and Retreat of the Texas A&M Graduate Interdisciplinary Degree Program in Marine Biology and present their results at the annual Texas A&M Student Research Week in March. Students are encouraged to participate in a one-hour, intensive thesis-writing seminar and submit their results to *Explorations: The Texas A&M Undergraduate Journal*. Finally, all Texas Sea Grant Scholars are expected to prepare a formal research thesis, which will be deposited in the university's digital repository.

Six students working on five research projects (one was a team project) were chosen for the inaugural Texas Sea Grant Scholars Program. The following is a list of the students (with their campus and mentor in parentheses), their project titles and a brief summary of their research:

- **Gary Baine** (TAMUG, Dr. Chris Marshall), *Variation in Skull Shape Reflects Feeding Adaptations in Basal Otariid Pinnipeds*: Baine sought to relate the mathematics of the variations in skull shapes between closely related populations of sea lions and how it affects their hunting capabilities and their prey preference. He hopes to determine if a change in or movement of prey species is responsible for an 80 percent decline in these sea lion populations over the past 40 years.
- **Ellen Giddens** (TAMU, Dr. Luis Hurtado), *Patterns of Spatial and Temporal Genetic Differentiation of the Blue Crab (*Callinectes sapidus*) an Estuarine Keystone Species in the Northern Gulf of Mexico*: Giddens sampled blue crab DNA from nine sites spread between South Padre Island and Tampa, Fla., to determine if these populations were genetically different from each other. The results may lead to better management of blue crab populations.
- **Cyreneia Millberry** (TAMU, Dr. Masami Fujiwara), *Predicting the Effects of Tidal Fluctuations and Freshwater on Shrimp Growth and Survival*: Millberry looked at how river discharges and tidal fluctuations affected commercially valuable shrimp populations, particularly juvenile shrimp, in Texas estuaries. This could, in turn, affect shrimp management decisions.
- **Marcella Nunez** (TAMUG, Dr. Antoinetta Quigg), *The Change in Growth and Composition of Marine Microalgae in Response to Sodium Bicarbonate and Nitrogen*: Nunez sought to determine if sodium bicarbonate can become a less expensive source of carbon for growing marine microalgae, and if limiting nitrogen would increase the microalgae's lipid production. Her research could lead to less expensive sources of biofuel.
- **Josh Carter and Raven Walker** (TAMUG, Dr. Glenn Jones), *"Our Tables Have Suffered": Quantifying the Decline of Commercially Valuable Living Resources in Chesapeake Bay, 1850-1950*: NOAA and NMFS catch data goes back to 1950. Carter and Walker used the economics principle of supply and demand and "Ephemera" like newspaper ads and restaurant menus to infer the health of commercially valuable species through a timeline of their prices going back to 1850. They found that the price for most of the species rose faster than the rate of inflation, indicating that these populations were in decline long before official records began.

Grants-in-Aid of Graduate Research Program

Texas Sea Grant received 18 proposals for its first ever Grants-In-Aid of Graduate Research Program. The program is intended to promote scientific excellence and achievement by providing small grants in support of their research to graduate students enrolled in TAMU, TAMUG or TAMUCC whose marine- or coastal-related research in any field of study is relevant to Texas, though not necessarily based in Texas.

The one-year grants are based on merit and, in part, on the financial needs of the applicant and range from \$500 to \$2,000 (with an average award of \$1,200). The grants must be applied to expenses directly related to the student's thesis work, such as fieldwork, laboratory analysis, purchase of testing materials, etc. Funds cannot be used for travel to present at meetings or conferences, capital equipment, software, salaries, tuition, or room and board during the school year.

Chosen students will be notified by May 15. The grants begin June 1 and must be completed by May 31, 2014.

Knauss Fellowships

Texas Sea Grant had two applicants chosen to be 2013 Dean John A. Knauss Marine Policy Fellows. Sepp Haukebo is working in NOAA's Office of Education and Henry "Hank" Hodde III is Coordinator of Sustainable Coastal Development and Hazard Resilient Communities in the National Sea Grant Office.

Haukebo graduated magna cum laude with a bachelor's degree in marine biology from Texas A&M University at Galveston and received a master's degree in Wildlife and Fisheries Sciences at Texas A&M University in College Station.

Hodde received a bachelor's degree in residential science from Florida State University and a master's degree in environmental science from the University of Houston-Clear Lake.

Texas Sea Grant endorsed three candidates — one each from The University of Texas, Texas A&M University and Texas A&M University-Corpus Christi - to become 2014 Knauss Fellows. The National Sea Grant Office will announce the chosen candidates by early June.

National Sea Grant Office RFPs

The National Sea Grant Office announced in February 2013 that it had two funding opportunities available — one regarding aquaculture extension and technology transfer and one for community climate change adaptation.

Application deadline for both is in mid-April, and Texas Sea Grant anticipates submitting two aquaculture proposals and one climate change adaptation proposal. All three proposals are joint Texas Sea Grant-Louisiana Sea Grant projects.

The National Office expects to have available about \$1,600,000 for each of FY 2013 and FY 2014 to fund marine aquaculture extension and technology transfer efforts, as

part of the overall plan to support the development of environmentally and economically sustainable ocean, coastal and Great Lakes aquaculture.

About \$1,000,000 (pending Congressional appropriation) is expected to be available for climate adaptation efforts for FY 2013-2014 as part of an overall plan to enhance climate adaptation in coastal communities.

Extension & Education Highlights 2012-2013

New Partnerships and Initiatives

Dr. Pamela Plotkin launched major new initiatives through partnerships with:

- Texas A&M University at Galveston to relocate the *R/V Karma* and the Floating Classroom Program to Galveston.
- Texas Parks and Wildlife Department to hold Coastal Expos along the Texas coast to educate Texans about the wise use and stewardship of their coastal resources.
- The University of Texas Marine Science Institute to highlight Texas Sea Grant-funded research through *Science and the Sea* radio programs that reach more than 170 affiliates throughout the U.S. Five programs based on Texas Sea Grant research have aired between October 2012 and March 2013.

Highlights

- Texas Sea Grant's Dr. Plotkin and Dr. John Jacob partnered with Dr. Arnold Vedlitz from Texas A&M's Bush School of Government and Public Service to conduct a survey examining ordinary Texans' risk assessments and policy priorities for the future of water in the state. The goal of the project was to provide data to aid Texas Legislators making decisions on water-related issues and legislation. Dr. Vedlitz has been invited to present his results to a select group of Texas Legislators in Austin.
- Texas Sea Grant received funding to create a coastal access website for the state modeled after Maine Sea Grant's successful "Accessing the Maine Coast" website. Coastal Development Specialist Heather Wade is leading development of the website, which is intended to inform government and public entities, private waterfront landowners and waterfront users with information about coastal access.
- Dr. Jacob helped educate Houstonians about urban flooding threats through his participation in the 28-minute television program *But It Never Flooded Here Before*. The program aired on KHOU Channel 11 in Houston several times between April-July 2012. KHOU estimates that more than 100,000 people viewed the program during a single airing. Since the initial broadcast, Spanish voice-overs and closed captioning have been added, and the program was been posted to KHOU's website and on YouTube. A bilingual DVD was also developed for distribution to a wider Texas audience.
- TCWP's Wetland Restoration continues to partner with the Texas Parks and Wildlife Department to utilize and teach an innovative wetland habitat restoration method pioneered at Sheldon Lakes State Park in Houston. The method involves using current (mostly aerial) photos of a restoration site and superimposing historical (pre-development) photos to determine the area's original topography. Workers restore the original topography and replant the area using native species. TCWP staff have taught the restoration method during two workshops in the past year and they continue to hold once-weekly workdays at Sheldon Lakes to

complete the restoration project there.

- The WaterSmart Landscapes program, coordinated by Dr. Jacob's Texas Coastal Watershed Program (TCWP), received a Texas General Land Office grant to install rain gardens in public spaces to demonstrate the benefits of using these natural gardens to manage stormwater "where it falls." TCWP staff partnered with 30 Houston-area Girl Scouts and other volunteers to install a 555 square-foot rain garden and 1,500-gallon rainwater cistern on the campus of the University of Houston at Clear Lake to demonstrate how residents can reduce runoff pollution.
- Dr. Jacob and his TCWP team received a \$100,000 NOAA grant to use the weTable interactive computer interface and the Community Health and Resources Management (CHARM) model to conduct a series of community development workshops in the Rockport area. The 18-month long project, which is being aided by Heather Wade, could help community leaders plan the area's growth 25 years into the future.
- TCWP staff, in partnership with Delaware Sea Grant, held the first weTable User's Conference in late February 2013 in downtown Houston. The conference trained about 50 people from across the country and Hawaii in the use of the weTable, which will improve the capacity of professionals in Texas and other coastal states to promote sustainable coastal development.
- TCWP staff, in partnership with the Clear Creek Independent School District (CCISD), City of League City, Texas Commission on Environmental Quality, and the Galveston Bay Estuary Program created a stormwater wetland in an existing 11-acre detention pond adjacent to CCISD's Education Village. The wetland is designed to clean runoff from the 144-acre campus. CCISD educators have begun incorporating this new wetland into course curriculum at all grade levels for students at the Education Village, and graduate students from TAMU have undertaken research projects to determine the efficacy of the wetland.
- As part of a grant from the Texas General Land Office, TCWP's WaterSmart Project staff held a hands-on workshop on how to create and maintain a rain garden, which culminated in workshop participants and some volunteers creating a rain garden at Heritage Park in League City. Under the grant, the WaterSmart Project staff, in partnership with local Girl Scouts, also created a rain garden at Armand Bayou Nature Center.
- In partnership with the Texas Marina Association, Texas Sea Grant educated recreational boaters about how to get their permanently installed marine sanitation devices (MSDs) certified under state law. In 2012, nearly 3,000 recreational boats were certified — a 30 percent increase over 2011.
- About 2,960 students, half of them Hispanic, and 1,140 adults learned math and marine science during 200 educational cruises aboard the Floating Classroom *R/V Karma* from ports in Corpus Christi, Matagorda and Port Lavaca.
- Ninety-nine percent (842) of the Texas commercial shrimp fishermen who applied for federal Trade Adjustment Assistance (TAA) help completed the mandatory 12 hours of intensive training and 91 percent (769) of them went on to complete their long-term business plans. Texas Sea Grant Extension staff launched the TAA project and provided the training that resulted in Texas commercial fishermen receiving \$9.5 million from the federal government while learning how to operate

- their businesses more efficiently in an effort to compete with foreign imports
- Commercial shrimp fishermen based at the Port of Palacios received intensive technical assistance in the use of the new Bycatch Reduction Device (BRD) through result demonstrations via one-on-one technology transfers, resulting in more than 90 percent of the Palacios fleet adopting the new design. This technology transfer resulted in a nearly 9 percent reduction in shrimp loss.
 - Since 2008, Texas Sea Grant has worked with cooperating shrimpers in the Gulf of Mexico and South Atlantic regions to transfer technology of fuel-efficient trawl gear, which reduces fuel consumption between 20 percent and 39 percent. To date, more than 85 percent of the Cameron County shrimp trawling fleet (132 vessels) have switched to the new fuel-efficient gear. In 2012 alone, the fuel savings were estimated at \$7.9 million. Since 2008, the fuel savings are estimated to be 9.8 million gallons valued at \$25.7 million. Additional savings are accrued through reductions in both frequency of oil and filter changes and major engine overhauls. An estimated 200 jobs were saved because without these fuel savings, many of the boats would have remained tied at the dock.
 - Texas Sea Grant-led informal Turtle Excluder Device (TED) inspections of the state's offshore shrimp fleet led to almost 100 percent compliance among boats later inspected by fisheries authorities. Of the 199 boats boarded, only three (1.5 percent) received citations for serious violations. Fines for TED non-compliance can run as high as \$220,000 not including potential loss of catch.
 - Funded by the Gulf States Marine Fisheries Commission, Texas Sea Grant partnered with the other Gulf Region Sea Grant Programs, Benny Galloway and Charles Caillouet to launch and complete a Kemp's ridley sea turtle stock assessment workshop.
 - Dr. Plotkin joined with the other Gulf Region Sea Grant directors and Texas Sea Grant economist Mike Haby to establish the Gulf of Mexico Economics Working Group, which comprises marine economists from Gulf Region Sea Grant programs and other economists in the region who are deemed critical to the working group's efforts. Where possible, the working group will identify the various marine dependent-industries in the Gulf region; evaluate the economic characteristics, activities and consequences (output, incomes, jobs, tax creation, etc.) of each sector utilizing available secondary data; and describe Sea Grant extension program involvement with those sectors.
 - Texas A&M University's Provost provided \$100,000 for Texas Sea Grant to launch an ocean awareness outreach campaign targeting students on the College Station campus and residents of the surrounding communities. The campaign includes installation of a 300-gallon saltwater aquarium in the university's Memorial Student Center, installing a WaterSmart garden/landscape outside Texas Sea Grant's headquarters building, and development of a traveling museum display (in partnership with the Oceanography Department) that will inform the public about the Deepwater Horizon oil spill and the results of the research conducted to determine its impacts.
 - Texas Sea Grant partnered with the other Gulf Region Sea Grant Programs and the Gulf of Mexico Research Initiative (GoMRI) to bring science teachers to a GoMRI-sponsored research meeting in January 2013 that focused on the

Deepwater Horizon oil spill, where the teachers learned about the science resulting from GoMRI's support. A teacher from A&M Consolidated High School in College Station represented Texas teachers at the meeting.

- Karen Bishop and Karla Dunlap were hired as research assistants to work on the Texas portion of a region-wide hydrological restoration project implemented by the Gulf of Mexico Sea Grant Programs. The two women are identifying and characterizing areas in Texas where removal of man-made objects like dams, bridges or culverts will restore the natural water flow, thus benefitting the surrounding ecosystems and ultimately the state's bays and estuaries. They have begun entering potential sites into a database with those identified by Sea Grant Programs in the other four Gulf states to form a readymade list of sites that can be paired with restoration funds and/or groups based on size, type or location as stipulated in a particular project. Dunlap is based in the McAllen area and Bishop is based in Port Aransas.
- Seventy-nine newly certified Texas Master Naturalists joined 330 active TMNs who volunteered 59,304 hours (28.5 FTEs), valued at \$1.29 million (\$21.79/hour via Independent Sector). Their combined efforts resulted in the development of an additional 2 miles of nature trails and restored more than 4,650 acres of coastal dune and wetland habitat.
- The Texas Sea Grant-coordinated Monofilament Recovery and Recycling Program (MRRP) enrolled 17 new volunteers, raising the total number of bin sponsors to 56. These trained volunteers sponsored 238 permanent recycling bins located across the state, and during the past year they collected 229 pounds, or about 311 miles, of monofilament fishing line. Since data collection began in 2004, 981 pounds (1,331 miles) of monofilament fishing line has been removed from coastal ecosystems, eliminating its potential impact on wildlife.
- Texas Sea Grant hosted two more successful regional National Ocean Science Bowl competitions in February 2013. Annapolis Christian Academy successfully defended its Loggerhead Challenge championship against eight other teams in Corpus Christi. Newcomer The Village School emerged atop a 14-team field to win the Dolphin Challenge in Galveston.

Marketing & Communications Highlights 2012-2013

Media Relations:

Texas Sea Grant utilizes the eyes and ears of its staff and monthly reports from Texas A&M University's media tracking efforts to document print and broadcast stories concerning the Program, its activities and its people. These efforts catch most, but probably not all, of the stories that appear in media outlets.

- Texas Sea Grant and/or its staff were mentioned prominently in 41 print and broadcast stories by Texas media outlets in 2012-2013. These stories appeared in coastal markets from the Houston/Galveston Area to the Rio Grande Valley and the inland markets served by *The Bryan-College Station Eagle* newspaper, KBTX-TV (broadcasting to a 75-mile radius around Bryan-College Station) and the *San Antonio-Express News* and the 80,000 people who subscribe to Texas A&M's daily e-newsletter *TAMU Times*. The print media have a combined circulation of 1.2 million subscribers and the broadcast outlets can potentially reach 700,000 households. Fourteen of the stories resulted from Texas Sea Grant media releases.
- Texas Coastal Watershed Program staff either wrote or were quoted in three 2012 stories appearing in the *Houston Chronicle*. With a circulation of almost 693,000, the *Chronicle* is by far the largest print media outlet in the state. The newspaper's web presence, Chron.com, ran the same three stories. Chron.com does not list its daily readership, but it did report that in 2012 it recorded a little more than 1 billion hits from 110 million unique visitors.
- The most widely reported story in 2013 was of a melon-headed whale that beached near South Padre Island. Cameron County Coastal and Marine Resources Agent Tony Reisinger was quoted in five stories done by one broadcast and three print media outlets.
- NOAA's Coastal Services Magazine published two Texas Sea Grant-centric stories — one on the Red Tide Rangers and one on the use of Community Health and Resource Management (CHARM) model and the weTable by the Program's coastal development staff. Coastal Services is distributed to 8,100 readers across the nation.
- The number of media releases distributed has increased each of the past four years, from 6 in 2010 to 14 in 2011 to 19 in 2012. Through March 25 of this year, Texas Sea Grant has distributed 9 media releases, which is two more than the same period in 2012. Distribution has also been streamlined by utilizing the network built by the Texas A&M Marketing and Communications Department (MarComm). Beginning in July 2012, all Texas Sea Grant media releases are sent to MarComm along with a list of target markets. MarComm distributes the releases to all of the media outlets in the target markets and will also send copies to alternate outlets deemed appropriate.
- A listing of news stories featuring Texas Sea Grant can be found at <http://texas-sea-grant.tamu.edu/NewsAndEvents/InTheNews.html>.

- A listing of all Texas Sea media releases is available at <http://texas-sea-grant.tamu.edu/NewsAndEvents/MediaReleases/MediaReleases.html>.

Social Media & Web:

- Texas Sea Grant launched its Spanish-language web presence in September 2012. Web surfers can find Spanish versions of Texas Sea Grant's main English language pages by going to <http://texasseagrant.org> and clicking on the "En Espanol" link at the top of the page.
- All of Texas Sea Grant's first tier web pages (those listed in the menu bar), most of the staff page links, all of the press releases and the Ralph Rayburn Scholarship page — a total of 60 web pages — are available in Spanish. New content is continuously translated through an agreement with UMass Translations at the University of Massachusetts.
- In June 2012, Texas Sea Grant implemented a social media strategy intended to broaden its demographic reach and streamline the posting process. The strategy entails linking several different social media platforms — Facebook, Twitter, Pinterest and the curation publishing platform Scoop.it. Texas Sea Grant publishes four "magazines" on Scoop.it. Each magazine is dedicated to one of the Program's four strategic areas — resilient coasts, marine education, safe and sustainable seafood, and healthy oceans. Stories posted to Scoop.it are set to automatically populate Texas Sea Grant's Facebook and Twitter feeds. Texas Sea Grant's Pinterest site is also tied to Facebook and Twitter. Each of the social media sites caters to a different demographic. By posting across all of the sites, Texas Sea Grant is able to reach a larger audience with its information. The National Sea Grant Office communications staff took notice of Texas Sea Grant's increased social media presence and asked Jim Hiney to give a presentation on the social media strategy to the rest of the network's communicators during a monthly teleconference in October 2012.
- The Scoop.it magazines generated 2,500 views since they were created — 99 percent of these from people not registered with Scoop.it. These views resulted from Facebook and Twitter posts connected to Scoop.it stories.
- Overall about 76 percent of Scoop.it traffic came from the U.S. and another 10 percent from the United Kingdom. The other traffic came from Canada, Mexico, Italy Russia, Argentina, Chile, Australia, Indonesia and India.
- Texas Sea Grant's Facebook audience during the past year has been predominantly female (55 percent to 65 percent) and in the 25-34 age group. The second largest demographic is 45-54 years old, followed by the 18-24 age group. The vast majority of views come from the United States, primarily in coastal cities, with Houston having the most views.
- The Loggerhead Challenge and Dolphin Challenge Facebook pages also drew predominantly female viewers (55 percent to 65 percent) but the overwhelming demographic was 18-24 year-olds. Activity on the Dolphin Challenge site was relatively light during the past 12 months (1-20 views per day), but spiked during the week before and after the competition. The page received 427 views in the

week before and 1,066 views in the week after the 2013 competition. The Loggerhead Challenge page does not yet qualify for Google Analytics.

- The Texas Sea Grant Facebook page has drawn about 300 unique views per week since April 2012. The Facebook site did draw views from around the world, including people from Venezuela, Brazil, Puerto Rico, Portugal, Australia, Germany, Serbia and Morocco.
- The Facebook post from July 3, 2012, congratulating Tony Reisinger on his 30 years with Texas Sea Grant drew the most views (417 during a 28-day period) and shares (37) of any post in the past year. Second most popular was the March 12, 2013, post about the Sea Level Rise report Texas Sea Grant helped develop. It drew 366 views and was shared by six people.
- Texas Sea Grant's Twitter feed (@TXSeaGrant) currently has 518 followers. Three of our most faithful re-Tweeters, Texas A&M University, NOAA Research and NOAA Sea Grant, have a combined 80,000 followers.
- In May 2012, Texas Sea Grant launched its Knauss Fellows Blog (<http://texasknaussfellows.posterous.com/>). The blog, written by the Texas Fellows, is intended to give readers a behind-the-scenes look at the lives of Knauss Fellows and possibly create more interest in the program on the part of potential Fellows.
- The Texas Coastal Watershed Program's four Facebook pages and six websites registered a total of 51,000 visitors in 2012.

Branding

- Representatives from Texas Sea Grant and MarComm worked together in the fall of 2012 to develop a new co-branding logo that allowed Texas Sea Grant to continue marketing itself as "Sea Grant for Texas" while allowing the program and the university to trade on each other's reputations and resources. The new logo combined the existing Texas Sea Grant logo with the phrase, "At Texas A&M University" underneath. The co-branding logo became necessary when in 2011, Texas A&M University System Chancellor John Sharp announced an initiative whereby all system components not already branded as "Texas A&M" would adopt the naming protocol by Fall 2012. For example, "Texas AgriLife Extension Service" became "Texas A&M AgriLife Extension Service." As part of this initiative, Texas A&M University mandated that all of its colleges and department adopt a unifying brand architecture that combined the university's name and logo with the unit's name. Texas Sea Grant sought an exemption for its logo by citing existing National Sea Grant guidelines for its logo usage. It was also feared that labeling the program as "Texas A&M Sea Grant" might have an effect on potential PIs from outside of the university system.
- Texas Sea Grant's move back to campus and involvement with the university's Brand Council led MarComm to include Texas Sea Grant in ads it ran for the university in *Texas Monthly* and *Texas Aggie* magazines (see the ads in Appendix F).

- Texas Sea Grant staff have access to the co-branding logo and templates for letterhead, address and shipping labels, and PowerPoint presentations via the Program's branding webpage. At present the webpage is primarily intended for use by Texas Sea Grant staff. Once a brand usage guide is in place, the page can be made available to partner organizations who need easy access to Texas Sea Grant logos. The branding website can be found at (<http://texas-sea-grant.tamu.edu/WhoWeAre/BrandingGuide2012.html>).

Print Publications (See Appendix I for 2012-2013 publications list)

- **Texas Shores:** Texas Sea Grant published issues of *Texas Shores* in July 2012 and February 2013. The Spring/Summer 2012 issue focused on the impact of the drought on coastal ecosystems, while the Winter/Spring 2013 edition explored Texas Sea Grant-funded coastal research and its importance to the state. The number of print subscribers has risen by 9 percent, or 463 readers, since the magazine resumed publication with the Winter/Spring 2012 issue that featured Texas Sea Grant's 40th anniversary. There are currently more than 5,400 print subscribers, and a small number of readers subscribe digitally. Other distribution methods include a direct mailing to medical offices in southeast and central Texas metro areas, and distribution of 250 copies at the upcoming National Science Teachers Association meeting in San Antonio in April 2013. The next issue, Summer/Fall 2013, will be published in August and feature coastal resiliency.
- **Texas Homeowner's Handbook:** The next publication to be published will be this full-color, 84-page book that educates homeowners about how to prepare for coastal natural hazards. The English-language edition has been sent to the printer, and copies are expected to be available for distribution by the end of the month. A Spanish-language version will be produced shortly thereafter. Produced in partnership with the Texas General Land Office (TGLO), the book will be available on the TGLO and Texas Sea Grant websites.
- Texas Sea Grant produced 22 publications and collected 114 reprints and other publications from researchers in 2012 and thus far in 2013. Most of the publications were for targeted audiences, such as the coastal resiliency indexes produced for two specific coastal bend communities, the septic system protection informational mailer developed for Houston area residents, and the printed materials needed for the two National Ocean Sciences Bowl regional competitions that Texas Sea Grant hosts each year.
- A greatly revised edition of the popular *Saltwater Fishes of Texas: A Dichotomous Key* was completed and offered to the public as a free digital download online in July 2012. At 289 pages, the revised edition is more than twice the size of the original key. As of late March 2013, the download page received 106 views. Analytics on the page do not record the number of downloads.
- About 4,000 copies of various educational publications, including a middle-school curriculum, were distributed to science teachers during the 2012 Conference for the Advancement of Science Teaching in Corpus Christi.

- Texas Sea Grant began increasing its publications presence in new markets, including having copies of its *Hooked on Seafood* cookbook distributed at the International Boston Seafood Show in March 2013.

Online publications

- Beginning in July 2012, Texas Sea Grant used its website to provide a list of 130 scientific journal articles based on Texas Sea Grant-funded research. This list will be updated as needed and enhanced with links to the journals where available. In November 2012, this was supplemented with a PDF archive of almost 1,100 publications produced by Texas Sea Grant from 1973 through 2005 and 2013. Additional publications are being uploaded until publications from all years are available online. The website hosting the archive of journal reprints and other Texas Sea Grant publications was accessed 437 times between July 2012 and January 2013.

Other progress

- **Photo database:** In 2012 Texas Sea Grant established a digital photo database to catalog, store and share its photographic images. The database is easily accessible by the field staff over the web. They can download images for use on various projects, and they can upload photos they take while in the course of their duties. The database is currently password protected and available only to Texas Sea Grant staff.

Staff Awards & Recognition

- Calhoun County Coastal and Marine Resources Agent Rhonda Cummins received the 2013 Diocese of Victoria Mother Elizabeth Ann Seton Award on March 21, 2013. This award is given to those who have volunteered gifts and talent by demonstrating outstanding service and unselfish dedication to one of the Catholic Schools in the Diocese. Cummins received the award for her extensive work with the students at Our Lady of the Gulf Catholic School in Port Lavaca, which includes enriching the school's science and math curriculums by introducing the construction of boats and several marine and maritime focused field trips. She also coordinated the school's Black Mangrove Wetland Restoration project, served on the School Advisory Council for three years, became its Outreach Coordinator in 2012 and co-chairs the 4H Science Club.
- Research Coordinator Dr. Mona Behl was one of 24 oceanographers from around the world chosen to attend the Marine Geosciences Leadership Symposium, organized and hosted by the Consortium for Ocean Leadership in Washington, D.C., in mid-March 2013. This weeklong biennial workshop attracts some of the world's most talented early-career marine geoscientists who are interested in reaching beyond their research laboratories to communicate and enhance the impact of their work to a wider audience.
- Aquaculture Specialist Granvil Treece received the Texas Aquaculture Association's Outstanding Service Award during the organization's 43rd annual conference and trade show in January 2013. He was cited for his many contributions to the aquaculture industry during his 30-year Sea Grant career, including his shrimp farming short course (held annually since 1986 and expanded to include finfish), his 29 years of service as an association board member and the vast amount of information on research and new technologies he disseminated throughout the industry, both domestically and internationally.
- Dr. John Jacob's visionary approach integrating research, outreach and education to address coastal resource conservation and sustainable development issues has earned him the Texas A&M AgriLife Extension Service's 2012 Superior Service Award in the specialist category. The annual Superior Service Awards recognize AgriLife Extension faculty and staff members who provide outstanding performance in Extension education or in service to the organization. Texas Sea Grant's Extension Program is operated jointly with the Texas A&M AgriLife Extension Service.
- Jacob was also honored with the 2012 Terry Hershey Award for Excellence from the Department of Recreation, Park and Tourism Sciences at Texas A&M. Named in honor of Houston's grande dame of conservation, the Hershey Award recognizes excellence in park, recreation or natural resources contributions to Texas, the region and/or the nation, as well as support for education and innovations as a leader in natural resource protection.
- Ten Texas Sea Grant outreach professionals who joined forces to help commercial fishermen and aquaculturists cope with competition from imported seafood have received the Texas A&M AgriLife Extension Service's 2012

Superior Service Award in the team category. The team comprised Seafood Specialist Michael G. Haby, Marine Fisheries Specialist Gary Graham, Environmental Quality Specialist Dr. Russ Miget and Aquaculture Specialist Granvil Treece; and County Coastal and Marine Resource Agents Terrie Looney (Chambers/Jefferson counties), Julie K. Massey (Galveston County), John P. O'Connell (Brazoria County), Rhonda D. Cummins (Calhoun County) and Tony Reisinger (Cameron County); and Aransas County Extension Agent Ginger Easton Smith. The team helped Texas commercial shrimp fishermen and aquaculturists who raise catfish and shrimp earn about \$10 million through the U.S. Department of Agriculture's Trade Adjustment Assistance Program (TAA). TAA provides money to participants in industries that can document that they have been injured by imports. The amount of money per person is relatively small, up to \$12,000, but the program requires that participants receive training that teaches them how to make their operations run more efficiently.

- In addition to winning a Superior Service Award, the Trade Adjustment Assistance Team was named in October 2012 as winner of the Sea Grant Extension Association's Superior Outreach Award for the Gulf of Mexico Region.
- In August 2012, Gary Graham was recognized with a lifetime achievement award by the Gulf and South Atlantic Fisheries Foundation for his more than 40 years of work on fisheries issues. He previously received the Distinguished Service Award from the Foundation, which is a private, regional nonprofit research and development organization for the commercial fishing and seafood industries.
- Jefferson/Chambers County Coastal and Marine Resources Agent Terrie Looney received the Alpha Zeta Chapter (Texas) Epsilon Sigma Phi Mid-career Award in May 2012. The award is designed to pay the tribute to an experienced Extension professional who has consistently exhibited leadership and excellence in Extension programming for more than 10 years and less than 20 years.

Appendix A

Texas Sea Grant Strategic Plan 2014-2017



**Sea Grant**
Texas

AT TEXAS A&M UNIVERSITY

TexasSeaGrant.org

Publication supported in part by an Institutional Grant (NA10OAR4170099) to the Texas Sea Grant College Program from the National Sea Grant Office, National Oceanic and Atmospheric Administration, U.S. Department of Commerce. TAMU-SG-13-601 200 January 2013 NA10OAR4170099 C/AF-1

TEXAS SEA GRANT COLLEGE PROGRAM 2014–2017 STRATEGIC PLAN

INTRODUCTION

The Texas Gulf Coast provides a wealth of natural resources that drive the Texas economy, provide food and fuel for a rapidly growing human population and sustain and nourish life. The quality and abundance of these natural resources is pivotal to sustained growth in Texas. Balancing the economic, environmental and cultural benefits these natural resources offer is Texas' grand challenge. The Texas Sea Grant College Program's research and engagement programs respond to this challenge by capturing the academic potential of our universities, linking universities to the needs of Texans, building knowledge, creating innovative tools and services with a public purpose, translating research results to the public, developing the Texas workforce, sustaining industries and solving real-world problems to improve human welfare and the health of our natural resources.

This plan aligns with the National Sea Grant Strategic Plan 2014-2017 and NOAA's goals and objectives as articulated in NOAA's Next Generation Strategic Plan: climate adaptation and mitigation, weather-ready nation, healthy oceans, and resilient coastal communities and economies. This plan capitalizes on Texas Sea Grant's unique capacities and strengths, and establishes a prioritized direction to guide Texas Sea Grant in addressing critical state needs.

PROGRAM BACKGROUND

Texas A&M University, one of the first Sea Grant Institutions established through the National Sea Grant College and Program Act of 1966, fulfills its sea grant mission through the Texas Sea Grant College Program. Texas Sea Grant is a partnership that unites the resources of the federal government, the State of Texas, local governments, industry and universities across the state. Texas Sea Grant yields a 15:1 return on investment.

Texas Sea Grant is part of a national network of Sea Grant programs in coastal and Great Lakes states. The network is funded by NOAA in partnership with the states to help connect the research conducted at Sea Grant Institutions with the public. Sea Grant is NOAA's primary university-based program, dedicated to helping citizens use scientific information to support a vibrant economy while ensuring ecological sustainability.

VISION

Texas Sea Grant envisions a future where people live, work and play along the Texas Gulf Coast in harmony with the natural resources that attract and sustain them, and where we use our natural resources in ways that capture the economic, environmental and cultural benefits they offer, while preserving their quality and abundance for future generations.

MISSION

Texas Sea Grant's mission is to improve the understanding, wise use and stewardship of Texas coastal and marine resources.

To achieve this mission, Texas Sea Grant directs its research and engagement programs to benefit the citizens, businesses and communities of Texas – from providing grants and scholarships that benefit students and develop Texas' workforce, to funding Texas' innovative researchers to solve real-world problems, to deploying boots-on-the-ground extension professionals to help small businesses be more competitive in a global marketplace and coastal communities to grow sustainably and build resilience to impacts from storms and other hazards.

FOCUS AREAS

To help Texans understand, manage and use Texas Gulf Coast resources wisely, Texas Sea Grant identified four focus areas central to the program's activities:

1. Healthy Coastal Ecosystems
2. Sustainable Fisheries and Aquaculture
3. Resilient Communities and Economies
4. Environmental Literacy and Workforce Development

These focus areas evolved from the National Sea Grant Program's 2009-2013 Strategic Plan and reflect America's most urgent coastal needs, NOAA's goals and Sea Grant's strengths and core values. Each focus area has goals, outcomes and performance measures. The goals describe the desired long-term direction for each focus area. The outcomes are benchmarks that Texas Sea Grant can use to track progress toward achieving each goal. Performance measures are quantitative ways of measuring outcomes.

Outcomes are commonly categorized as short-, medium- and long-term. In this plan, learning, action and consequence outcomes are synonymous to short-, medium- and long-term outcomes and have been chosen to more easily identify the transition across outcome categories. For example, progress toward a goal starts with an achievable and measurable learning outcome and is followed by a series of "what happens next" (action and consequence) questions until the goal is met. Using this approach, it is easier to demonstrate in a more or less linear process how goals are achieved.

- Learning (short-term) outcomes lead to increased awareness, knowledge and skills, and changes in attitudes, opinions, aspirations or motivations through research and/or constituent engagement.
- Action (medium-term) outcomes lead to behavior change, social action, adoption of information, changes in practices, improved decision-making or changes in policies.
- Consequence (long-term) outcomes in most cases require focused efforts over multiple strategic planning cycles. Consequence outcomes in a four-year strategic plan serve as reference points toward reaching focus area goals between the current and future strategic plans.

The outcomes identified can only be realized through full utilization of Texas Sea Grant's research and engagement programs. For example, many of the learning outcomes identified require a substantial investment in needs-based and merit-reviewed research before any action outcomes can be achieved. Simply

stated, Texas Sea Grant-sponsored research is the “engine” that leads to new products, tools or other discoveries used by Texas Sea Grant’s engagement programs to effect change.

There are two types of performance measures identified in this plan. Performance measures that are most closely linked to a single focus area are listed at the end of each focus area section. Cross-cutting performance measures - broad measures of progress toward goals for all focus areas - are listed following the Education and Workforce Development Focus area. The four-year target for each performance measure appears in parentheses following each of the 12 measures.

Focus Area: Healthy Coastal Ecosystems (HCE)

Healthy coastal ecosystems, sustained by their surrounding watersheds, are the foundation of life along the Gulf Coast. Keeping coastal ecosystems healthy is a challenge because of the diversity of stressors each system faces. This is further complicated because ecosystems do not adhere to traditional political boundaries. Responsible management of these systems requires new kinds of thinking and actions, often termed ecosystem-based management¹. Ecosystem-based approaches require unprecedented levels of coordination among federal, state and local jurisdictions and the active engagement of the people who live, work and play along our coast. They also require understanding of the characteristics of species, landscapes and their interactions within each ecosystem.

In general, increasingly rapid development of the built environment, greater demands on fisheries resources, climate change and other human activities are leading to water quality degradation, increased demands on water supplies, changes to fisheries stocks, wetlands loss, proliferation of invasive species and a multitude of other environmental impacts. It is essential for decision-makers to understand the interconnectedness and interactions of these systems in order to maintain vital habitats and inform restoration efforts within ecosystems and watersheds.

1. Goal: Ecosystem services are improved by enhanced health, diversity and abundance of fish, wildlife and plants.

Learning Outcomes

- 1.1. Develop and calibrate new standards, measures and indicators of ecosystem sustainability.
- 1.2. Identify critical uncertainties that impede progress toward achieving sustainable ecosystems and the goods and services they provide.

Action Outcomes

- 1.3. Resource managers and policy- and decision-makers use standards and indicators to support ecosystem-based management.

Consequence Outcomes

- 1.4. Dynamic ecological systems provide a wide range of ecological, economic and societal services and are more resilient to change.

¹ Ecosystem-based management is an integrated approach to management that considers the entire ecosystem, including humans. The goal of ecosystem-based management is to maintain an ecosystem in a healthy, productive and resilient condition so that it can provide the services humans want and need. Ecosystem-based management differs from current approaches that usually focus on a single species, sector, activity or concern; it considers the cumulative impacts of different sectors.

- 1.5. Greater public stewardship leads to participatory decision-making and collaborative ecosystem-based management decisions.

2. Goal: Ecosystem-based approaches are used to manage land, water and living resources.

Learning Outcomes

- 2.1. Stakeholders have access to data, models, policy information and training that support ecosystem-based planning, decision-making and management approaches.
- 2.2. Baseline data, standards, methodologies and indicators are developed to assess the health of ecosystems and watersheds.
- 2.3. Residents, resource managers, businesses and industries understand the effects of human activities and environmental changes on coastal resources.
- 2.4. Resource managers have an understanding of the policies that apply to coastal protected species.

Action Outcomes

- 2.5. Methodologies are used to evaluate a range of practical ecosystem-based management approaches for planning and adapt to future management needs.
- 2.6. Resource managers apply ecosystem-based management principles when making decisions.
- 2.7. Resource managers incorporate laws and policies to facilitate and implement ecosystem-based management.
- 2.8. Residents, resource managers and businesses integrate social, natural and physical science when managing resources and work with all sectors in the decision-making process.

Consequence Outcomes

- 2.9. Land, water and living resources are managed using ecosystem-based approaches.

3. Goal: Ecosystems and their habitats are protected², enhanced or restored.

Learning Outcomes

- 3.1. Residents, resource managers and businesses understand the importance of the benefits provided by preserving non-degraded ecosystems.
- 3.2. Residents, resource managers and businesses understand the threats to ecosystems and the consequences of degraded ecosystems.
- 3.3. Scientists develop technologies and approaches to restore degraded ecosystems.

Action Outcomes

- 3.4. Resource managers set realistic and prioritized goals to protect, enhance and restore habitats by incorporating scientific information and public input.
- 3.5. Resource managers, businesses and residents adopt innovative approaches and technologies to maintain or improve the function of ecosystems.

Consequence Outcomes

- 3.6. Habitats are protected, enhanced or restored.
- 3.7. Degraded ecosystem function and productivity are restored.

² In the context of this goal, protected areas are those places in some form of a conservation management program.

Healthy Coastal Ecosystems Performance Measures

1. Number of Texas Sea Grant tools, technologies and information services that are used by our partners/customers to improve ecosystem-based management (10).
2. Number of ecosystem-based approaches used to manage land, water and living resources in coastal areas as a result of Texas Sea Grant activities (10).
3. Number of acres of coastal habitat protected, enhanced or restored as a result of Texas Sea Grant activities (8,000).

Focus Area: Sustainable Fisheries and Aquaculture (SFA) ³

The overall economic impact of the commercial, recreational, for-hire fisheries and aquaculture industries in the United States is more than \$276 billion. The commercial fishing industry supports about 1 million full- and part-time jobs and generates \$116 billion⁴. The recreational and for-hire fishing industries generate significant tourism revenue with \$73 billion in total economic impact for saltwater fishing and an additional \$6 billion annually for Great Lakes recreational and for-hire fisheries. The U.S. aquaculture industry generates an economic impact of \$1 billion, provides additional opportunities for job creation, and contributes to meeting the nation's demand for finfish and shellfish.

Texas Sea Grant will maintain its leadership role in working with the seafood industry to ensure a safe and sustainable supply of seafood products now and for future generations. Seafood safety will continue to be an ongoing concern for consumers as foreign imports, some of which are associated with seafood contamination, continue to increase. Texas Sea Grant's partnership with NOAA Fisheries, state agencies, seafood processors, fishing associations and consumer groups will ensure safe, secure and sustainable supplies of domestic seafood and decrease our reliance on seafood imports.

4. Goal: A safe, secure and sustainable supply of seafood to meet public demand.

Learning Outcomes

- 4.1. Fishery managers and fishermen understand the dynamics of wild fish populations.
- 4.2. The seafood industry⁵ is knowledgeable about innovative technologies, approaches and policies.
- 4.3. Commercial and recreational fishermen are knowledgeable about efficient and responsible fishing techniques.
- 4.4. The commercial fishing industry is aware of innovative marketing strategies to add value to its product.
- 4.5. The seafood processing industry learns and understands economically viable techniques and processes to ensure the production and delivery of safe and healthy seafood.

³ We use a working definition of "seafood sustainability" that is based on the NOAA Fishwatch concept. Sustainability involves "meeting today's needs without compromising the ability of future generations to meet their needs. In terms of seafood, this means catching or farming seafood responsibly, with consideration for the long-term health of the environment and the livelihoods of the people who depend upon the environment."

⁴ NOAA Fisheries, 2009. Fisheries Economics, Sociocultural Status and Trends Series: <http://www.st.nmfs.noaa.gov/st5/publication/>.

⁵ The seafood industry includes all sectors of the industry, including aquaculturists, fishermen, processors, wholesalers, retailers and supporting businesses.

Action Outcomes

- 4.6. Fishermen employ efficient fishing techniques, including bycatch reduction.
- 4.7. Fishermen apply techniques to reduce negative impacts on depleted, threatened or endangered species.
- 4.8. The seafood industry adopts innovative technologies and approaches to supply safe, sustainable and competitively marketable seafood.
- 4.9. The commercial fishing and aquaculture industries adopt innovative marketing strategies to add value to their products.
- 4.10. The seafood industry adopts techniques and approaches to minimize the environmental impact of their sectors.
- 4.11. Resource managers establish policies and regulations that achieve a sustainable balance between economic benefit and conservation goals.
- 4.12. The seafood processing industry implements innovative techniques and processes to create new product forms and ensure the delivery of safe and healthy seafood.

Consequence Outcomes

- 4.13. The seafood⁶ supply is sustainable and safe.
- 4.14. The economic viability and sustainability of domestic fishing and aquaculture industries is maintained.

5. **Goal: Informed consumers who understand the health benefits of seafood consumption and how to evaluate the safety and sustainability of the seafood they buy.**

Learning Outcomes

- 5.1. The seafood industry is aware of the standards for safe seafood.
- 5.2. The seafood industry is knowledgeable about consumer trends regarding seafood sustainability and safety and how to adjust operations to meet emerging demands.
- 5.3. Seafood consumers have the knowledge to evaluate sustainable seafood choices.
- 5.4. Seafood consumers have an increased knowledge of the nutritional benefits of seafood products and know how to judge seafood safety and quality.

Action Outcomes

- 5.5. The seafood industry adopts standards for safe seafood.
- 5.6. The seafood industry adopts technologies and techniques to ensure seafood safety.
- 5.7. Seafood consumers preferentially purchase sustainable seafood products.

Consequence Outcomes

- 5.8. Consumers improve their health through increased consumption of safe and sustainable seafood products.
- 5.9. The seafood industry operates sustainably and is economically viable.

Sustainable Fisheries and Aquaculture Performance Measures

⁶ Seafood includes product originating from all sectors of the fishing and aquaculture industries.

4. Number of fishermen, seafood processors and aquaculture industry personnel who modify their practices using knowledge gained in fisheries sustainability and seafood safety as a result of Texas Sea Grant activities (300).
5. Number of seafood consumers who modify their purchases using knowledge gained in fisheries sustainability, seafood safety and the health benefits of seafood as a result of Texas Sea Grant activities (500).

Focus Area: Resilient Communities and Economies (RCE) ⁷

To accommodate more people and activity while balancing demands on coastal resources, Texas must develop innovative policies, institutional capacities and management approaches to increase community resilience. Texas Sea Grant will continue to support cutting-edge research in the areas of marine-related energy sources, climate change, coastal processes, energy efficiency, hazards, storm water management and tourism. Texas Sea Grant programs will engage our diverse and growing coastal populations to apply the best-available scientific knowledge that addresses increased resource demands and vulnerability. Ultimately, Texas Sea Grant will bring its unique research and engagement capabilities to support the development of resilient coastal communities that sustain diverse and vibrant economies, effectively respond to and mitigate natural and technological hazards and function within the limits of their natural and built environments.

6. Goal: Development of vibrant and resilient coastal economies.

Learning Outcomes

- 6.1. Communities⁸ are aware of the interdependence between the health of the economy and the health of the natural and cultural systems.
- 6.2. Communities have access to information needed to understand the value of waterfront- and tourism-related economic activities.
- 6.3. Communities understand the strengths and weaknesses of alternative development scenarios on resource consumption and local economies.
- 6.4. Communities are aware of regulatory regimes affecting economic sustainability.
- 6.5. Communities are knowledgeable about economic savings from energy planning and conservation.

Action Outcomes

- 6.6. Citizens are actively engaged in management and regulatory decisions.
- 6.7. Communities engage in economic development initiatives that capitalize on the value of their natural and cultural resources while balancing resource conservation and economic growth.

Consequence Outcomes

- 6.8. Communities have diverse, healthy economies and industries without displacing traditional working waterfronts⁹.

⁷ Resilience is determined by the degree to which a community is capable of organizing itself to increase its capacity for learning from past economic, natural or technological disasters.

⁸ Communities are defined broadly to include governments, businesses, residents, visitors and non-governmental organizations.

⁹ Working waterfront is a term broadly used in this plan to include water-dependent and water-related industries, such as energy production, tourism, ports and harbors, marine transportation, shipyards, marinas, commercial fishing, recreational fishing, aquaculture, fishing piers and public access.

7. Goal: Communities use comprehensive planning to make informed strategic decisions.

Learning Outcomes

- 7.1. Communities understand the connection between planning and natural resource management issues and make management decisions that minimize conflicts, improve resource conservation efforts and identify potential opportunities.

Action Outcomes

- 7.2. Communities make use of tools and information to explore the different patterns of coastal development, including community visioning exercises, resource inventories and coastal planning.
- 7.3. Communities adopt coastal plans.
- 7.4. The public, leaders and businesses work together to implement plans for the future and to balance multiple uses of coastal areas.

Consequence Outcomes

- 7.5. Quality of life in communities, as measured by economic and social well-being, improves without adversely affecting environmental conditions.

8. Goal: Improvements in coastal water resources sustain human health and ecosystem services.

Learning Outcomes

- 8.1. Communities are aware of the impact of human activities on water quality and supply.
- 8.2. Communities understand the value of clean water, adequate supplies and healthy watersheds.
- 8.3. Communities understand water laws and policies affecting the use and allocation of water resources.

Action Outcomes

- 8.4. Communities implement water conservation measures.
- 8.5. Communities engage in planning efforts to protect water supplies and improve water quality.
- 8.6. Communities adopt mitigation measures, best management practices and improved site designs in local policies and ordinances to address water supplies and water quality.

Consequence Outcomes

- 8.7. Water supplies are sustained.
- 8.8. Water quality improves.

9. Goal: Resilient coastal communities adapt to the impacts of hazards and climate change.

Learning Outcomes

- 9.1. Residents and decision-makers are aware of and understand the processes that produce hazards and climate change and the implications of those processes for them and their communities.
- 9.2. Decision-makers are aware of existing and available hazard- and climate-related data and resources and have access to information and skills to assess local risk vulnerability.
- 9.3. Communities have access to data and innovative and adaptive tools and techniques to minimize the potential negative impact from hazards.

- 9.4. Decision-makers understand the legal and regulatory regimes affecting adaptation to climate change, including coastal and riparian property rights, disaster relief and insurance issues.

Action Outcomes

- 9.5. Communities apply best available hazards and climate change information, tools and technologies in the planning process.
- 9.6. Decision-makers apply data, guidance, policies and regulations to hazard planning and recovery efforts.
- 9.7. Communities develop and adopt comprehensive hazard mitigation and adaptation strategies suited to local needs.
- 9.8. Residents take action to reduce the impact of coastal hazards on their life and property.
- 9.9. Communities adopt a comprehensive risk communications strategy for hazardous events.

Consequence Outcomes

- 9.10. Communities effectively prepare for hazardous events and climate change.
- 9.11. Communities are resilient and experience minimum disruption to life and economy following hazard events.

Resilient Communities and Economies Performance Measures

6. Number of communities that implemented sustainable economic and environmental development practices and policies (e.g., land-use planning, working waterfronts, energy efficiency, climate change planning, smart growth measures, green infrastructure) as a result of Texas Sea Grant activities (10).
7. Number of communities that implemented hazard resiliency practices to prepare for, respond to or minimize coastal hazardous events as a result of Texas Sea Grant activities (10).

Focus Area: Environmental Literacy and Workforce Development (ELWD)

The scientific, technical and communication skills needed to address the daunting environmental challenges confronting our nation are critical to developing a national workforce capacity. The Congressional report, *Rising Above the Gathering Storm*¹⁰, states that building a workforce literate in science, technology, engineering and mathematics is crucial to maintaining America's competitiveness in a rapidly changing global economy. These skills are also necessary to advance cutting-edge research and to promote enhanced resource management. In recognition of these needs, the America COMPETES Act¹¹ mandates that NOAA build on its historic role in stimulating excellence in the advancement of ocean and atmospheric science and engineering disciplines. The Act also mandates that NOAA provide opportunities and incentives for the pursuit of academic studies in science, technology, engineering and mathematics. Workforce needs are reflected in the broader science and technology communities of both the private and public sectors with whom Texas Sea Grant works to fulfill its mission.

An environmentally literate person is someone who has a fundamental understanding of the systems of the natural world and the relationships and interactions between the natural and built environment and the ability to understand and use scientific evidence to make informed decisions regarding environmental issues¹².

¹⁰ National Academy of Sciences, 2010: http://www.nap.edu/catalog.php?record_id=12999

¹¹ America COMPETES, 2010: <http://www.commerce.gov/americancompetes>

¹² 2009-2029 NOAA Education Strategic Plan

These issues involve uncertainty and require the consideration of economic, aesthetic, cultural and ethical values.

10. Goal: An environmentally literate public supported and informed by a continuum of lifelong formal and informal engagement opportunities.

Learning Outcomes

- 10.1. Formal and informal educators are knowledgeable of the best available science on the effectiveness of environmental science education.
- 10.2. Formal and informal educators understand environmental literacy principles.
- 10.3. Lifelong learners are able to engage in informal science education opportunities focused on coastal topics.

Action Outcomes

- 10.4. Engagement professionals use environmental literacy principles in their programs.
- 10.5. Engagement programs are developed and refined using the best available research on the effectiveness of environmental and science education.
- 10.6. Formal and informal education programs incorporate environmental literacy components.
- 10.7. Formal and informal education programs take advantage of the knowledge of Sea Grant-supported scientists and engagement professionals.
- 10.8. Formal and informal educators, students and/or the public collect and use coastal weather data in inquiry and evidence-based activities.
- 10.9. Lifelong learners make choices and decisions based on information they learned through informal science education opportunities.
- 10.10. Educators work cooperatively to leverage federal, state and local investments in coastal environmental education.

Consequence Outcomes

- 10.11. Members of the public incorporate broad understandings of their actions on the environment into personal decisions.

11. Goal: A future workforce reflecting the diversity of Texas Sea Grant programs, skilled in science, technology, engineering, mathematics and other disciplines critical to local, state, regional and national needs.

Learning Outcomes

- 11.1. Students and teachers are aware of opportunities to participate in science, technology, engineering, mathematics and active stewardship programs.

Action Outcomes

- 11.2. A diverse and qualified pool of applicants pursues professional opportunities for career development in natural, physical and social sciences and engineering.
- 11.3. Graduate students are trained in research and engagement methodologies.
- 11.4. Research projects support undergraduate and graduate training in fields related to understanding and managing our coastal resources.

Consequence Outcomes

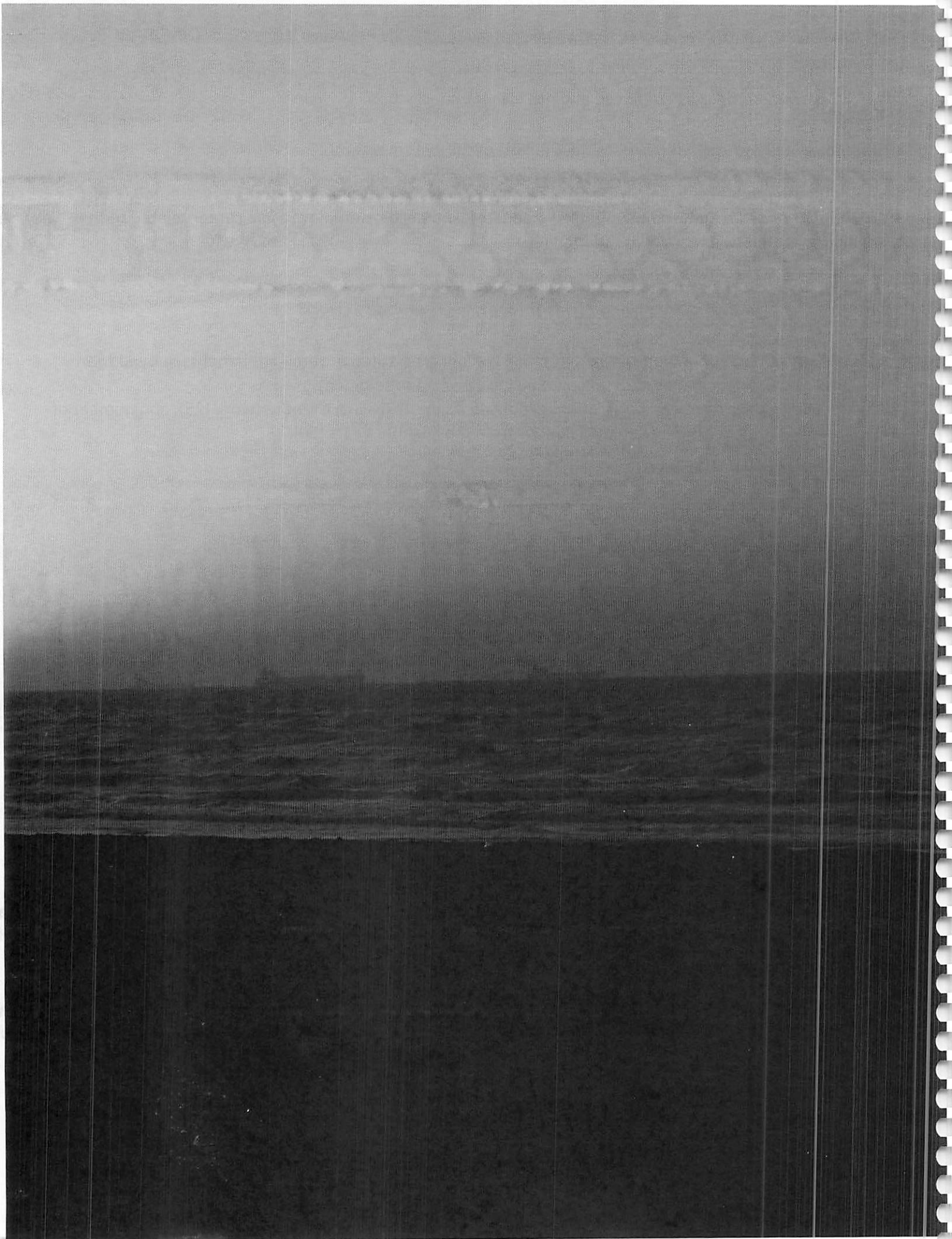
- 11.5. A diverse workforce trained in science, technology, engineering, mathematics, law, policy or other job related fields is employed and has high job satisfaction.

Environmental Literacy and Workforce Development Performance Measures

8. Number of Texas Sea Grant facilitated curricula adopted by formal and informal educators (20).
9. Number of people engaged in Texas Sea Grant- supported informal education programs (60,000).
10. Number of Texas Sea Grant-supported graduates who become employed in a career related to their degree within two years of graduation (20).

CROSS-CUTTING PERFORMANCE MEASURES

11. Economic (market and non-market; jobs and businesses created or retained) benefits derived from Texas Sea Grant activities (\$25 million; 800 jobs created or retained).
12. Number of peer-reviewed publications produced by the Texas Sea Grant network (25), and number of citations for all peer-reviewed publications from the last four years (50).



Appendix B

NOAA NATIONAL SEA GRANT COLLEGE PROGRAM 2014–2017 STRATEGIC PLAN

Sustaining our nation's ocean, coastal and Great Lakes resources through university-based research, communications, education, extension and legal programs.

INTRODUCTION

Serious challenges present the greatest opportunities for change, and Sea Grant is prepared not only to respond, but to help coastal communities prepare to meet these challenges. One of Sea Grant's demonstrated strengths is its ability to quickly mobilize universities and other partners to address challenges across the country and around the world. The national Sea Grant network of university scientists and communication, education, extension and legal professionals has the ability, through the organization's coordinated state and regional infrastructure, to address local and state priorities of national importance.

At this time of great risk to the sustainability¹ of our ocean, coastal and Great Lakes resources, there is an even greater opportunity for the Sea Grant network to play a significant role, through innovation and creativity, in addressing the goals set forth in this plan. The Sea Grant programs will strive to achieve these national goals in a manner that reflects the particular needs of individual states and communities and the nation as a whole. This four-year strategic plan establishes a prioritized national direction to guide the Sea Grant network in addressing critical national needs at local, state and regional scales in ocean, coastal and Great Lakes environments. The plan capitalizes on Sea Grant's unique capacities and strengths, allows state Sea Grant programs to be flexible, and supports the Next Generation Strategic Plan of the National Oceanic and Atmospheric Administration (NOAA).

SEA GRANT VISION AND MISSION

The National Sea Grant College Program envisions a future where people live, work and play along our coasts in harmony with the natural resources that attract and sustain them. This is a vision of coastal America where we use our natural resources in ways that capture the economic, environmental and cultural benefits they offer, while preserving their quality and abundance for future generations.

This vision complements the vision articulated in NOAA's Strategic Plan: "Healthy ecosystems, communities and economies that are resilient in the face of change."

Sea Grant's mission is to provide integrated research, communication, education, extension and legal programs to coastal communities that lead to the responsible use of the nation's ocean, coastal and Great Lakes resources through informed personal, policy and management decisions.

¹ Sustainability is defined as meeting the needs of the present generation without compromising the ability of future generations to meet their own needs. Sustainability has three equally weighted components: economic, social and environmental.

SEA GRANT MODEL

Sea Grant was created by the U.S. Congress in 1966 to be a highly leveraged federal and state partnership to harness the intellectual capacity of the nation's universities to solve ocean, coastal, Great Lakes and island (hereby referred to as coastal) problems. The National Sea Grant College Program engages citizens, communities, scientists, organizations and governments to sustain and enhance the vitality, value and wise use of the nation's coastal resources. Administered and supported by NOAA, and implemented through leading research universities, Sea Grant provides unique access to scientific expertise and to new discoveries. Through its scientists and communications, education, extension and legal specialists (hereby referred to as engagement professionals), Sea Grant generates, translates and delivers cutting-edge, unbiased, science-based information to address complex issues.

Sea Grant is a national network. This network includes the National Sea Grant Office, 33 university-based state programs, the National Sea Grant Advisory Board, the National Sea Grant Law Center, the National Sea Grant Library and hundreds of participating institutions. The Sea Grant network enables NOAA and the nation to tap the best science, technology and expertise to balance human and environmental needs in coastal communities. Sea Grant's alliance with major research universities around the country provides access to thousands of scientists, students and engagement professionals. Sea Grant's university-based programs are fundamental to the development of the future scientists and resource managers needed to conduct research and to guide the responsible use and conservation of our nation's coastal resources. With its strong research capabilities, local knowledge and on-the-ground workforce, Sea Grant provides an effective national network of unmatched ability to rapidly identify and capitalize on opportunities and to generate timely, practical solutions to real problems in real places.

SEA GRANT CORE VALUES

Since its inception, a strong set of core values has provided the foundation for Sea Grant's work. Sea Grant is founded on a belief in the critical importance of university-based research and constituent engagement². Sea Grant invests significantly in merit-reviewed research each year. Research discoveries are then distributed to Sea Grant's constituents through sustained engagement programs. Meaningful and sustained engagement has allowed Sea Grant to form strong partnerships with leading coastal state research universities, with other NOAA programs, and with a wide range of public and private partners at federal, state and local levels. This has proven to be a highly effective way to identify and solve the most relevant problems facing coastal communities.

Sea Grant's unique integration of research with constituent engagement is at the heart of its mission. As a pioneer in translational research (from discovery to application), Sea Grant ensures that unbiased, science-based information is accessible to all. The diverse capabilities of Sea Grant's personnel and partners enable the organization to be creative and responsive in generating policy-relevant research and disseminating scientific and technological discoveries to a wide range of audiences. Sea Grant's science-based, non-regulatory approach and its long-term history of engagement with local communities have made Sea Grant a

² A Mandate to Engage Coastal Users: A Review of the National Sea Grant Extension Program and a Call for Greater National Commitment to Engagement (November 2000) and NOAA's Science Advisory Board's report on Engaging NOAA Constituents. Each report defined constituent engagement as being responsive, accessible, respecting partners, maintaining scientific neutrality, integrating diverse expertise, coordination of efforts and building resource partnerships.

trusted source of information. Sea Grant serves as a catalyst for decision support by increasing knowledge among decision-makers and the public as a whole. Sea Grant's commitment to these core values is vital to achieving the goals set forth in this plan.

PLANNING PROCESS AND STRATEGIC APPROACH

The collective Sea Grant network brought its wealth of expertise and experience to the task of creating this plan. The planning process began with identification of priorities by the Sea Grant state programs (and their stakeholders and advisory committees) followed by a review of existing plans and reports that set national, regional, state and local priorities. To elicit additional input and guidance, the Sea Grant network, national stakeholder groups, representatives from NOAA programs, other federal agencies and environmental non-profit organizations were asked to provide input on three drafts of the 2014-2017 National Sea Grant Program Strategic Plan

A strategic approach to managing coastal resources in ways that balance human use with environmental health requires:

- Better science-based information about how coastal ecosystems function and how human activities affect coastal habitats and living resources;
- Citizens who understand the complexities of coastal environments and the interactions between human use and coastal ecosystem health;
- Management and decision-making processes that are based on sound information, involve citizens who have a stake in America's coastal resources and include mechanisms to evaluate trade-offs between human and environmental needs; and,
- Incorporation of social science, including quality of life and sustainable economic development, into ecosystem-based management decisions.

FOCUS AREAS

To help the nation understand, manage and use its coastal resources wisely, Sea Grant identified four focus areas central to what Sea Grant does. The focus areas are:

1. Healthy Coastal Ecosystems
2. Sustainable Fisheries and Aquaculture
3. Resilient Communities and Economies
4. Environmental Literacy and Workforce Development

These focus areas evolved from Sea Grant's 2009-2013 Strategic Plan and reflect America's most urgent needs along our coasts, as well as NOAA goals and Sea Grant's strengths and core values. The focus areas also reflect the integration of Sea Grant's research and engagement programs. These functional areas provide the foundation for implementing a successful four-year plan.

Each focus area has goals, outcomes and performance measures. The goals describe the desired long-term direction for each focus area. The outcomes are benchmarks from which Sea Grant can track progress toward achieving each goal. Performance measures are quantitative ways of measuring outcomes with targets developed by each Sea Grant program.

Outcomes are commonly categorized as short-, medium- and long-term. In this plan, learning, action and consequence outcomes are synonymous to short-, medium- and long-term outcomes and have been chosen to more easily identify the transition across outcome categories. For example, progress toward a goal starts with an achievable and measurable learning outcome and is followed by a series of “what happens next” (action and consequence) questions until the goal is met. Using this approach, it is easier to demonstrate in a more or less linear process how goals are achieved.

- Learning (short-term) outcomes lead to increased awareness, knowledge, skills, changes in attitudes, opinions, aspirations or motivations through research and/or constituent engagement.
- Action (medium-term) outcomes lead to behavior change, social action, adoption of information, changes in practices, improved decision-making or changes in policies.
- Consequence (long-term) outcomes are long-term, and in most cases, require focused efforts over multiple strategic planning cycles. Consequence outcomes in a four-year strategic plan serve as reference points toward reaching focus area goals between the current and future strategic plans.

The outcomes identified in the 2014-2017 National Sea Grant Strategic Plan can only be realized through full utilization of Sea Grant’s research and engagement programs. For example, many of the learning outcomes identified require a substantial investment in needs-based and merit-reviewed research before any actionable outcomes. Simply stated, Sea Grant-sponsored research is the “engine” that leads to new products, tools or other discoveries used by Sea Grant’s engagement programs to effect change.

There are two types of performance measures identified in this plan. Performance measures that are most closely linked to a single focus area are listed at the end of each focus area section. Cross-cutting performance measures - broad measures of progress toward goals for all focus areas - are listed following the Education and Workforce Development Focus area.

Collectively, the four focus areas include 11 goals, 91 outcomes and 12 performance measures. This plan directly aligns to NOAA’s goals and objectives as articulated in NOAA’s Next Generation Strategic Plan: climate adaptation and mitigation, weather-ready nation, healthy oceans, and resilient coastal communities and economies. The 2014-2017 National Sea Grant Strategic Plan capitalizes on Sea Grant’s unique capacities and strengths and provides state programs with the flexibility and creativity required to adapt to emerging needs.

Focus Area: Healthy Coastal Ecosystems (HCE)

The United States manages millions of square miles of coastal territories that contain diverse and productive ecosystems. These ecosystems span from the tropics to the Arctic and support a variety of recreational, commercial and subsistence activities. More than four million acres of coral reefs serve as vital economic and biodiversity hotspots in the Atlantic, Caribbean, Gulf of Mexico and Pacific³. More than 88,569 square miles of coastal wetlands provide nurseries for more than half of our commercially harvested fish species and refuges for 75 percent of all our migratory birds and waterfowl⁴. In addition, there are the countless miles of beaches and bluffs, seagrass beds, oyster reefs and tidal flats, which have long made our coasts popular places to live

³ USGS 2002, <http://pubs.usgs.gov/fs/2002/fs025-02/>.

⁴ NOAA 2012, <http://stateofthecoast.noaa.gov/>.

and visit. Therefore, healthy coastal ecosystems, sustained by their surrounding watersheds, are the foundation of life along the coast.

Keeping coastal ecosystems healthy is a challenge because of the diversity of stressors each system faces. This is further complicated because ecosystems do not adhere to traditional political boundaries. Responsible management of these systems requires new kinds of thinking and actions, often termed ecosystem-based management⁵. Ecosystem-based approaches require unprecedented levels of coordination among federal, state and local jurisdictions and the active engagement of the people who live, work and play along our coasts. They also require understanding of the characteristics of species, landscapes and their interactions within each ecosystem.

In general, increasingly rapid coastal development, greater demands on fisheries resources, climate change and other human activities are leading to water quality degradation, increased demands on water supplies, changes to fisheries stocks, wetlands loss, proliferation of invasive species and a host of other environmental impacts. It is essential for decision-makers to understand the interconnectedness and interactions of these systems in order to maintain vital habitats and inform restoration efforts within ecosystems and watersheds. Sea Grant is a leader in regional approaches to understanding and maintaining healthy ecosystems, with planning efforts across the country to identify information gaps, implement research priorities and coordinate information and technology transfer to people who need it. Sea Grant recognizes the need to determine the value of the myriad services ecosystems⁶ provide that maintain the conditions for life on Earth. Sea Grant's regional consortia, nationwide networks and international contacts are particularly well-suited to helping the nation address ecosystem health at the appropriate local, state, regional, national and global levels.

1. Goal: Ecosystem services are improved by enhanced health, diversity and abundance of fish, wildlife and plants.

Learning Outcomes

- 1.1. Develop and calibrate new standards, measures and indicators of ecosystem sustainability.
- 1.2. Identify critical uncertainties that impede progress toward achieving sustainability of ecosystems and the goods and services they provide.

Action Outcomes

- 1.3. Resource managers, policy- and decision-makers use standards and indicators to support ecosystem-based management.

Consequence Outcomes

- 1.4. Dynamic ecological systems provide a wide range of ecological, economic and societal services and are more resilient to change.

⁵ Ecosystem-based management is an integrated approach to management that considers the entire ecosystem, including humans. The goal of ecosystem-based management is to maintain an ecosystem in a healthy, productive and resilient condition so that it can provide the services humans want and need. Ecosystem-based management differs from current approaches that usually focus on a single species, sector, activity or concern; it considers the cumulative impacts of different sectors.

⁶ Ecosystem services include provisioning (food and water), regulating (flood and disease control), cultural (spiritual, recreational and cultural benefits) and supporting (nutrient cycling).

- 1.5. Greater public stewardship leads to participatory decision-making and collaborative ecosystem-based management decisions.

2. Goal: Ecosystem-based approaches are used to manage land, water and living resources.

Learning Outcomes

- 2.1. Stakeholders have access to data, models, policy information and training that support ecosystem-based planning, decision-making and management approaches.
- 2.2. Baseline data, standards, methodologies and indicators are developed to assess the health of ecosystems and watersheds.
- 2.3. Residents, resource managers, businesses and industries understand the effects of human activities and environmental changes on coastal resources.
- 2.4. Resource managers have an understanding of the policies that apply to coastal protected species.

Action Outcomes

- 2.5. Methodologies are used to evaluate a range of practical ecosystem-based management approaches for planning and adapt to future management needs.
- 2.6. Resource managers apply ecosystem-based management principles when making decisions.
- 2.7. Resource managers incorporate laws and policies to facilitate and implement ecosystem-based management.
- 2.8. Residents, resource managers and businesses integrate social, natural and physical science when managing resources and work with all sectors in the decision-making process.

Consequence Outcomes

- 2.9. Land, water and living resources are managed using ecosystem-based approaches.

3. Goal: Ecosystems and their habitats are protected⁷, enhanced or restored.

Learning Outcomes

- 3.1. Residents, resource managers and businesses understand the importance of the benefits provided by preserving non-degraded ecosystems.
- 3.2. Residents, resource managers and businesses understand the threats to ecosystems and the consequences of degraded ecosystems.
- 3.3. Scientists develop technologies and approaches to restore degraded ecosystems.

Action Outcomes

- 3.4. Resource managers set realistic and prioritized goals to protect, enhance and restore habitats by incorporating scientific information and public input.
- 3.5. Resource managers, businesses and residents adopt innovative approaches and technologies to maintain or improve the function of ecosystems.

Consequence Outcomes

- 3.6. Habitats are protected, enhanced or restored.

⁷ In the context of this goal, protected areas are those places in some form of conservation management program.

3.7. Degraded ecosystem function and productivity are restored.

Healthy Coastal Ecosystems Performance Measures

1. Number of Sea Grant tools, technologies and information services that are used by our partners/customers to improve ecosystem-based management.
2. Number of ecosystem-based approaches used to manage land, water and living resources in coastal areas as a result of Sea Grant activities.
3. Number of acres of coastal habitat protected, enhanced or restored as a result of Sea Grant activities.

Focus Area: Sustainable Fisheries and Aquaculture (SFA)⁸

The nation has witnessed the decline of many of its major fisheries while seafood consumption has increased and continues to be encouraged because of its health benefits. To fill the gap between seafood demand and domestic harvests, the United States imports 86 percent⁹ of what is consumed leading to a seafood trade deficit of over \$10 billion¹⁰ per year. With global wild fisheries harvests at a plateau of around 185 metric tonnes¹¹, some 50 seafood species are now produced from aquaculture. There are no projected increases in wild capture fisheries, but global aquaculture is predicted to increase by 33 percent over the next decade. These projections create opportunities for an expanded U.S. aquaculture industry and for innovative marketing strategies and value-added products for the nation's wild fisheries industry.

The overall economic impact of the commercial, recreational, for-hire fisheries and aquaculture industries in the United States is over \$276 billion. The commercial fishing industry supports approximately 1 million full- and part-time jobs and generates \$116 billion in sales¹². The recreational and for-hire fishing industry generates significant tourism revenue with \$73 billion in total economic impact for saltwater fishing and an additional \$6 billion annually for Great Lakes recreational and for-hire fisheries. The U.S. aquaculture industry generates an economic impact of \$1 billion, provides additional opportunities for job creation, and contributes to meeting the nation's demand for finfish and shellfish.

Sea Grant continues to play a leadership role in developing innovative technologies for all sectors of the seafood industry, including fishing, aquaculture, seafood processing and consumer safety, to ensure a safe and sustainable supply of seafood products now and for future generations. Seafood safety will continue to be a concern for consumers as foreign imports, some of which are associated with seafood contamination, continue to increase. Sea Grant's partnership with NOAA Fisheries, state fisheries managers, seafood processors, fishing associations and consumer groups will ensure safe, secure and sustainable supplies of domestic seafood and decrease our reliance on seafood imports.

⁸ We use a working definition of "seafood sustainability" that is based on the NOAA Fishwatch concept. Sustainability involves "meeting today's needs without compromising the ability of future generations to meet their needs. In terms of seafood, this means catching or farming seafood responsibly, with consideration for the long-term health of the environment and the livelihoods of the people who depend upon the environment."

⁹ Food and Agriculture Organization of the United Nations.

¹⁰ U.S. Department of Agriculture Foreign Agricultural Service statistics.

¹¹ Food and Agriculture Organization of the United Nations.

¹² NOAA Fisheries, 2009. Fisheries Economics, Sociocultural Status and Trends Series: <http://www.st.nmfs.noaa.gov/st5/publication/>.

4. Goal: A safe, secure and sustainable supply of seafood to meet public demand.

Learning Outcomes

- 4.1. Fishery managers and fishermen understand the dynamics of wild fish populations.
- 4.2. The seafood industry¹³ is knowledgeable about innovative technologies, approaches and policies.
- 4.3. Commercial and recreational fishermen are knowledgeable about efficient and responsible fishing techniques.
- 4.4. The commercial fishing industry is aware of innovative marketing strategies to add value to its product.
- 4.5. The seafood processing industry learns and understands economically viable techniques and processes to ensure the production and delivery of safe and healthy seafood.

Action Outcomes

- 4.6. Fishermen employ efficient fishing techniques, including bycatch reduction.
- 4.7. Fishermen apply techniques to reduce negative impacts on depleted, threatened or endangered species.
- 4.8. The seafood industry adopts innovative technologies and approaches to supply safe and sustainable seafood.
- 4.9. The commercial fishing and aquaculture industries adopt innovative marketing strategies to add value to their products.
- 4.10. The seafood industry adopts techniques and approaches to minimize the environmental impact of their sectors.
- 4.11. Resource managers establish policies and regulations that achieve a better balance between economic benefit and conservation goals.
- 4.12. The seafood processing industry implements innovative techniques and processes to create new product forms and ensure the delivery of safe and healthy seafood.

Consequence Outcomes

- 4.13. The U.S. seafood¹⁴ supply is sustainable and safe.
- 4.14. There is an expansion of the sustainable domestic fishing and aquaculture industries.

5. Goal: Informed consumers who understand the health benefits of seafood consumption and how to evaluate the safety and sustainability of the seafood they buy.

Learning Outcomes

- 5.1. The seafood industry is aware of the standards for safe seafood.
- 5.2. The seafood industry is knowledgeable about consumer trends regarding seafood sustainability and safety and how to adjust operations to meet emerging demands.
- 5.3. U.S. seafood consumers have the knowledge to evaluate sustainable seafood choices.
- 5.4. U.S. seafood consumers have an increased knowledge of the nutritional benefits of seafood products and know how to judge seafood safety and quality.

¹³ The seafood industry includes all sectors of the industry, including aquaculturists, fishermen, processors, wholesalers, retailers and supporting businesses.

¹⁴ Seafood includes product originating from all sectors of the fishing and aquaculture industries.

Action Outcomes

- 5.5. The seafood industry adopts standards for safe seafood.
- 5.6. The seafood industry adopts technologies and techniques to ensure seafood safety.
- 5.7. U.S. seafood consumers preferentially purchase sustainable seafood products.

Consequence Outcomes

- 5.8. Consumers improve their health through increased consumption of safe and sustainable seafood products.
- 5.9. The U.S. seafood industry operates sustainably and is economically viable.

Sustainable Fisheries and Aquaculture Performance Measures

4. Number of fishermen, seafood processors and aquaculture industry personnel who modify their practices using knowledge gained in fisheries sustainability and seafood safety as a result of Sea Grant activities.
5. Number of seafood consumers who modify their purchases using knowledge gained in fisheries sustainability, seafood safety and the health benefits of seafood as a result of Sea Grant activities.

Focus Area: Resilient Communities and Economies (RCE)¹⁵

Coastal communities in the United States provide vital economic, social and recreational opportunities for millions of Americans. For example, in 2010 over 13.5 million people were employed in the tourism industry in coastal communities in over 750,000 business establishments, earning combined wages of \$266 billion. The total economic value generated by the U.S. coastal tourism industry in 2010 was estimated at \$531 billion. However, decades of population migration have transformed many natural coastal habitats into urban landscapes and intensified the use of finite coastal resources. Between 1970 and 2010, the population of U.S. coastal watersheds has increased by 45 percent to a total of 164 million, or 52 percent of the nation's population¹⁶. This population increase has resulted in greater vulnerability of coastal communities and environments to natural¹⁷ and technological¹⁸ hazards. To accommodate more people and activity while balancing demands on coastal resources, our nation must develop innovative policies, institutional capacities and management approaches to increase community resilience.

Sea Grant will continue to support cutting-edge research in the areas of marine-related energy sources, climate change, coastal processes, energy efficiency, hazards, stormwater management and tourism. Sea Grant programs will engage our diverse and growing coastal populations in applying the best-available scientific knowledge to address increased resource demands and vulnerability. Ultimately, Sea Grant will bring its unique research and engagement capabilities to support the development of resilient coastal communities that sustain diverse and vibrant economies, effectively respond to and mitigate natural and technological hazards and function within the limits of their ecosystems.

¹⁵ Resilience is determined by the degree to which a community is capable of organizing itself to increase its capacity for learning from past economic, natural or technological disasters.

¹⁶ NOAA Economic Value of Resilient Coastal Communities, Revised 3/9/2012.

¹⁷ Natural hazards include hurricanes, Northeasters, tropical storms, extreme rainfall events, flooding, wildfires, tornadoes, droughts, tsunamis, blizzards and heat waves.

¹⁸ Technological hazards include chemical and oil spills and nuclear reactor accidents.

6. Goal: Development of vibrant and resilient coastal economies.

Learning Outcomes

- 6.1. Communities¹⁹ are aware of the interdependence between the health of the economy and the health of the natural and cultural systems.
- 6.2. Communities have access to information needed to understand the value of waterfront- and tourism-related economic activities.
- 6.3. Communities understand the strengths and weaknesses of alternative development scenarios on resource consumption and local economies.
- 6.4. Communities are aware of regulatory regimes affecting economic sustainability.
- 6.5. Communities are knowledgeable about economic savings from energy planning and conservation.

Action Outcomes

- 6.6. Citizens are actively engaged in management and regulatory decisions.
- 6.7. Communities engage in economic development initiatives that capitalize on the value of their natural and cultural resources while balancing resource conservation and economic growth.

Consequence Outcomes

- 6.8. Communities have diverse, healthy economies and industries without displacing traditional working waterfronts²⁰.

7. Goal: Communities use comprehensive planning to make informed strategic decisions.

Learning Outcomes

- 7.1. Communities understand the connection between planning and natural resource management issues and make management decisions that minimize conflicts, improve resource conservation efforts and identify potential opportunities.

Action Outcomes

- 7.2. Communities make use of tools and information to explore the different patterns of coastal development, including community visioning exercises, resource inventories and coastal planning.
- 7.3. Communities adopt coastal plans.
- 7.4. The public, leaders and businesses work together to implement plans for the future and to balance multiple uses of coastal areas.

Consequence Outcomes

- 7.5. Quality of life in communities, as measured by economic and social well-being, improves without adversely affecting environmental conditions.

¹⁹ Communities are defined broadly to include governments, businesses, residents, visitors and non-governmental organizations.

²⁰ Working waterfront is a term broadly used in this plan to include water-dependent and water-related industries, such as energy production, tourism, ports and harbors, marine transportation, shipyards, marinas, commercial fishing, recreational fishing, aquaculture, fishing piers and public access.

8. Goal: Improvements in coastal water resources sustain human health and ecosystem services.

Learning Outcomes

- 8.1. Communities are aware of the impact of human activities on water quality and supply.
- 8.2. Communities understand the value of clean water, adequate supplies and healthy watersheds.
- 8.3. Communities understand water laws and policies affecting the use and allocation of water resources.

Action Outcomes

- 8.4. Communities engage in planning efforts to protect water supplies and improve water quality.
- 8.5. Communities adopt mitigation measures, best management practices and improved site designs in local policies and ordinances to address water supplies and water quality.

Consequence Outcomes

- 8.6. Water supplies are sustained.
- 8.7. Water quality improves.

9. Goal: Resilient coastal communities adapt to the impacts of hazards and climate change.

Learning Outcomes

- 9.1. Residents and decision-makers are aware of and understand the processes that produce hazards and climate change and the implications of those processes for them and their communities.
- 9.2. Decision-makers are aware of existing and available hazard- and climate-related data and resources and have access to information and skills to assess local risk vulnerability.
- 9.3. Communities have access to data and innovative and adaptive tools and techniques to minimize the potential negative impact from hazards.
- 9.4. Decision-makers understand the legal and regulatory regimes affecting adaptation to climate change, including coastal and riparian property rights, disaster relief and insurance issues.

Action Outcomes

- 9.5. Communities apply best available hazards and climate change information, tools and technologies in the planning process.
- 9.6. Decision-makers apply data, guidance, policies and regulations to hazard planning and recovery efforts.
- 9.7. Communities develop and adopt comprehensive hazard mitigation and adaptation strategies suited to local needs.
- 9.8. Residents take action to reduce the impact of coastal hazards on their life and property.
- 9.9. Communities adopt a comprehensive risk communications strategy for hazardous events.

Consequence Outcomes

- 9.10. Communities effectively prepare hazardous events and climate change.
- 9.11. Communities are resilient and experience minimum disruption to life and economy following hazard events.

Resilient Communities and Economies Performance Measures

6. Number of communities that implemented sustainable economic and environmental development practices and policies (e.g., land-use planning, working waterfronts, energy efficiency, climate change planning, smart growth measures, green infrastructure) as a result of Sea Grant activities.
7. Number of communities that implemented hazard resiliency practices to prepare for, respond to or minimize coastal hazardous events as a result of Sea Grant activities.

Focus Area: Environmental Literacy and Workforce Development (ELWD)

The scientific, technical and communication skills needed to address the daunting environmental challenges confronting our nation are critical to developing a national workforce capacity. The Congressional report, *Rising Above the Gathering Storm*²¹, states that building a workforce literate in science, technology, engineering and mathematics is crucial to maintaining America's competitiveness in a rapidly changing global economy. These skills are also necessary to advance cutting-edge research and to promote enhanced resource management. In recognition of these needs, the America COMPETES Act²² mandates that NOAA build on its historic role in stimulating excellence in the advancement of ocean and atmospheric science and engineering disciplines. The Act also mandates that NOAA provide opportunities and incentives for the pursuit of academic studies in science, technology, engineering and mathematics. Workforce needs are reflected in the broader science and technology communities of both the private and public sectors with whom Sea Grant works to fulfill its mission.

An environmentally literate person is someone who has a fundamental understanding of the systems of the natural world, the relationships and interactions between the living and non-living environment and the ability to understand and utilize scientific evidence to make informed decisions regarding environmental issues²³. These issues involve uncertainty and require the consideration of economic, aesthetic, cultural and ethical values.

10. Goal: An environmentally literate public supported and informed by a continuum of lifelong formal and informal engagement opportunities.

Learning Outcomes

- 10.1. Formal and informal educators are knowledgeable of the best available science on the effectiveness of environmental science education.
- 10.2. Formal and informal educators understand environmental literacy principles.
- 10.3. Lifelong learners are able to engage in informal science education opportunities focused on coastal topics.

Action Outcomes

- 10.4. Engagement professionals use environmental literacy principles in their programs.
- 10.5. Engagement programs are developed and refined using the best available research on the effectiveness of environmental and science education.

²¹ National Academy of Sciences, 2010: http://www.nap.edu/catalog.php?record_id=12999

²² America COMPETES, 2010: <http://www.commerce.gov/americancompetes>

²³ 2009-2029 NOAA Education Strategic Plan

- 10.6. Formal and informal education programs incorporate environmental literacy components.
- 10.7. Formal and informal education programs take advantage of the knowledge of Sea Grant-supported scientists and engagement professionals.
- 10.8. Formal and informal educators, students and/or the public collect and use coastal weather data in inquiry and evidence-based activities.
- 10.9. Lifelong learners make choices and decisions based on information they learned through informal science education opportunities.
- 10.10. Educators work cooperatively to leverage federal, state and local investments in coastal environmental education.

Consequence Outcomes

- 10.11. Members of the public incorporate broad understandings of their actions on the environment into personal decisions.

- 11. Goal: A future workforce reflecting the diversity of Sea Grant programs, skilled in science, technology, engineering, mathematics and other disciplines critical to local, regional and national needs.**

Learning Outcomes

- 11.1. Students and teachers are aware of opportunities to participate in science, technology, engineering, mathematics and active stewardship programs.

Action Outcomes

- 11.2. A diverse and qualified pool of applicants pursues professional opportunities for career development in natural, physical and social sciences and engineering.
- 11.3. Graduate students are trained in research and engagement methodologies.
- 11.4. Research projects support undergraduate and graduate training in fields related to understanding and managing our coastal resources.

Consequence Outcomes

- 11.5. A diverse workforce trained in science, technology, engineering, mathematics, law, policy or other job related fields is employed and have high job satisfaction.

Environmental Literacy and Workforce Development Performance Measures

- 8. Number of Sea Grant facilitated curricula adopted by formal and informal educators.
- 9. Number of people engaged in Sea Grant supported informal education programs.
- 10. Number of Sea Grant-supported graduates who become employed in a career related to their degree within two years of graduation.

CROSS-CUTTING PERFORMANCE MEASURES

- 11. Economic (market and non-market; jobs and businesses created or retained) benefits derived from Sea Grant activities.
- 12. Number of peer-reviewed publications produced by the Sea Grant network, and number of citations for all peer-reviewed publications from the last four years.

IMPLEMENTATION STRATEGY

This plan provides a national framework for the work of the 33 Sea Grant programs. The state strategic plans align with the National Sea Grant Strategic Plan with particular focus on the specific needs and priorities of each respective state and region. The 2014-2017 National Sea Grant Strategic Plan will be implemented through each of the programs' portfolios of merit-reviewed research, communications, education, extension and legal projects. This implementation strategy utilizes Sea Grant's unique combination of research and engagement capabilities and capitalizes on its strong federal-university-state-private sector partnerships.

Progress toward meeting state programs' strategic plans will be used to assess each individual Sea Grant program's contribution toward meeting the national goals outlined in this plan. The National Sea Grant Office will track state-level performance measures, other numerical metrics and impacts to highlight Sea Grant's contributions in achieving the goals identified in the National Sea Grant Strategic Plan. The National Sea Grant Office will track and disseminate best practices applied by individual Sea Grant programs and facilitate their adoption by the entire Sea Grant network. The National Sea Grant Advisory Board will continue in its role of developing strategies to foster wider use of the National Sea Grant College Program to address the highest priorities regarding the wise utilization of the nation's coastal resources. Sea Grant will revisit this plan yearly to ensure that the organization is accomplishing its four-year goals while staying alert to new trends and opportunities.

Appendix C

Sea Grant Association

A REQUEST TO CAPITALIZE ON THE NATION'S COASTAL RESOURCE POTENTIAL THROUGH RESEARCH AND OUTREACH ACTIVITIES OF THE NATIONAL SEA GRANT COLLEGE PROGRAM

For the United States to be more fully responsive to the economic development potential of its coastal resources as well as the environmental challenges faced by its coastal communities, ***the Sea Grant Association is requesting federal funding of \$70 million for the National Sea Grant College Program in FY2014.***

Recognizing the constraints in the budget process, this amount is \$22 million below the authorized level for FY 2014. This funding recommendation is consistent with previous direction from the appropriations subcommittee about strengthening the impact of the program.

What is the economic importance of the Nation's coastal communities?

It is important to appreciate that 52% of the nation's total population lives in coastal watershed counties. The nation's coastal population increased by nearly 51 million people from 1970 to 2010 and by 2020, the coastal population is expected to grow by another 10% or 15.6 million. According to NOAA's most recent figures for 2009, the coastal economy contributed \$8.3 trillion to the Nation's Gross Domestic Product resulting in 66 million jobs and wages worth an estimated \$3.4 trillion. Recreational coastal fishing contributed about \$73 billion in total economic impact supporting over 320,000 jobs. For commercial fishing, the average annual value of all U.S. marine fisheries from 2008 to 2010 is estimated at \$4 billion providing about 1 million jobs and generating over \$32 billion in income. Our nation's ports, often located in the heart of sensitive coastal ecosystems, are an essential driver of the U.S. economy. About \$1.9 trillion worth of imports came through U.S. ports in 2010 supporting an estimated 13 million jobs. Over 50% of the total energy produced domestically occurred in coastal states including natural gas production, electricity generation, and oil and gas production. Coastal areas are providing opportunities for renewable energy development with projects that seek to extract energy from the movement of ocean water due to tides, currents, or waves; from the temperature differential between hot and cold ocean water; and from strong winds in offshore ocean environments.

How has the National Sea Grant College Program contributed to the economic health of the Nation's coastal communities?

According to the October 2012 Biennial Report of the National Sea Grant Advisory Board, the Sea Grant program delivered the following benefits to the Nation:

- \$170 million in economic benefits;
- 630 businesses created or retained;
- 3800 jobs created or retained;

The *Sea Grant Association* (SGA) is a non-profit organization dedicated to furthering the Sea Grant Program concept. SGA's regular members are the academic institutions that participate in the National Sea Grant College Program. The SGA advocates for greater understanding, use, and conservation of marine, coastal and Great Lakes resources.

For more information, please visit www.sga.seagrant.org or contact:
LaDon Swann, SGA President, 251-438-5690, swanndl@auburn.edu
Paul Anderson, SGA External Relations Committee Chair, 207-581-1435, panderson@maine.edu

Sea Grant Association

A REQUEST TO CAPITALIZE ON THE NATION'S COASTAL RESOURCE POTENTIAL THROUGH RESEARCH AND OUTREACH ACTIVITIES OF THE NATIONAL SEA GRANT COLLEGE PROGRAM

- 670,000 acres of degraded ecosystems restored;
- 450 communities trained in coastal hazard resilience;
- 9,900 fishers adopted responsible harvesting techniques;
- 56,000 stakeholders modified practices based on increased knowledge of safety, sustainability, and health;
- 900 communities implemented sustainable development practices;
- 3100 volunteer hours for education, outreach, and extension;
- 1000 undergraduate students supported;
- 150 undergraduate degrees awarded; and
- 200 graduate degrees awarded.

Approximately 95% of the federal funding provided to Sea Grant leaves Washington and goes to the state programs where it is used to conduct research, carry out extension and outreach activities, and deliver valuable services to our state and the other states that participate in this program. Moreover, federal funding through the Sea Grant program has a significant leveraging impact with every two federal dollars invested attracting at least an additional dollar in non-federal resources in matching funding.

The National Sea Grant College program is one of the very few nationally competitive grant programs that can demonstrate this kind of real impact at the local, state and national levels.

Since its creation in 1966, the National Sea Grant College Program has been at the forefront of addressing economic opportunities and environmental issues facing coastal communities through its research and outreach efforts. Although working as a programmatic entity of NOAA, Sea Grant has a number of unique attributes that allow the program to quickly respond — in merit-based, research-based, non-advocacy fashion — to pressing coastal resource and community needs. Sea Grant is “bottom-up” driven and university-based, and is fully and actively engaged with appropriate regional, state and local organizations. In addition, Sea Grant is not charged with specific regulatory or resource management responsibilities, nor is its efforts confined to any one scientific discipline or approach. Rather, Sea Grant can focus or refocus its research and outreach activities to best address resource issues impacting coastal communities or the nation as a whole.

America must use its coastal resources wisely to sustain the health and productivity of coastal communities. With the requested federal funding that will leverage significant state and local support; the National Sea Grant College Program will be uniquely positioned to continue its contributions to our coastal communities.

The *Sea Grant Association* (SGA) is a non-profit organization dedicated to furthering the Sea Grant Program concept. SGA's regular members are the academic institutions that participate in the National Sea Grant College Program. The SGA advocates for greater understanding, use, and conservation of marine, coastal and Great Lakes resources.

For more information, please visit www.sga.seagrant.org or contact:
LaDon Swann, SGA President, 251-438-5690, swannd@auburn.edu
Paul Anderson, SGA External Relations Committee Chair, 207-581-1435, panderson@maine.edu

Appendix D

**Texas Sea Grant College Program Funding
(September 1, 2011--August 31, 2012)**

Program Funding (NOAA)	Total	
Texas Sea Grant Base Funding	\$1,746,000	\$1,746,000
<hr/>		
Supplemental Funding (NOAA)		
Sea Grant Program Merit	\$140,000	
Texas Coastal CHARM: Coastal Resilience Tools for Local Officials	\$100,000	
Sea Grant WeTable Participatory Planning Users Conference	\$20,000	
Knauss Fellowship (Azzara)	\$49,000	
Knauss Fellowship (Bagwill)	\$49,000	
Knauss Fellowship (Carr)	\$49,000	
Knauss Fellowship (Welder)	\$49,000	
Texas Public Survey to Inform Water Quality	\$36,625	
Climate Adaptation Capacity Building Initiative	\$60,000	
Gulf of Mexico Economics Working Group	\$30,000	
Gulf Climate Community of Practice Workshop	\$30,000	
Coastal Resilience Website Development	\$6,300	
Texas Sea Grant Scholars Program	\$19,045	
Genetic Repository for Gulf of Mexico Fishes	\$6,593	
Aquaculture Research Program 2011	\$152,341	
Aquaculture Research Program 2012	\$111,685	
Enhancing Proof of Concept Procedures of Potential Bycatch Reduction	\$83,571	\$992,160
<hr/>		
Supplemental Funding (Other)		
National Ocean Sciences Bowl Loggerhead Challenge (COL)	\$15,000	
National Ocean Sciences Bowl Dolphin Challenge (COL)	\$15,000	
Clean Texas Boater Environmental Education Program (TPWD)	\$30,368	
UMN-National TAAF Training Coordination Center	\$356,275	
Intergovernmental Personnel Act (Dahood) (NSF)	\$44,627	
Galveston and Brazoria County Stormwater Quality Improvement (TCEQ)	\$495,000	
Coastal & Local: Texas Tools for Community Resiliency and Storm Recovery (USM)	\$99,170	\$1,055,440
<hr/>		
State Funding		
State of Texas Special Item Appropriation	\$256,270	
Texas A&M University Annual Appropriation	\$287,818	
Texas A&M University Ocean Awareness Promotion (Provost Office)	\$100,000	\$644,088
<hr/>		
TOTAL PROGRAM FUNDING (9/1/2011-8/31/2012)	\$4,437,688	

Appendix E



The Risk of Rising Sea Level

**Texas Universities Ready and Able
to Help Coastal Communities Adapt**

February 2013

Executive Summary: The Risk of Rising Sea Level

Texas Universities Stand Ready and Able to Help Coastal Communities Adapt

Although it may not be noticeable to the naked eye, the sea is rising along the Texas Gulf Coast. In fact, by 2100, much of the Texas coast will likely be under at least a foot of water, which poses a risk not only to the economic vitality of low-lying areas, but also to areas immediately beyond that are within reach of a storm surge. However, one foot of rise is considered the best-case scenario. Some models project a rise of 6 feet. Regardless of how much the Gulf rises relative to the Texas coast in the coming decades, it is clear from experience that even small increases in sea level will exacerbate coastal flooding, contaminate coastal freshwater supplies with salt water, shrink barrier islands, erode beaches, displace marshes, and magnify the impact and cost of extreme weather events such as hurricanes and tropical storms. The recent devastation caused by Hurricane Sandy was, in fact, made worse by a foot of sea-level rise over the last century.

The Texas coast is an engine of the Texas economy. It supports a robust tourism industry built around its natural resources and is an industrial hub of state, national and global significance. Sea-level rise spells trouble not only for sensitive coastal environments but also for residents, communities, and the many vital industries and infrastructure supporting them. Other Gulf Coast states, notably Louisiana and Florida, have taken significant strides forward to study sea-level rise, and they have begun to prepare for the inevitable. Adaptation strategies have been identified and cost-benefit ratios calculated by several different communities to determine what protective measures can be implemented. Texas lags behind other states in these efforts, and remains, for the most part, unprepared.

To provide leadership on this issue, The University of Texas at Austin hosted a workshop in September 2012 to identify the current status of sea-level rise along the Texas Gulf Coast and to assess risks to the ecosystems, communities, and economy of the region. Twenty-eight scientists from six of Texas' leading academic institutions participated in the workshop, representing the depth of expertise and capacity of the state's university community to work collaboratively on this complex societal challenge. Representatives from the nonprofit, governmental, and private sectors also attended the workshop, signifying broad-based support from many stakeholders for participating in the planning process that must occur as coastal communities adapt to rising seas.

The following pages provide an overview of what is currently known about sea-level rise and highlight the opportunity before us. The response to sea-level rise is long-term but requires that we start planning today if we are to get ahead of the issue. Critical to this effort is additional research that must be conducted to grasp the full magnitude of the threat and to serve as the basis for adaptation to changes on the horizon.

To keep this effort moving, the university community is committed to working with entities directly affected by rising sea level including cities, counties, and regional councils of government; industries, including utilities, petrochemical companies, and commercial fisheries; seaports and airports; realtors and builders; neighborhood associations; economic development foundations; consumer groups, environmental interests; and others. The university community is eager to work to increase awareness of the risks of rising sea level and provide the research essential for planning and preparedness.

What is the issue?

Sea level is rising, as it has been for thousands of years since the last ice age. The current 1/5-inch-per-year rate of sea-level rise in the Gulf is about five times the average rate calculated over the previous 4,000 years and is one of the highest rates reported globally. The volume of ocean water has been increasing from ice and glacial melting, and expanding as it warms, and both processes have accelerated recently and are now adding to the oceans' volume at about twice the former rate. The current rate of sea-level rise is expected to accelerate further, doubling or even tripling by the end of the 21st century as a warming atmosphere fuels further expansion of the oceans, and threatens to melt significant portions of the Greenland and Antarctic ice sheets. How high could sea level rise? Prior to the last ice age, during another very warm period approximately 122,000 years ago, sea levels were about 20 feet higher than they are today.

Along the 367 miles of the Texas coast two phenomena are occurring: the Gulf of Mexico is rising, and the land is either stable or subsiding. In combination, they cause *relative* sea-level rise, relative because the measured magnitude of change may be higher or lower than the ocean surface change alone. Texas is fortunate to have tide gauges that have measured sea level during the last 40 to 100 years. These tide gauge records show different rates of relative sea-level rise over time (see map at right). Geographic variation in the rate of rise along the coast is due to land subsidence caused by compaction of sediments, fault activity along the coast, and human activities, in particular groundwater pumping and oil and gas extraction. Land subsidence is especially prevalent in the Houston-Galveston region. Average maximum rates of subsidence at the center of this region were as high as nearly 5 inches per year between 1964 and 1973. Fortunately, rates of subsidence since then have dramatically decreased due to curtailment of groundwater pumping.

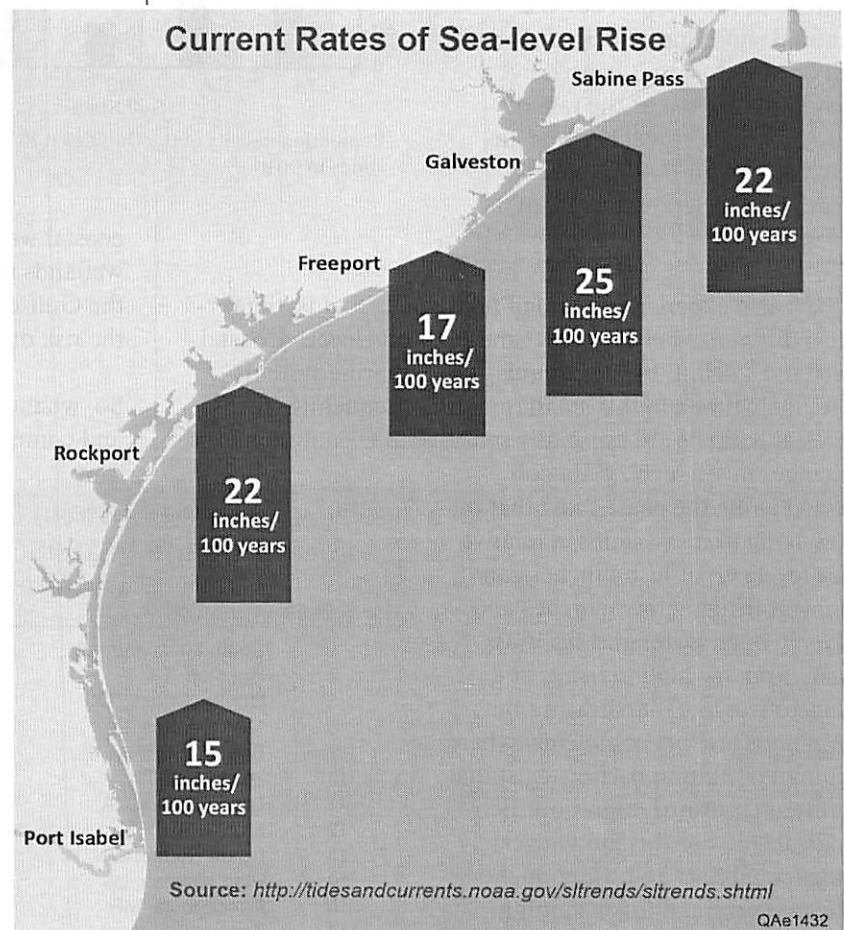
Another factor currently impacting our coasts is a paucity of sediment carried to the coast by rivers. Most Texas rivers deposit their sediment in bays, where sediment helps sustain deltas and wetlands; only the Brazos River and Rio Grande flow directly to the coast. Sediment delivered to the coast by these two rivers has greatly decreased because of dams and, in the case of the Rio Grande, increased water withdrawals. In the past, sediment delivered by both rivers resulted in the construction of large deltas in the Gulf, which were major sources of sand for barrier islands. In the absence of sediment delivery, these barriers are now undergoing unprecedented and unsustainable

erosion, which makes the coast ever more vulnerable to damage from severe storms.

Deltas within Texas bays represent a critical transition zone and unique ecosystem. Reduction in the amount of sediment delivered by rivers such as the Sabine, Trinity, Lavaca, and Nueces has resulted in extensive erosion and even destruction of these deltas.

With little new sediment being added to the coast by rivers, the Texas shoreline is retreating. The rate of retreat is variable, reflecting the existing distribution of sediment, barrier island thickness, and amount of sand that lies immediately offshore of the barriers. Tropical storms and hurricanes remove sand from the shoreline, transporting it far offshore, where it is lost from the system. The combination of shoreline retreat, beach erosion, and sea-level rise is particularly threatening to the future of our coastal communities.

A best-case scenario of sea-level rise can be derived by simply extending current rates of rise into the future. Under this scenario, sea level along the Texas coast will be



1-2 feet higher, depending on location, by 2100. This rise will markedly affect Texans, our economy, and the environment because coastal populations and infrastructure will have expanded further in size and proximity to the coast, as has been seen during the last 50 years. A worst-case scenario is an almost unfathomable 6 feet of rise.

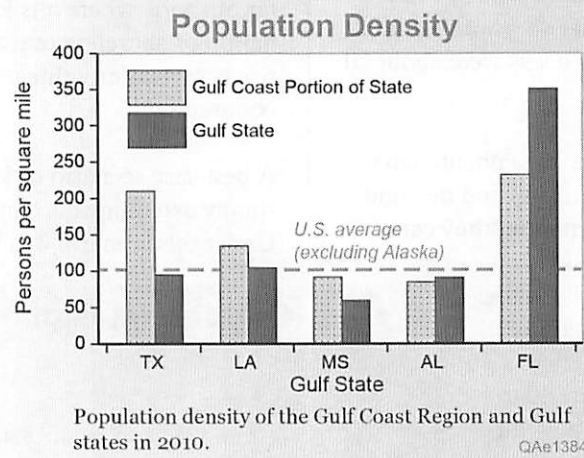
Why Should We Care?

The relatively flat and low-lying nature of the Gulf coastal plain makes it especially vulnerable to sea-level rise. Most of the Texas coast is eroding inland, due in part to the effects of both sea-level rise and subsidence. Texas has some of the highest coastal erosion rates in the country. Research shows that 64% of the Texas coast is eroding at an average rate of about 6 feet per year, and some locations lose more than 30 feet per year. As a whole, the Texas coast is eroding at an average rate of 2.3 feet per year, which translates into the loss of 235 acres of land along the Texas Gulf shoreline per year. The shoreline along Texas estuaries and lagoons is more than 15 times the length of the Gulf shoreline, and that shoreline is retreating as well. From 1930 to 1995, more than 50% of the shoreline surrounding West Bay (part of the Galveston Bay System behind Galveston and Follets Islands) retreated; less than 3% of the natural shoreline advanced. Not all of this erosion is caused by sea-level rise, but as the rate of rise increases, it will become an increasingly important process that will accelerate the rate of erosion.

Texas also experiences a small tidal range, that is, the vertical difference between low- and high-tide levels. Coastal wetlands, deltas, barrier islands, and estuarine systems are finely tuned to this small range. Consequently, Texas coastal habitats are especially sensitive to even minor changes in sea level. Data collected along the coast show that on low-lying barrier islands, a relative sea-level rise of just 4 inches can convert fringing low marshes and flats to open water and sea grass beds, and dry high marshes and flats to wet low marshes and flats. Wetlands are lost completely where human or natural barriers exist that prevent landward migration. Ecological shifts of this kind adversely impact habitats and water quality that are essential for sustaining commercially- and recreationally-valuable fish, oysters, and other living organisms.

For example, relative sea-level rise has led to loss of wetland marshes and increases in open water along

the upper coast of Texas, including Galveston Bay. This area lost more than 43,000 acres of salt and fresh marshes and more than 4,000 acres of tidal flats between the 1950s and 2004. South of Galveston Bay, the picture is more complicated. Marshes have eroded in many places where sedimentation has been unable to keep pace with rising sea level. However, fresh and salt marshes have increased in other, previously upland areas. While gains of some wetland habitats may occur in localized areas, this net loss of marsh is expected to continue due to flooding, inundation and erosion caused by a combination of subsidence and sea-level rise. The current rate of sea-level rise is approaching the point at which wetland growth rates will be unable to keep up with rising water. When this occurs, these wetland habitats will be replaced by open water.



Historically, the Texas coastline was protected from storms and surges by long barrier islands and wetlands. However, reduced sediment delivery, wetland destruction, and coastal development have been eroding that protective system. In the absence of natural buffers, people, homes and other structures take the brunt of storm surges. Texas scientists estimate that the loss of 1 acre of native

coastal wetland boosts flood damage by \$1.5 million. As wetlands recede inland, so does the land itself, bringing the Gulf closer to homes and businesses and increasing the risk of storm surges and flooding.

So, what does the risk of rising sea level mean to people and commerce in Texas? In the direct path of rising seas are 18 counties along the Texas coast, which include 6 of the top 20 most-populated counties in the state. Combined, these counties represent less than 6% of the landmass in Texas, but they hold nearly 25% (6.1 million) of the state's 2010 population. Population density along the Texas Gulf Coast is more than twice that of the rest of the state, and growth in this region is outpacing Texas' population growth.

Also in harm's way are four of the United States' 10 busiest ports are in Texas: Houston, Corpus Christi, Beaumont, and Texas City (see list to the left). Fifty-two percent of all foreign crude oil imports were received at Texas ports in 2010.

Leading Ports in Tonnage in 2009

U.S. Rank	Port	Short Tons (Millions)
1	South Louisiana, LA	213
2	Houston, TX	211
5	Corpus Christi, TX	68
6	New Orleans, LA	68
7	Beaumont, TX	68
10	Texas City, TX	53
11	Lake Charles, LA	52
12	Mobile, AL	52
13	Baton Rouge, LA	52
14	Plaquemines, LA	51
16	Pascagoula, MS	37
17	Tampa, FL	35
19	Port Arthur, TX	34
27	Freeport, TX	27
47	Galveston, TX	10

In 2009, 15 of top 50 U.S. ports, by tonnage, were located in the Gulf Coast Region.

Source: U.S. Army Corp of Engineers, 2010

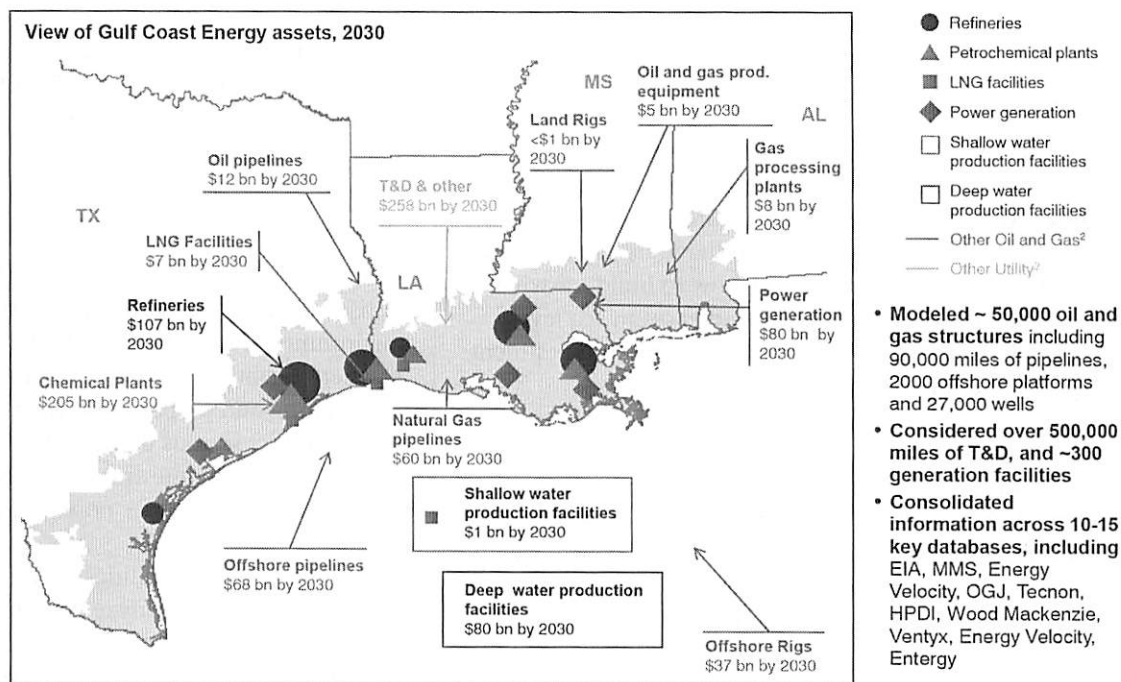
QAE1385

Texas ports generate \$5 billion in local and state tax revenue and \$48 billion in personal income. They create 1 million direct jobs and 1.3 million indirect jobs annually. Texas ports account for 19% of all U.S. port tonnage, and they accept cargo from trading partners all over the world.

In addition to the state's ports, shipping lanes, and associated assets, Texas hosts refineries, petrochemical facilities, utility assets (e.g., generation, transmission and distribution (T&D) facilities), oil and gas production and transportation infrastructure, and LNG terminals. These assets are also vulnerable to storm surge and sea-level rise. A recent study by Entergy, a power-generating utility based in Louisiana that serves East Texas, estimated the current value of Gulf Coast energy assets at **\$800 billion** considering 2,000 offshore platforms, 90,000 miles of pipelines, 300 power plants, and 500,000 miles of T&D lines among many other assets (see figure above). Almost all of these assets are in Texas and Louisiana and offshore in the Gulf of Mexico from these states' coastlines.

In addition to energy infrastructure, coastal cities, road infrastructure, fisheries, recreational and tourism infrastructure and facilities, coastal waterways, and ecosystem services are also at risk from adverse impacts of sea-level rise. For example, Texas accounts for 25% by value of all commercial fishing landings in the Gulf Coast region (see figure at right). Ninety-seven percent of Gulf of Mexico commercial seafood landings rely on estuaries and wetlands to survive. Those same estuaries support 75% of North American migratory birds during their migration, including waterfowl important to birdwatchers and recreational hunters.

Projected Replacement Value of Gulf Coast Energy Assets in 2030



Source: Entergy, 2010

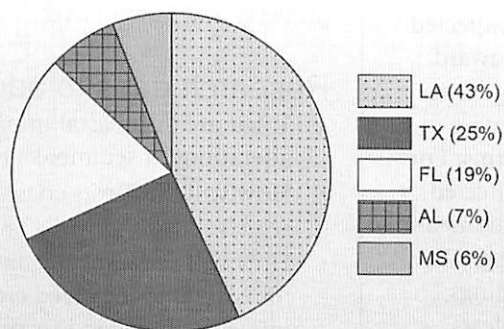
QAe1468

What does the future hold?

Ongoing sea-level rise will contaminate coastal freshwater aquifers with salt water, increase the frequency and severity of coastal flooding and push storm surges further inland, shrink barrier islands, erode beaches, displace wetlands, and magnify the impact of extreme weather events such as hurricanes and tropical storms. For example, by 2100, Galveston could experience inundation events associated with small- to mid-size hurricanes 6-7 times more frequently than today and the island could flood every year. In harm's way along the Texas coast are cities and settlements, roads, railways, and airports, industrial complexes, ports, drinking water supplies and systems, sewage disposal systems, agricultural lands, tourist attractions, real estate, and natural coastal ecosystems.

The financial costs to mitigate and adapt to sea-level rise are difficult to determine. However, inaction is likely to be orders of magnitude more costly than adaptation. A recent study of Galveston Bay showed that, given current economic conditions, a 2-foot rise in sea-level would cause an additional property loss of \$1.7 billion from a Hurricane Ike-equivalent storm. The odds of a 100-year flood or worse occurring along the Texas coast by 2030 at the present rate of sea-level rise is about 14%. If the rate of rise accelerates, the likelihood of coastal flooding will be even greater, and the resulting damage and insurance claims may become overwhelming.

Landings by Value



Distribution of the \$660 million of commercial fishing value by state, an average annual value from 2007 to 2009.

Source: National Marine Fisheries Service, 2010

QAe1386

What is being done to adapt to sea-level rise in Texas and elsewhere?

Texas has fallen behind other Gulf states in adaptation planning for sea-level rise, and remains, for the most part, unprepared. Today, sea-level rise is rarely considered by governments, organizations, and individuals as they make decisions about where to develop, how to build, or what to preserve. However, anticipated increases in sea level will impact the longevity, safety, and return-on-investment of current and future projects.

A recent (2012) extreme weather event, Hurricane Sandy, serves as a fresh reminder of the devastation that can be associated with sea-level rise. Although Sandy was unusually severe, resulting from the confluence of several weather patterns, the water in New York Harbor now stands 11 to 16 inches higher than it did a century ago. That historic amount of rise in water level does not account for a 14-foot storm surge, but it did contribute to a surge that was higher and more destructive than it would have been otherwise. Damage estimates for Hurricane Sandy make it the second-costliest U.S. storm, second only to Hurricane Katrina.



Aftermath of Superstorm Sandy (photo: U.S. Geological Survey)

Accounting for changes in sea level that may be expected to occur over the lifetime of projects is one step toward making informed decisions. Planning for the long-term effects of sea-level rise will also help us better prepare in the short-term for flood damage from coastal storms. For example, as a result of Sandy, governors of the affected states are calling for implementation of adaptation measures such as providing backup generators for hospitals, relocating power systems to higher floors in buildings, and taking action to make public transit systems less flood-prone.

Other states along the Gulf Coast, notably Louisiana and Florida, have taken significant strides forward to study

sea-level rise, and they have begun to prepare for the inevitable. Vulnerability assessments have been conducted, adaptation strategies have been identified, and cost-benefit ratios calculated by several different communities to determine what protective measures can be implemented (see figure on next page).

Where do we go from here?

Coordinated research is needed to determine how sea-level rise will affect coastal communities, including natural environments, local businesses and private property, government facilities, and other infrastructure. In the absence of planning and preparation, we can expect rising sea level to inflict serious damage. We have the opportunity to start answering questions such as where, when, and to what extent sea-level rise poses a danger.

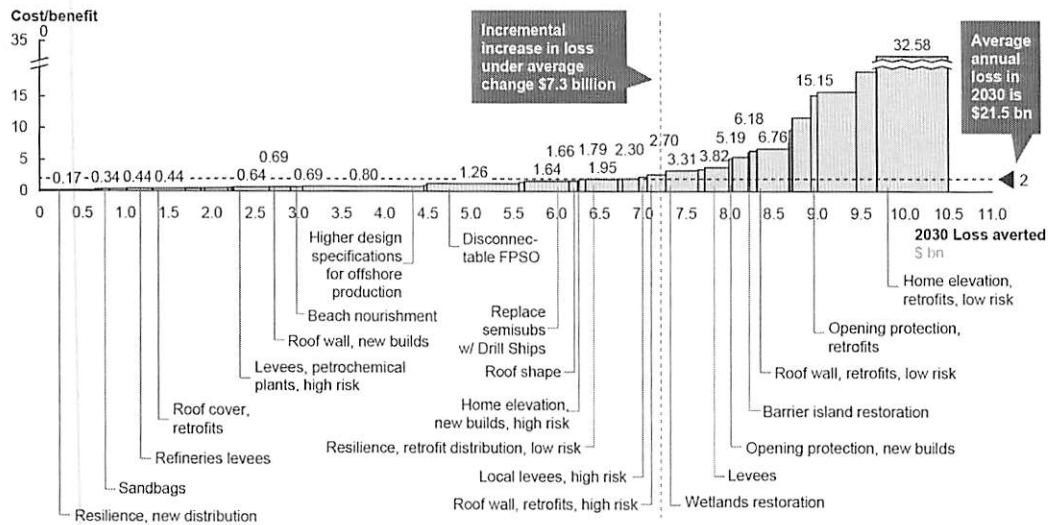
Recognizing the capabilities of Texas' academic institutions to collect and analyze data, transform these data into useful information, communicate the findings to Texans, and assist policy makers and stakeholders in adapting to our changing circumstances, The University of Texas at Austin hosted a workshop in September 2012 to identify the current status of sea-level rise and the potential risks posed to the ecosystems, communities, and economy of the region. The workshop was attended by 28 researchers from 4 different university campuses who represented a wide range of expertise. The willingness of participants to contribute to the workshop, and the consensus represented by this white paper, illustrate the readiness of the Texas university community to help decision makers and stakeholders start assessing the threat and develop an integrated plan to reduce the economic and environmental impacts of sea-level rise in Texas.

The Texas university community is already leading research efforts to understand how large natural events (hurricanes, tropical storms, storm surges) impact coastal environments. Understanding comes from monitoring sea level, the seafloor, sediment, water quality, and other parameters on the Texas Gulf Coast. Even with these efforts, gaps in knowledge remain, and these gaps place the Texas Gulf Coast at increased risk of adverse impacts to property and human lives.

Research gaps to address include:

- What are the coastal impacts of natural and human alterations in sediment supply from rivers to the coast?
- How will the Texas coast respond to different rates of sea-level rise?
- How will sea-level rise and changing storm patterns translate into localized erosion, flooding, damage to infrastructure, and loss of ecosystems?
- Could sea-level rise cross a critical threshold that causes ecosystems and the services they provide (e.g., nursery grounds for commercially-valuable shellfish)

Analysis of Cost Effectiveness of Measures to Mitigate Against Sea-Level Rise



Cost-benefit (C/B) ratios of measures to offset anticipated annual losses that would occur in 2030 across the Gulf Coast. Seven billion dollars in annual expected loss could be averted by measures with a C/B ratio of less than 2.

Source: Entergy, 2010

QAe1467

to collapse? What would be the socio-economic consequences of such a collapse?

- What is the vulnerability of coastal communities to increased storm surge under various sea-level rise scenarios? How would the risk profile change if barrier islands were no longer in place?
- How can short-term/market-driven development interests be persuaded to heed predictions of sea-level rise?
- What types of land-use patterns are better suited for adapting to sea-level rise?
- What are the “no-regrets” policies that local governments can enact that will mitigate coastal hazards while adapting to sea-level rise?
- What coastal protection measures are physically and economically feasible and socially and environmentally acceptable in different locations, and how much time do we have to start implementing these measures?
- At what point is retreating from the shoreline more cost effective than defending coastal land?
- How uncertain is the information about sea-level rise and other coastal (physical, ecological, and socio-economic) processes, and what are the implications of these uncertainties for decision making?

Sea-level rise presents an opportunity for Texas to tap the powerful resource that exists within its colleges and universities. The university research community is eager to initiate and lead science-based policy responses to this major societal issue.

Conclusion

The Texas Gulf Coast provides resources that drive the Texas economy, provide food and fuel for a rapidly growing human population, and sustain and nourish life. The quality and abundance of these resources are paramount to sustained growth in Texas. The Texas coastal region

also represents a vital hub of industrial activity of national and even global significance.

The time is now to begin assessing the risks posed by sea-level rise in preparation for the long-term planning and implementation of adaptation strategies that will ultimately be necessary to protect the ecosystems, communities, and economy of the Texas Gulf Coast. Critical to this effort is additional research needed to fully understand the magnitude of the issue and to serve as the basis for adaptation to changes on the horizon. The Texas university community is uniquely capable of providing planners, policy makers and other stakeholders with the data, information, and analyses necessary to protect and preserve this vital region.

Contact Us

For more information about the issue, to become a partner in research or to get involved in adaptation planning for the Texas coast, please contact:

Dr. Wendy Gordon, Ecologia Consulting at wendy@ecologiaconsulting.com

Workshop Co-sponsors

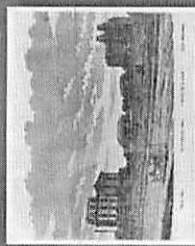
Bureau of Economic Geology (UT) • Energy Institute (UT)

Participant Organizations

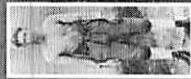
Center for Space Research (UT) • Center for Texas Beaches and Shores (TAMUS) • Cockrell School of Engineering (UT) • Conrad Blucher Institute (TAMUS) • Department of Earth Science (Rice) • Department of Geography (TXSTATE) • Ecologia Consulting • Entergy • Environmental Science Institute (UT) • Harte Research Institute (TAMUS) • Hazard Reduction and Recovery Center (TAMUS) • Houston Advanced Research Center • Institute for Geophysics (UT) • Marine Science Institute (UT) • Mission-Aransas National Estuarine Research Reserve • Texas General Land Office • Texas Parks & Wildlife Department • Texas Sea Grant (TAMU) • Texas Water Resources Institute (TAMU) • Witt & Associates

Appendix F

IT'S TIME TO KEEP MOVING FORWARD.



1876
The Agricultural and Mechanical College of Texas (now Texas A&M) opens as the state's first public institution of higher education.



1922
The legend of "The 12th Man" is born as E. King Gill stands ready to assist the Aggies on the gridiron.



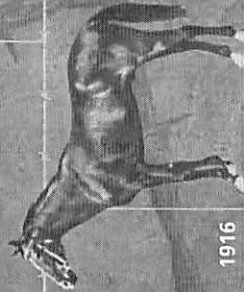
1972
Texas Sea Grant program is established at Texas A&M as part of the National Sea Grant Network, formed to focus on coastal science, research and education.



1991
Texas A&M starts the Colopias Program to help impoverished communities in Texas improve quality of life by teaching them to solve problems such as creating clean water.



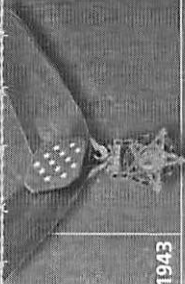
2011
A Texas A&M-led archeological research team discovers that the earliest Americans resided in central Texas nearly 15,000 years ago.



1916
The School of Veterinary Medicine opens at Texas A&M. Today, the school ranks in the top 10 nationally and remains the state's only veterinary college.



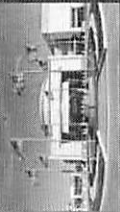
1862
United States Congress passes the Morrill Land-Grant Act, designating public land for the purpose of higher education.



1943
The first of seven Aggies is awarded the Medal of Honor, representing the thousands of Aggies who serve the nation. During World War II, Texas A&M produced more officers and servicemen than any other school.



1982
Texas A&M students start The Big Event, the nation's largest student-run community service project, which this year saw 17,000 Aggies completing 1,700 projects in the local area.



1997
The George Bush Presidential Library and Museum opens on the campus of Texas A&M in honor of the nation's 41st president.



2012
Texas A&M joins the Southeastern Conference, making Texas SEC Country.

It started with a bold move 150 years ago to bring a state university to Texas. Today, as the sixth-largest university in the nation, Texas A&M continues to shape our state's character through a dedication to teaching, research, selfless service and now, our entrance into the SEC. Texas is a state that's always moving forward, and we'll be there every step of the way.

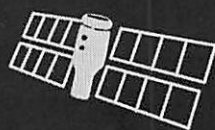
IT'S TIME FOR



TEXAS A&M
UNIVERSITY

www.tamu.edu

facebook.com/tamu twitter.com/tamu tamutimes.tamu.edu youtube.com/tamu



SPACE-GRANT STATUS 1989

LAND-GRANT STATUS 1876



SEA-GRANT STATUS 1971

What you stand for says a lot about who you are. At Texas A&M University, we stand for advancing our state through research and innovation. As the only school in Texas with land-grant, sea-grant, and space-grant designations, we are uniquely positioned to impact the future of energy, industry, and education for millions of Texans, and billions of people around the world. It's a challenge we don't take lightly, and one which our students and faculty are eager to accept.



TEXAS A&M
UNIVERSITY.

TAMU.edu

Appendix G



MEDIA ADVISORY

2700 Earl Rudder Frwy South, Suite 1800 • College Station, Texas 77845 • 979/845-3854 • FAX 979/845-7525

For Immediate Release: February 6, 2012



Science At Work For Texans

<http://texas-sea-grant.tamu.edu>

For more information contact:

Terrie Looney

(409) 656-0559

tslooney@tamu.edu

Annapolis Christian Academy wins Loggerhead Challenge

CORPUS CHRISTI, TX — Hometown team Annapolis Christian Academy won the 2012 Loggerhead Challenge Regional Competition of the National Ocean Sciences Bowl (NOSB) on Saturday and advances to the National Finals.

The team of Emily Borchardt, Andrew Hanks, Austin Jones, Colton Garrett and Rylee Williams emerged at the top of the 10-team field after a day of head-to-head matches where the high school students demonstrated their knowledge of marine and coastal science by answering questions from biology, physics, chemistry, geology, geography, mathematics and the social sciences. Annapolis Christian Academy defeated second place finisher Corpus Christi Homeschool Co-op in the final match, earning the right to face the winners of the other 24 NOSB regional competitions in Baltimore April 19-22. The Loggerhead Challenge was held on the campus of Texas A&M University – Corpus Christi (TAMUCC).

As the runner-up, the Corpus Christi Homeschool Co-op team of Myca Reed, Ismael Orozco, Jade Redublo, Andrew Sprinkle and Jillian Gomez is an alternate for the NOSB National Finals if Annapolis Christian Academy cannot compete.

The “A” Team from Chaparral Star Academy in Austin finished in third place.


Gregory-Portland High School’s “B” Team was honored with the Dr. Wes Tunnell Sportsmanship Award, which is given to the team judged by competition officials to best embody the spirit of earnest competition while demonstrating exemplary decorum. The award was presented by Tunnell, a widely respected ocean scientist renowned as much for his integrity, honesty and work ethic as he is for his expansive body of research. Tunnell is currently associate director of the Harte Institute for Gulf of Mexico Studies at TAMUCC. The rest of the Loggerhead Challenge field comprised Gregory-Portland High School “A” Team, “A” and “B” teams from San Antonio’s James Madison and Theodore Roosevelt High Schools, and Chaparral Star Academy’s “B” Team.

NOSB, hosted in Texas by the Texas Sea Grant College Program, is intended to increase knowledge of the oceans on the part of high school students, their teachers and parents, and to raise the visibility and public understanding of the national investment in ocean-related research.

“The competition was incredible,” said Terrie Looney, Loggerhead Challenge Regional Coordinator. “These kids exhibited an absolutely amazing grasp of ocean science and proved themselves exemplary scholars and outstanding sportsmen. One team had to win, but all of the teams proved they belonged in this competition.

“We wish Annapolis Christian Academy good luck as they represent the Loggerhead Challenge at the National Finals,” said Looney, who is also the Texas Sea Grant Extension Program’s Coastal and Marine Resources Agent for Jefferson and Chambers counties.”

The theme for the 2012 NOSB regional and national competitions is “A Sea of Change: Development and



Evolution.” The theme not only deals with biological evolution, but the adaptations of humans to a changing ocean. For example, technologies are developed and evolve to address our nation’s need for operational forecasting systems and offshore alternative/renewable energy production, and how federal agencies have had to adapt their research and management practices to answer emerging issues such as ocean acidification.

The Loggerhead Challenge, held annually in Corpus Christi, is one of two NOSB regional competitions hosted by Texas Sea Grant each year and it is open to high school teams from south and west Texas. The other competition is the Dolphin Challenge, open to teams from north and east Texas. This year’s Dolphin Challenge, scheduled Saturday, March 3, will be held for the first time on the campus of Texas A&M University at Galveston. Prior Dolphin Challenges were held on the campus of Texas A&M University in College Station.

NOSB is managed nationally by the Consortium for Ocean Leadership, a nonprofit organization representing 94 of the leading public and private ocean research and education institutions, aquaria and industry with the mission to advance research, education and sound ocean policy.

The Texas Sea Grant College Program is a partnership of university, government and industry focusing on marine research, education and outreach. It is administered through the National Oceanic and Atmospheric Administration and is one of 32 university-based Sea Grant Programs around the country. Texas Sea Grant is based at Texas A&M University.



MEDIA ADVISORY

2700 Earl Rudder Frwy South, Suite 1800 • College Station, Texas 77845 • 979/845-3854 • FAX 979/845-7525

For Immediate Release: February 15, 2012



For more information contact:
Jim Hiney,
Communications Coordinator
Office: (979) 862-3773
bohiney@tamu.edu

Red Tide Rangers earn rest as bloom wanes

COLLEGE STATION, Texas — One of the largest and longest red tides in Texas history appears to be disappearing, thanks in part to recent and much-needed rains, giving a well-deserved rest to volunteers who helped track the harmful algal bloom.

Samples collected and studied by Red Tide Rangers, a group created by the Texas Sea Grant College Program's Tony Reisinger and the acting director at The University of Texas-Pan American's Coastal Studies Laboratory, Don Hockaday, showed no red tide cells in the waters near South Padre Island.

"I think we can say that red tide gone from South Texas and is not likely to come back in the near future," said Reisinger, Cameron County Coastal and Marine Resources Agent with the Texas Sea Grant Extension Program (TXSGE).

Declining water temperatures had already affected the health of red tide organisms — the small photosynthetic plant *Karenia brevis* — and increased freshwater inflows into Texas coastal waters from inland storm runoff is dropping salinities below levels the normally open-ocean dweller needs to survive.

"I'm really hopeful this (freshwater inflow) is the nail in the coffin for red tide," said Meridith Byrd, Texas Parks and Wildlife Department (TPWD) harmful algal bloom (HAB) biologist. "We're seeing very low cell counts along the rest of the Texas coast."

Most of the information Byrd uses to track red tide in south Texas comes from Red Tide Rangers, who collect water samples daily from several locations around South Padre Island and then count the number of *Karenia* cells. They also note the number of dead fish, if any, and gauge the severity of the irritating aerosol created when red tide cells break apart in the surf.

Byrd calls the Red Tide Rangers "an invaluable part of our red tide monitoring program. They are out there giving us daily data, and there is no other network like them along the Texas coast. We would not otherwise be getting the kind of data they give us because we don't have sufficient staff to do so."

The current red tide has been an inconvenience at times to coastal residents but it has devastated the state's oyster industry. The public oyster season, which should have opened Nov. 1, 2011, remains closed along most of the coast, including in Galveston Bay, where the vast majority of the state's oyster crop is

-More-

The Texas Sea Grant College Program is a partnership of university, government and industry, focusing on marine research, education and advisory services. Visit our website at <http://texas-sea-grant.tamu.edu>.

harvested. The closure has cost oyster fishermen about \$7 million thus far, said Lance Robinson, TPWD Coastal Fisheries Division Upper Coast Upper Coast Regional Director.

The bloom was first detected in Brazos Santiago Pass, near the City of South Padre Island, in early September by a TPWD crew conducting a routine sampling cruise to monitor local fish populations. Crew members noticed fish swimming erratically near the water's surface and gulping for air. Reisinger collected a water sample from the area shortly thereafter and confirmed the presence of *Karenia* cells.

Karenia is an ever-present inhabitant of the Gulf of Mexico, but usually in extremely small numbers of cells per milliliter of water, a standard by which it is measured.

"Finding one cell here and there is not enough to cause a panic, but finding even a handful of cells can spur us into stepping up our monitoring to determine if the counts will continue to grow over time into a full-blown bloom," Byrd explained.

In terms of geographical size, the latest red tide spread from the southern tip of Texas to the lower reaches of Galveston Bay, putting it on par with another very large *Karenia* bloom in 1986. For reasons as yet unknown, the recent red tide killed just one-fifth of the 22 million fish that died in 1986.

Robinson said the latest bloom owes its duration — it is thought to be among the longest on record — to the severe drought in Texas. *Karenia* likes living in seawater, where the average salinity is about 35 parts per thousand (ppt). Red tides can spread to Texas bays but they usually do not persist for long when freshwater inflows lower the salinity of the bays below about 22 ppt. The drought has greatly curtailed freshwater inflows, leaving Texas bays saltier than normal.

"Galveston Bay rarely sees red tide because the organism is an open ocean dweller and usually the bay is fresh enough that the plant doesn't like it," Robinson said. "This drought is responsible for some of Galveston Bay's highest salinities on record and is providing an education on a number of fronts for us by showing us what may happen in the future as more freshwater — even in non-drought years — is diverted from rivers for use by our growing population. As less water gets to the bays, the incidence of red tide will most likely increase. The impact on resources like oysters will be there as well."

It was the 1986 bloom and a couple more in the early 1990s that led Reisinger and Hockaday to form the Red Tide Rangers. Reisinger remembers "fish piled up like cordwood along the beaches and the inshore areas around South Padre Island" during the 1986 bloom. "All major species of game and prey fish were affected. There were huge tarpon lying all over the place. The smell was absolutely horrendous," he said.

TPWD had precious few staff available to handle the sampling needed to monitor the blooms, Reisinger said, so he and Hockaday decided to lend a hand by having preeminent red tide researcher Karen Steidinger in Florida train them to identify and count red tide cells in water samples. Steidinger is the "Karen" in *Karenia*, an honor bestowed upon her by taxonomists in recognition of her pioneering work.

"The red tide organism is such a big cell that if you get up extremely close, like on a floating dock, and the light is right, you can see all of these little red dots swimming around in the water. It's like a swarm of bees," Reisinger said. "But it was difficult learning to count them because there can be many cells per sample."

Reisinger and Hockaday found they could not collect and analyze the number of samples they needed to adequately monitor a bloom, so they struck upon the idea of training volunteers to collect water samples from areas suspected of having red tide. The volunteers soon overwhelmed Reisinger and Hockaday with more samples than they could manage in a timely manner. The obvious solution, said Reisinger, was to further train the volunteers to identify and count *Karenia* cells in the samples they collected.

The initial class of about 20 volunteers, whom Reisinger dubbed Red Tide Rangers, has since almost doubled in size and is now largely coordinated by Brigette Goza at The University of Texas-Pan American Coastal Studies Laboratory at South Padre Island. Their work has proved invaluable and led to them receiving a Gulf Guardian Award from the U.S. Environmental Protection Agency in 2006.

Data provided by Red Tide Rangers helps Byrd not only monitor blooms, but also update the public so people can better judge the health risks they face if they plan on being near the water. *Karenia* itself is not harmful. The danger comes from a potent poison called brevetoxin that the alga carries. Scientists do not know for certain why *Karenia* produce brevetoxin, but there is evidence that it is not a defensive mechanism. Research indicates brevetoxin may help *Karenia* control the amount of salt in a cell as the organism moves from the Gulf of Mexico into less salty bays.

Karenia is a very fragile cell and breaks easily, particularly when pounded by waves in surf zones. When broken, the cells release their brevetoxin into the water, where it mixes with the salt spray created by waves to form an aerosol that irritates eyes and respiratory systems. Healthy people suffer little more than discomfort, but the aerosol can pose much greater danger to asthmatics and others who suffer from respiratory conditions.

Brevetoxin is also dangerous to humans and other animals if they ingest it through eating tainted seafood, leading to neurotoxic shellfish poisoning (NSP). Symptoms include nausea and vomiting; burning, itching or tingling of the mouth and lips; slurred speech; and dizziness.

Brevetoxin collects mainly in the organs of fish. A minute amount — but not enough to be harmful — is deposited in the meat of fish, so those caught in red tide areas are safe to eat as long as they are caught live and are acting normally, Byrd said. Animals, particularly dogs and coyotes, have died from eating contaminated fish because they consume the organs as well as the meat.

Filter feeders like oysters also accumulate brevetoxin in their organs and are the primary source of NSP in humans, which is why the Texas Department of State Health Services closes oyster harvesting in a bay when red tide cells are detected. Brevetoxin is a very stable compound that cannot be destroyed by cooking and remains in fish tissue for long periods of time. Despite the lack of red tide at the southern end of the state, the Cameron County Department of Health and Human Services continues to issue a warning to pet owners to monitor their dogs closely because there may still be some tainted dead fish on area beaches. Reisinger said the foam created by red tide-laden surf is also thought to be harmful to canines when sniffed and researchers believe at least one dog died after inhaling brevetoxin from the foam.

The Texas Sea Grant College Program is a partnership of university, government and industry focusing on marine research, education and outreach. It is administered through the National Oceanic and Atmospheric Administration and is one of 32 university-based Sea Grant Programs around the country. Texas Sea Grant is a non-academic research center in the College of Geosciences Texas A&M University.

TXSGE is a joint outreach program of Texas Sea Grant, Texas AgriLife Extension and the Commissioners Courts in participating counties.

MEDIA ADVISORY

2700 Earl Rudder Frwy South, Suite 1800 • College Station, Texas 77845 • 979/845-3854 • FAX 979/845-7525

For Immediate Release: February 15, 2012



For more information contact:
Jim Hiney,
Communications Coordinator
Office: (979) 862-3773
bohiney@tamu.edu

Willacy County students introduced to *Karma*

PORT MANSFIELD, TX — The Texas Sea Grant College Program's floating classroom is currently cruising the waters of the Laguna Madre near here, introducing Willacy County public school students to a marine ecosystem that few have visited despite living a relatively short distance away.

An invitation from Dr. Richard Kline at The University of Texas at Brownsville (UTB) and a grant from Willacy County allowed the RV *Karma* to travel from its homeport in Corpus Christi to Port Mansfield to provide fourth through eighth grade students from the Lasara, San Perlita and Lyford school districts, as well as Ichthyology students from UTB, with a unique opportunity to learn about the Laguna Madre first hand. The *Karma* is scheduled to complete the student trips and sail for the City of South Padre Island on Friday, Feb. 17, where it will host Texas Master Naturalists and other school groups on cruises through next Wednesday.

Willacy County students spent about two hours aboard the *Karma* participating in a number of activities, including helping deploy and retrieve a small trawl net. Sea life caught in the net was transferred to touch tanks on the back deck of the 57-foot former bay shrimp boat, where students were allowed to handle the catch while naturalists talked about the animals' biology and role in the ecosystem.

Students also collected and viewed plankton samples, tested water clarity and learned about aquatic food webs.

Students likewise spent about two hours on land at the UTB Department of Biological Sciences field station in Port Mansfield, where Kline, an assistant professor of biological sciences, and his graduate students taught lessons on a variety of topics, including fisheries, coral biology and beach restoration. Kline also led students into nearby marine ecosystems, where they threw cast nets and examined the animals they caught.

"We're showing these kids how important the marine environment is to them. These are experiences that the students would not have been exposed to in their classrooms," Kline said. "Students learn much better when they get to handle these creatures in person instead of just viewing them on a computer screen."

-More-

The Floating Classroom Program is operated by the Texas Sea Grant Program in partnership with Texas AgriLife Extension. The *Karma* is a U.S. Coast Guard-inspected passenger-for-hire vessel, which means it meets the strictest safety requirements. It is operated by a licensed captain and experienced crew trained to respond to all emergencies.

For more information on the Floating Classroom Program, go to <http://floatingclassroom.tamu.edu>

The Texas Sea Grant College Program is a partnership of university, government and industry focusing on marine research, education and outreach. It is administered through the National Oceanic and Atmospheric Administration and is one of 32 university-based Sea Grant Programs around the country. Texas Sea Grant is based in the College of Geosciences Texas A&M University.

-30-

Editor's Note: There are spots available for journalists to join the Master Naturalists on their cruises on Sunday, Feb. 19. For more information, contact Tony Reisinger, (956) 493-8129.

— Hiney 02/15/12
NR- 12-04



MEDIA ADVISORY

2700 Earl Rudder Frwy South, Suite 1800 • College Station, Texas 77845 • 979/845-3854 • FAX 979/845-7525

For Immediate Release: March 5, 2012



For more information contact:

Terrie Looney

(409) 835-8461

tslooney@tamu.edu

Langham Creek wins 2012 Dolphin Challenge

GALVESTON, TX — Langham Creek High School's "A" Team won the 2012 Dolphin Challenge Regional Competition of the National Ocean Sciences Bowl (NOSB) on Saturday and now advances to the National Finals.

The team of Andrew Hu, Syed Ali, Madison Selldin, Christina Tremel and Sydney Denmen emerged at the top of the 10-team field after a day of head-to-head matches where the high school students demonstrated their knowledge of marine and coastal science by answering questions from biology, physics, chemistry, geology, geography, mathematics and the social sciences. Langham Creek, from Houston, defeated second place finisher Sanger High School "A" Team in the final match, earning the right to face the winners of the other 24 NOSB regional competitions in Baltimore April 19-22. The Dolphin Challenge was held on the campus of Texas A&M University at Galveston (TAMUG).


For the second straight year, Glenda Dawson High School from Pearland was honored with the Ralph Rayburn Sportsmanship Award, which is given to the team judged by competition officials to best embody the spirit of earnest competition while demonstrating exemplary decorum and character. The award is named in honor of host Texas Sea Grant College Program's late Associate Director and Extension Program Leader, who worked tirelessly throughout his career to help protect our marine resources. Rayburn's work ethic was legendary and he was widely respected as a man of great integrity, intelligence and generosity.

The rest of the Dolphin Challenge field comprised teams from Lubbock High School, Coronado High School (Lubbock), Langham Creek's "B" Team, "B" and "C" teams from Sanger High School, Rains High School (Emory) and Coppell High School.

NOSB is intended to increase knowledge of the oceans on the part of high school students, their teachers and parents, and to raise the visibility and public understanding of the national investment in ocean-related research. The theme for the 2012 NOSB regional and national competitions is "A Sea of Change: Development and Evolution." The theme not only deals with biological evolution, but the adaptations of humans to a changing ocean. For example, technologies are developed and evolve to address our nation's need for operational forecasting systems and offshore alternative/renewable energy production, and how federal agencies have had to adapt their research and management practices to answer emerging issues such as ocean acidification.

The Dolphin Challenge is one of two NOSB regional competitions hosted in Texas by Texas Sea Grant each year, and it is open to high school teams from north and east Texas. The other competition is the Loggerhead Challenge, held in Corpus Christi and open to teams from south and west Texas. The 2012 Loggerhead Challenge was held February 4 on the campus of Texas A&M University-Corpus Christi and was won by hometown school Annapolis Christian Academy.

-More-



NOSB is managed nationally by the Consortium for Ocean Leadership, a nonprofit organization representing 94 of the leading public and private ocean research and education institutions, aquaria and industry with the mission to advance research, education and sound ocean policy.

The Texas Sea Grant College Program is a partnership of university, government and industry focusing on marine research, education and outreach. It is administered through the National Oceanic and Atmospheric Administration and is one of 32 university-based Sea Grant Programs around the country. Texas Sea Grant is based at Texas A&M University.

-30-

Hiney 3/5/12
NR 12-05

MEDIA ADVISORY

2700 Earl Rudder Frwy South, Suite 1800 • College Station, Texas 77845 • 979/845-3854 • FAX 979/845-7525

For Immediate Release: March 8, 2012



For more information contact:
Jim Hiney
Communications Coordinator
Office: (979) 862-3773
bohiney@tamu.edu

O'Connell 'Ideal' Brazoria County marine agent

ANGLETON, TX — John O'Connell welcomes the task of confronting coastal resource issues that Brazoria County's burgeoning population creates. It's the reason he sought to be the county's new coastal and marine resources agent.

O'Connell, who has been Matagorda County Coastal and Marine Resources Agent for the past nine years, will begin his new job on April 2. He replaces Rich Tillman, who retired in 2010 after 14 years on the job. The position is funded jointly by the Texas Sea Grant College Program, Texas AgriLife Extension Service and Brazoria County.

O'Connell's office is moving just 40 miles northeast on SH 35 and he'll work on many of the same coastal concerns he faced in Matagorda County, but the issues are magnified by the nearly eight-fold population difference between the two counties.

"Moving from a county with 40,000 people to one with 300,000 people offers many interesting challenges for me," said O'Connell, who was introduced to the Brazoria County Commissioners Court on Feb. 28. "The main challenges relate to the sheer number of people and the pressure they put on coastal resources. We deal with issues like water quality, sustainable development, fisheries and coastal hazards on a daily basis, but the way in which we address them takes on added complexity when so many people are involved. I'm grateful for the opportunity to work with the Brazoria County Commissioners Court and the Extension staff here as we tackle these pressing coastal issues."

O'Connell, a native of San Antonio, received bachelor's and master's degrees in wildlife and fisheries sciences from Texas A&M University. He began his career as an assistant county extension agent for 4H and marine resources in Louisiana in 1994. He returned to Texas in 1996 as Calhoun County Marine Agent, a position he held until moving to Matagorda County in 2003.

During his career, O'Connell has worked in the areas of aquaculture, recreational and commercial fisheries, nature tourism, community needs assessment, marine education and leadership training. He created and leads Texas Sea Grant's Monofilament Recovery and Recycling Program — a statewide effort to remove discarded fishing line from the environment, where it poses a threat to aquatic life. The collected monofilament is recycled by Pure Fishing, the parent company of fishing products giant Berkeley. The used monofilament is chopped up, melted down and used to manufacture new fishing-related products like tackle boxes, spools for lines and artificial fish habitats. It is not made into more monofilament line.

O'Connell has also worked extensively with Matagorda County's Master Naturalists, and he plans to continue this partnership with Master Naturalists in his new home county. Brazoria County will benefit greatly from O'Connell's breadth of experience and commitment to serving stakeholders, according to Texas Sea Grant's Associate Director and extension program leader.

"Brazoria County faces many critical decisions concerning the wise use and conservation of its coastal and marine resources," Logan Respass said. "The work John has done in Calhoun and Matagorda counties makes him the ideal person to help Brazoria County leaders assess these issues and develop practical, effective and long-lasting solutions."

MEDIA ADVISORY

2700 Earl Rudder Frwy South, Suite 1800 • College Station, Texas 77845 • 979/845-3854 • FAX 979/845-7525

For Immediate Release: March 9, 2012



For more information contact:
Jim Hiney
Communications Coordinator
Office: (979) 862-3773
bohiney@tamu.edu

Beware the rip or prepare to RIP

COLLEGE STATION — The State of Texas is warning thousands of spring breakers to avoid traveling to Mexico because of increasing drug-related violence, but an equally dangerous threat lurks in the salty surf along the state's popular beaches.

Nine out of 10 beachgoers cannot identify a rip current that is happening right in front of them, said Dr. Chris Houser, associate professor of geography at Texas A&M University, who received a grant from the Texas Sea Grant College Program to study the public's perceptions of rip currents and identify ways to improve the ability of beach users to identify them.

A rip current is a horizontal current that moves perpendicular to the shore, frequently forming around man-made structures like jetties, piers and groins. It does not pull people under the water — it pulls them away from shore. At least 100 people die along the nation's coasts and Great Lakes beaches each year when rip currents pull them offshore, where they are unable to keep themselves afloat and cannot swim to safety.

Rip currents are more likely to form when there are heavy surf conditions, which combine with human nature to increase the danger.

"People tend to gravitate to areas where the waves are less intense, but those also happen to be where rip currents are most prevalent," Houser said, adding that most incidents involving people and rip currents happen around 4 p.m., "When you are sunbaked, tired and, in the case of adults, possibly affected by alcohol consumption."

If you are caught in a rip current:

- Remain calm to conserve energy and think clearly.
- Don't fight the current by trying to swim straight to shore.
- Escape the current by swimming in a direction following the shoreline. When free of the current, swim at an angle — away from the current — toward shore.
- If you are unable to escape by swimming, float or tread water. When the current weakens, swim at an angle away from the current toward shore.

-More-

- If you feel you will be unable to reach the shore, draw attention to yourself by facing the shore and calling or waving for help.

Signs of a possible rip current include a channel of churning, choppy water; an area with a noticeable difference in water color; a line of foam, seaweed or debris moving steadily seaward; and a break in the incoming wave pattern. However, some rip currents occur with no visible signs.

Many people have died trying to rescue rip current victims. If you see someone in trouble, get help from a lifeguard. If there is no lifeguard, yell instructions on how to escape the current, throw the victim something that floats and have someone call 9-1-1.

More information about rip currents is available from the National Oceanic and Atmospheric Administration (NOAA) at www.ripcurrents.noaa.gov. Posters and other printed materials in English and Spanish are also available by contacting Texas Sea Grant at sgpublications@tamu.edu.

The Texas Sea Grant College Program is a partnership of university, government and industry focusing on marine research, education and outreach. It is administered through the National Oceanic and Atmospheric Administration and is one of 32 university-based Sea Grant Programs around the country. Texas Sea Grant is based at Texas A&M University.

MEDIA ADVISORY

2700 Earl Rudder Frwy South, Suite 1800 • College Station, Texas 77845 • 979/845-3854 • FAX 979/845-7525

For Immediate Release: March 26, 2012



For more information contact:
Tony Reisinger,
Cameron County Extension Agent
Coastal & Marine Resources
956-493-8129

Marine mammal stranding response training offered

SOUTH PADRE ISLAND, Texas — A marine mammal stranding response training will be held at The University of Texas-Pan American Coastal Studies Lab, located in Isla Blanca Park, from 10 a.m. to noon on Saturday, March 31.

Participants will learn how to respond to live dolphin and whale strandings on South Padre Island. Brigitte Goza with the Coastal Studies Lab will recount a recent live dolphin stranding, lessons learned from the event and teach procedures for handling animals in a pool. Tim Markowitz, Ph.D., a marine mammalogist with The University of Texas at Brownsville Department of Biological Sciences, will lecture on the biology, life histories and identification of different whale species inhabiting the Gulf of Mexico. Dr. Tom DeMaar, senior veterinarian with the Gladys Porter Zoo, will talk about veterinary procedures, zoonotics and quality of life for the animals and responders.

This training is one of three courses required for volunteers seeking certification as Texas Coastal Naturalists — a new program that trains volunteers in the Laguna Madre area to be first responders to events like harmful algal blooms, cold stunned sea turtle strandings, marine mammal strandings, oiled wildlife and other coastal natural emergencies. In the winter of 2011, Texas Coastal Naturalists assisted in rescuing more than 800 cold stunned green sea turtles in the Laguna Madre. They also monitored the recent red tide and provided valuable information on location and concentration of the bloom.

The Texas Coastal Naturalist program provides a volunteer base for the Coastal Studies Lab, Sea Turtle Inc. and the Cameron County Extension Service. The Rio Grande Valley Chapter Texas Master Naturalists sponsors the program, which is also supported by the Texas Sea Grant College Program, the Texas Parks and Wildlife Department's Harmful Algal Bloom Work Group, the Gladys Porter Zoo, The University of Texas at Brownsville and Ocean Trust of Texas.



-More-

Cost for the training is \$10 payable to the Rio Grande Valley Chapter Texas Master Naturalist. The cost covers the three trainings required to be certified as a Texas Coastal Naturalist.

Current Coastal Naturalists are invited to take the marine mammal training as a refresher or as a continuation of the three courses, free of charge. Bring a towel and bathing suit if you would like to get in the pool to learn handling of the animals in the water. Registration is required and seating is limited. To register for the workshop, call Diane Abbott at the Coastal Studies Lab, 956-761-2644.

The Texas Sea Grant College Program is a partnership of university, government and industry focusing on marine research, education and outreach. It is administered through the National Oceanic and Atmospheric Administration and is one of 32 university-based Sea Grant Programs around the country. Texas Sea Grant is a non-academic research center in the College of Geosciences Texas A&M University.

TXSGE is a joint outreach program of Texas Sea Grant, Texas AgriLife Extension and the Commissioners Courts in participating counties.



MEDIA ADVISORY

2700 Earl Rudder Frwy South, Suite 1800 • College Station, Texas 77845 • 979/845-3854 • FAX 979/845-7525

For Immediate Release: April 3, 2012



For more information contact:
Jim Hiney,
Communications Coordinator
Office: (979) 862-3773
bohiney@tamu.edu

Public input sought on coastal and marine efforts

COLLEGE STATION, Texas — The Texas Sea Grant College Program is asking Texans to help it chart its course in the areas of coastal and marine research, outreach and education by participating in an online survey. As a “thank you,” five people who complete the survey will be chosen at random to win \$100 gift cards.

The program that bills itself as “Science at Work for Texans” is currently developing its strategic plan for 2014-2017. Texas Sea Grant’s mission is to improve the understanding, wise use and stewardship of Texas coastal and marine resources. To achieve this mission, Texas Sea Grant develops and supports research, education and outreach programs and partnerships, and relies on the public for knowledge, advice and guidance.

The survey takes just a few minutes to complete and gauges participants’ interest in issues concerning coastal community growth and development, jobs and the economy, coastal and marine education, and coastal health, safety and beauty. Individuals interested in voicing their opinions can find a link to the survey on Texas Sea Grant’s homepage, www://texas-sea-grant.tamu.edu. All responses are anonymous.

Based on the Land Grant concept, Texas Sea Grant is a unique partnership that unites the resources of the federal government, the State of Texas, universities across the state and marine-related industries to create knowledge, tools, products and services that benefit the economy, the environment and the citizens of Texas. Based at Texas A&M University in College Station, Texas Sea Grant is a non-academic research center in the College of Geosciences. It is also one of 32 university-based Sea Grant Programs around the country that are part of the National Sea Grant Network. The National Sea Grant Program is administered through the National Oceanic and Atmospheric Administration.

-30-

— Hiney 4/3/12
NR- 12-12

MEDIA ADVISORY

Texas A&M University, MS-4115 • College Station, Texas 77843 • 979/845-3854 • FAX 979/845-7525

For Immediate Release: April 6, 2012



Science At Work For Texans
<http://texas-sea-grant.tamu.edu>

For more information contact:
Jim Hiney,
Communications Coordinator
Office: (979) 862-3773
Cell: (979) 219-1545
bohiney@tamu.edu

Coastal development specialist earns Terry Hershey Award

COLLEGE STATION, Texas — Dr. John Jacob's impressive body of work integrating conservation and sustainable community development has earned him the prestigious Terry Hershey Award for Excellence from the Department of Recreation, Park and Tourism Sciences (RPTS) at Texas A&M University.

Named in honor of Houston's grande dame of conservation, the Hershey Award recognizes excellence in park, recreation or natural resources contributions to Texas, the region and/or the nation, as well as support for education and innovations as a leader in natural resource protection.

Jacob, Coastal Community Development Specialist with the Texas Sea Grant College Program, was chosen for his considerable work and achievements that "have helped to make people aware of bayou conservation, community development patterns and the value of open spaces," said Dr. Scott Shafer, RPTS Associate Department Head. "These are the kinds of issues Terry Hershey believes in and supports."

Jacob has long been a proponent of "Smart Growth," an urban planning and transportation model that concentrates growth in compact, walkable urban centers to avoid sprawl. Smart Growth harkens back to the way communities evolved before automobiles allowed people to easily travel significant distances.

"John recognized the need for and pioneered work in bringing concepts to Texas that emphasize what he terms the 'Human Scale' of community development," said Logan Respass, Texas Sea Grant's associate director and Extension program leader. "These concepts integrate walkability and what it means to be a vibrant community, like you see in The Strand district of Galveston and the French Quarter in New Orleans."

The National Oceanic and Atmospheric Administration recently awarded Jacob a \$100,000 grant to use the GIS-based Community Health and Resource Management (CHARM) model to help Rockport area officials assess how their communities can plan, adapt and respond to climate change impacts over time.

Jacob said his joint appointment with Texas Sea Grant and as a professor in the RPTS Department makes the award doubly gratifying because "it is recognition from my peers and it is named for someone whom I greatly admire and respect."

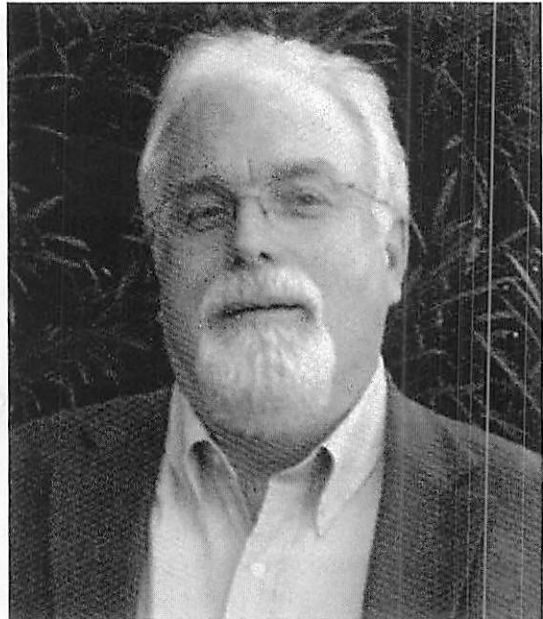
Based in Houston, Jacob is also head of the Texas Coastal Watershed Program, a cooperative effort of Texas Sea Grant and Texas AgriLife Extension Service that provides education and outreach to local governments and citizens on the impacts of land use on watershed health and water quality

-More-

He will receive the Hershey Award during the RPTS annual picnic on April 12 at Veterans Park in College Station.

Terese "Terry" Hershey and her late husband Jacob "Jake" Hershey devoted a great deal of time, energy and money to conservation causes, particularly in the Houston area. They are perhaps best known for working with then-Congressman George H.W. Bush to defeat the proposed channelization and paving of Buffalo Bayou in the 1960s. Terry Hershey was the inaugural winner of her namesake award in 1994 and it has been given to the likes of former Texas Parks and Wildlife Department Executive Director Andy Sansom, long-time San Antonio Parks and Recreation Department Director Bob Frazer and Donna Brasher, Deputy General Manager of Community Service for the Lower Colorado River Authority.

"The award has always gone to somebody who Terry Hershey would be very proud of," said Dr. Peter Witt, RPTS associate department head for Extension. "John joins a very distinguished group of Texans who have made great contributions to the conservation goals of Terry and Jake Hershey."



Dr. John Jacob

MEDIA ADVISORY

Texas A&M University, MS-4115 • College Station, Texas 77843 • 979/845-3854 • FAX 979/845-7525

For Immediate Release: May 2, 2012



Science At Work For Texans
<http://texas-sea-grant.tamu.edu>

For more information contact:
Jim Hiney,
Communications Coordinator
Office: (979) 862-3773
bohiney@tamu.edu

Coastal growth planning project gets \$100K grant

COLLEGE STATION, TX — Community leaders, elected officials and citizens in the Rockport area will work side-by-side using ordinary tables and light pens in new ways to crunch complex data and make far-reaching decisions about the area's growth over the next quarter-century, thanks to a \$100,000 federal grant.

The National Oceanic and Atmospheric Administration (NOAA) awarded the grant to Dr. John Jacob, Professor and Coastal Communities Development Specialist with the Texas Sea Grant College Program, to use the Community Health and Resources Management (CHARM) model in conjunction with the innovative weTable during a series of development planning workshops during an 18-month period beginning this summer.

The weTable combines a laptop computer, a projector, a light pen and a Nintendo Wii remote to transform an ordinary tabletop into an interactive computer interface. Participants use the light pen like a computer mouse on the projected image of the computer's desktop, which is shown on the tabletop. The Wii remote detects the pen's position on the table and sends the location to the laptop via Bluetooth connection so people can turn complex data into a color palette that allows them to paint different versions of future development, and the resulting picture tells them the consequences of their decisions in terms of things like potential runoff pollution, flooding and flood damage, water consumption and even walkability. Participants exchange control of the weTable by simply handing off the light pen, allowing them to interact with data, maps and each other instead of trying to crowd around a computer monitor or passively sit through someone else's presentation. It's the kind of work that only highly-trained specialist would have been able to complete in the past.

The CHARM model uses a variety of data — like demographics, average water consumption per dwelling type, and topographic and bathymetric measurements — from a number of sources, like NOAA, to calculate the end result of development based on parameters fed to it by workshop participants. These parameters can include locations for growth, anticipated numbers of new residents and predicted hurricane storm surges.



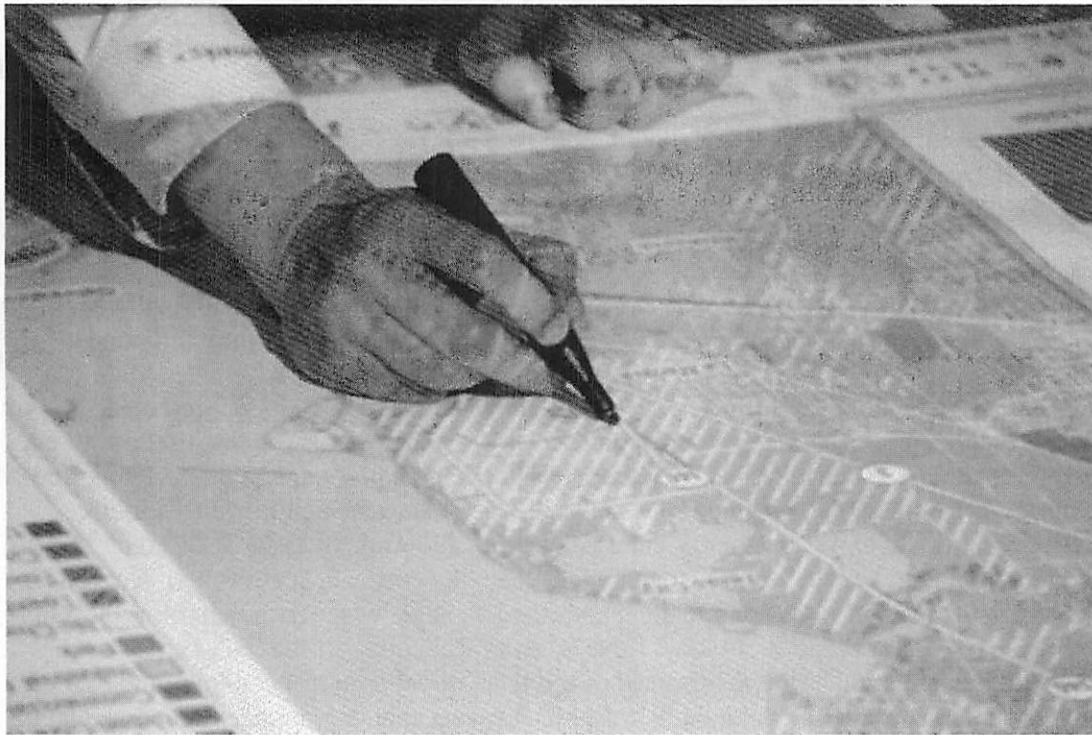
The Rockport area was chosen in part because of its proximity to Texas Sea Grant's Coastal Planning Specialist, Heather Wade, who will assist with the project. Wade is based at the Mission-Aransas National Estuarine Research Reserve in Port Aransas. Jacob also selected the area because he has worked with Rockport officials in the past and "they are very receptive to the process and have been interested for some time in growing while continuing to be a quality community."

During the first series of workshops this summer, participants will talk about priorities for their communities, and get an introduction to the CHARM model and the weTable, said Steven Mikulencak, Watershed Program Coordinator for Jacob's Texas Coastal Watershed Program, who will also be working on the CHARM project.

"We help workshop participants visualize the different impacts that future development can have in terms of issues like water quality, habitat loss and storm surge damage," Jacob said. "The CHARM model allows them to see these impacts in real time."

"Often times what people find is that if they put the population growth in single family developments with big yards, they'll end up paving over the entire area. The CHARM model lets them see the implications of their decisions — how many wetlands they destroyed and how many extra people they put in harm's way of hurricanes and other coastal hazards."

Jacob's team will take what they learn during the summer workshops and return to the area next year with an updated model for another series of workshops.



A participant uses a light pen to interact with the weTable and see the impact of various types of community development. Photo courtesy Dr. John Jacob



MEDIA ADVISORY

Texas A&M University, MS-4115 • College Station, Texas 77843 • 979/845-3854 • FAX 979/845-7525

For Immediate Release: May 29, 2012

For more information contact:

Billie Wilkinson, Co-leader
Girl Scout Cadette Troop 9665
(361) 510-8903



Science At Work For Texans

<http://texas-sea-grant.tamu.edu>

Local Girl Scouts benefitting marine life through recycling project

CORPUS CHRISTI, Texas – Four local Girl Scouts are teaming with the Texas Sea Grant College Program to help save the area's marine-dependent wildlife while earning prestigious recognition from their 100-year-old organization.

The girls, who comprise the entire membership of Girl Scout Cadette Troop 9665, will dedicate two monofilament recycling bins at Packery Channel Park, 14218 South Padre Island Dr., on Wednesday, May 30, during a 2 p.m. ceremony at the water's edge. The bins are part of Texas Sea Grant's statewide Monofilament Recovery and Recycling Program (MRRP).

Installing and dedicating the bins is the latest activity in a project that will earn the girls the Silver Award, the highest award available to Cadette Girl Scouts and the second highest award given by Girls Scouts of the United States of America. Cadettes are Girl Scouts ages 12-14. The members of Troop 9665 are 13 and 14 and are all students in Flour Bluff. To receive the Silver Award, each girl is required to put in 50 hours to a service project that leaves a lasting impact on their community. The girls in Troop 9665 each put in more than 55 hours of work on their monofilament recycling project, said Troop Co-leader Suzanne Gilliam.

Monofilament line is another name for single-strand, high-density nylon fishing line that is used on fishing reels. Used line can be harmful to boat motors and marine wildlife. Birds and animals cannot see discarded monofilament fishing line, so it is easy for them to become tangled in it and starve, drown or lose a limb.

Troop 9665 Co-Leader Billie Wilkinson said she and her daughter, Karlie Wilkinson, first got the idea to take on monofilament recycling as a Silver Award project after seeing similar bins in Florida during family fishing vacations there.

"We had not seen monofilament recycling bins at home but one of the girls had seen one bin at South Padre Island," Wilkinson said.

Karlie Wilkinson searched the internet for information on monofilament recycling, which led her to Texas Sea Grant's MRRP headed by Brazoria County Coastal and Marine Resources Agent John O'Connell. With guidance from O'Connell, the girls built 10 large recycling bins out of PVC pipe and made 75 personal monofilament recycling containers out of tennis ball cans. They distributed the first 15 personal cans as a troop to fishermen at a pier on the JFK Causeway.

Each girl distributed 10 more personal containers when they gave presentations on the project to area civic groups and elected officials. The troop installed the larger bins at Bob Hall Pier and at six of seven boat ramps owned by the Padre Isles Property Owners Association.

The troop is installing two large bins at Packery Channel Park because monofilament line is scattered throughout the park. "We held a troop cleanup project at the park and after two hours we filled a trash bag with monofilament line and we still didn't make a dent in the amount there," Wilkinson said.

As part of the project, the girls will check the bins on a regular basis, collect the monofilament line and send it to Pure Fishing, the parent company of fishing equipment giant Berkley, which is currently the only place that recycles used fishing line. The used monofilament is chopped up, melted down and the plastic is then used to manufacture new plastic fishing-related products like tackle boxes, spools for lines and artificial fish habitats. It is not made into more monofilament line.

-More-



Texas Sea Grant's MRRP is a statewide, volunteer-led effort to reduce monofilament in the environment by educating the public about the problems caused by monofilament line left in the environment, and encouraging recycling through a network of line recycling bins and drop-off locations. For more information about MRRP, contact O'Connell at (979) 864-1558, extension 116; j-occonnell@tamu.edu; or go to <http://mrrp.tamu.edu/>

The Texas Sea Grant College Program is a partnership of university, government and industry focusing on marine research, education and outreach. It is administered through the National Oceanic and Atmospheric Administration (NOAA) and is one of 32 university-based Sea Grant Programs around the country. Texas Sea Grant is based in the College of Geosciences Texas A&M University.



MEDIA ADVISORY

Texas A&M University, MS-4115 • College Station, Texas 77843 • 979/845-3854 • FAX 979/845-7525

For Immediate Release: June 4, 2012



Science At Work For Texans
<http://texas-sea-grant.tamu.edu>

For more information contact:
Jim Hiney,
Communications Coordinator
Office: (979) 862-3773
bohiney@tamu.edu

Two chosen for prestigious marine policy fellowship

COLLEGE STATION, Texas — Two candidates sponsored by the Texas Sea Grant College Program have been named finalists for prestigious 2013 Dean John A. Knauss Marine Policy Fellowships.

Sepp Haukebo and Henry Busch Hodde III will travel to Washington, D.C., this fall to interview with representatives from potential host offices in the Executive and Legislative branches of the federal government. Once they are each placed with a host office, Haukebo and Hodde will be formally accepted as Knauss Fellows. They will begin their fellowships in early 2013 and spend the rest of the year learning about marine policy issues through their work for their host offices.

Haukebo graduated magna cum laude with a bachelor's degree in marine biology from Texas A&M University at Galveston and he is pursuing a master's degree in Wildlife and Fisheries Sciences at Texas A&M University in College Station. His ultimate goal is to earn a doctorate in coastal ecosystem management and then promote conservation through research and education.

Hodde received a bachelor's degree in residential science from Florida State University and he is on track to receive his master's degree in environmental science from the University of Houston-Clear Lake by the end of this year. His graduate research focuses on coastal community resilience and sustainability — two areas that he wants to make the focus of his professional career.

Administered by the National Sea Grant Office, Knauss Fellowships provide a unique educational experience to students who have an interest in ocean, coastal and Great Lakes resources and in the national policy decisions affecting these resources. The program is open to students who are enrolled toward a degree in a graduate or professional program and they are required to apply through the nearest state Sea Grant Program. The fellowship is named in honor of one of Sea Grant's founders, former National Oceanic and Atmospheric Administration (NOAA) Administrator John A. Knauss.

Since the fellowship's inception in 1979, Texas Sea Grant has had 52 applicants accepted into the program. Texas Sea Grant has four 2012 Knauss Fellows — three from Texas universities and one from Oklahoma State University. For more information on Knauss Fellowships, go to <http://texas-sea-grant.tamu.edu/WhatWeDo/KnaussFellowships2012.html>.

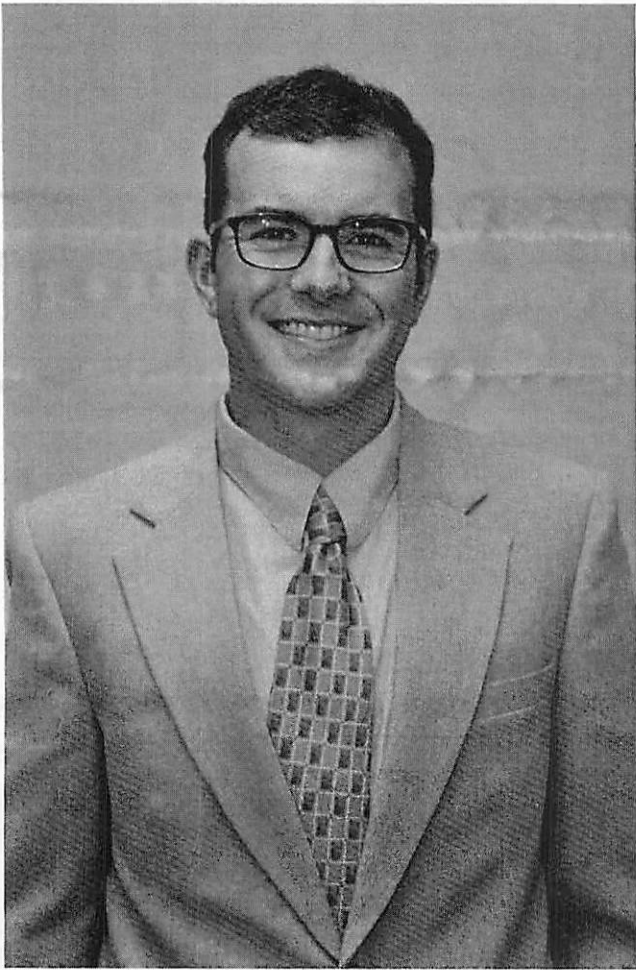
The Texas Sea Grant College Program is a partnership of university, government and industry focusing on marine research, education and outreach. It is administered through the National Oceanic and Atmospheric Administration (NOAA) and is one of 32 university-based Sea Grant Programs around the country. Texas Sea Grant is based in the College of Geosciences Texas A&M University.

-30-

— Hiney 6/4/12
NR- 12-17

Editors Note: Photos included on next page.





Sepp Haukebo



Henry Hodde



MEDIA ADVISORY

Texas A&M University, MS-4115 • College Station, Texas 77843 • 979/845-3854 • FAX 979/845-7525

For Immediate Release: July 13, 2012



Science At Work For Texans
<http://texas-sea-grant.tamu.edu>

For more information contact:
Jim Hiney,
Communications Coordinator
Office: (979) 862-3773
bohiney@tamu.edu

Modified gear could increase shrimp catch by 10 percent, limit bycatch

COLLEGE STATION, Texas — A small portion of Texas' commercial shrimping fleet will begin trawling state and federal waters 30 minutes after sunset on Sunday with modified gear that could increase their catch by as much as 10 percent while limiting the amount of unwanted species caught to federally acceptable levels.

For an industry that frequently operates on a razor thin margin between profitability and going out of business, 10 percent represents a very significant economic impact, says Gary Graham, Fisheries Specialist with the Texas Sea Grant College Program, who was instrumental in developing and testing the equipment.

"If you're talking about a boat that grosses \$300,000 to \$400,000 per year, then they are looking at grossing \$30,000 to \$40,000 more," Graham said. "That's a huge amount to them."

The Gulf of Mexico commercial shrimp season for both state and federal waters off the Texas coast closes for about two months, between May and July, every year to protect brown shrimp during their major period of emigration from nursery grounds in the bays to the Gulf of Mexico. This closure, which extends from shore out 200 nautical miles, allows the shrimp to reach a larger, more valuable size before they are harvested.

Federal regulations require that shrimp boats have bycatch reduction devices (BRDs) installed in their nets. Bycatch is the common term applied to sea life other than shrimp that wind up in shrimp nets.

There are currently four types of BRDs approved for use, but the majority of shrimp fishermen use a type called a "fisheye" because it is least expensive. A fisheye is a metal framework that keeps a hole in the net open so fish can swim out. Its drawback is that it also allows 10-15 percent of the shrimp that enter the net to escape, Graham says.

"Shrimp lost from the net equals money lost for the fisherman," says Tony Reisinger, Texas Sea Grant's Cameron County Coastal and Marine Resources Agent, who has helped Graham in his gear work for the past 30 years.

For the first time this year, about 80 boats will use a "modified composite" BRD. As Graham explains it, a composite BRD acts like a funnel within the net. "Imagine water rushing through this funnel and off to the sides there is quiet water. Fish will seek the quiet water and that's where there are holes in the net to let them escape."

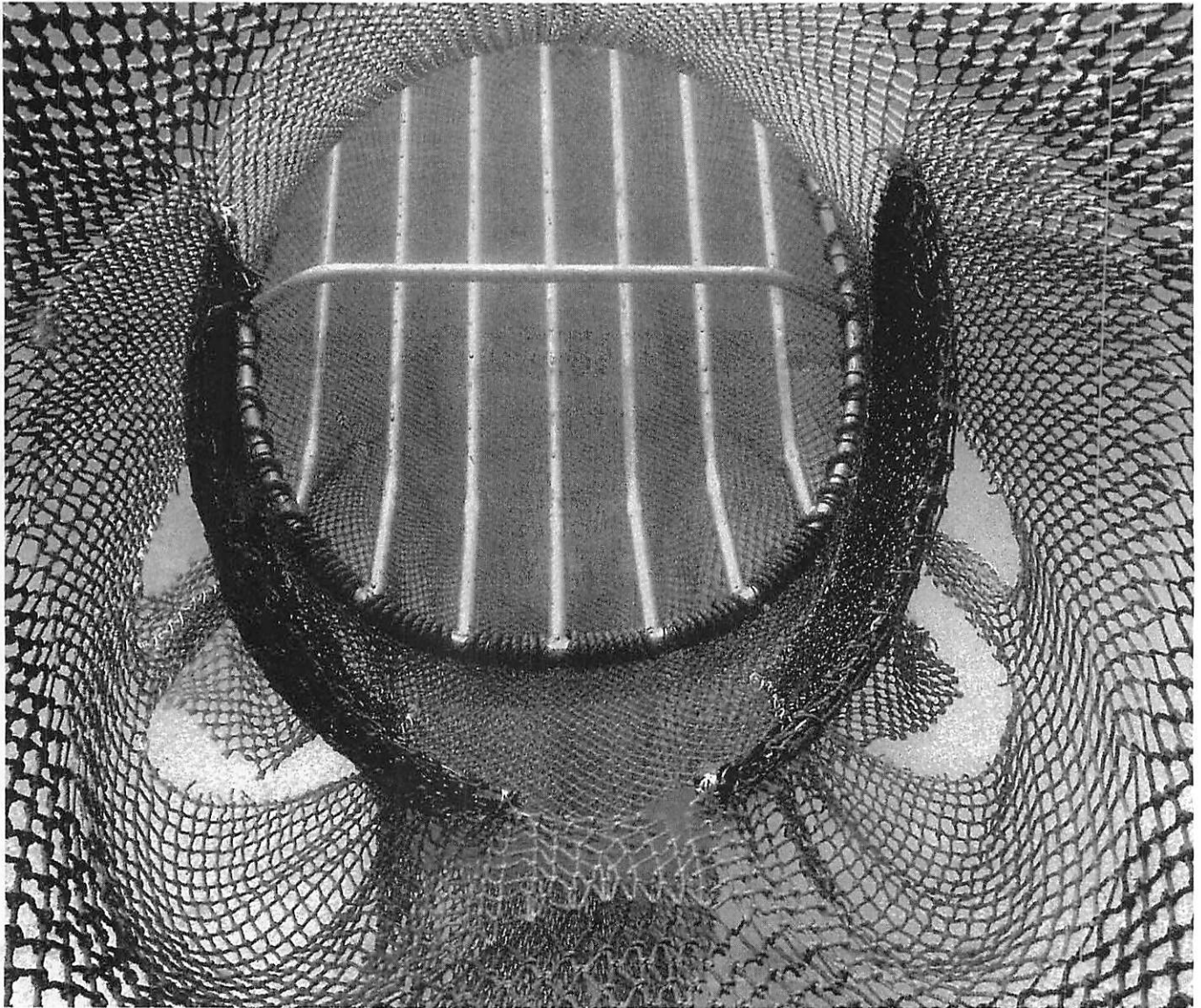
Composite BRDs have been around for several years but they were never fully certified because they failed to reduce bycatch by at least 30 percent — the threshold mandated by the federal government for fully certified BRDs. Composite BRDs achieved 30 percent reduction after they were modified to include a patch of netting with larger square mesh. The larger mesh measures between three and four inches square. By comparison, the netting surrounding the patch is generally diamond shaped with sides measuring a little less than two inches. The larger mesh is sewn into the nets behind the composite BRD and offers another escape route for trapped fish. Preliminary data suggests that the modified composite BRD reduces shrimp loss to somewhere between 2 percent and 5 percent.

Fisheye BRDs cost about \$20 each while the modified composite BRDs cost about \$130 each. Fishermen can quickly make back the cost of the more expensive BRD because more shrimp remain in the nets. Should the modified composite BRD perform as expected, many more shrimp fishermen will most likely adopt the gear.

"Shrimpers don't like to catch fish," Reisinger says. "The less bycatch you have on deck, the quicker you can work through your catch, which helps you keep your shrimp in a good quality condition, plus you are helping the environment by not taking a lot of fish."



The Texas Sea Grant College Program is a partnership of university, government and industry focusing on marine research, education and outreach. It is administered through the National Oceanic and Atmospheric Administration (NOAA) and is one of 32 university-based Sea Grant Programs around the country. Texas Sea Grant is based in the College of Geosciences Texas A&M University.

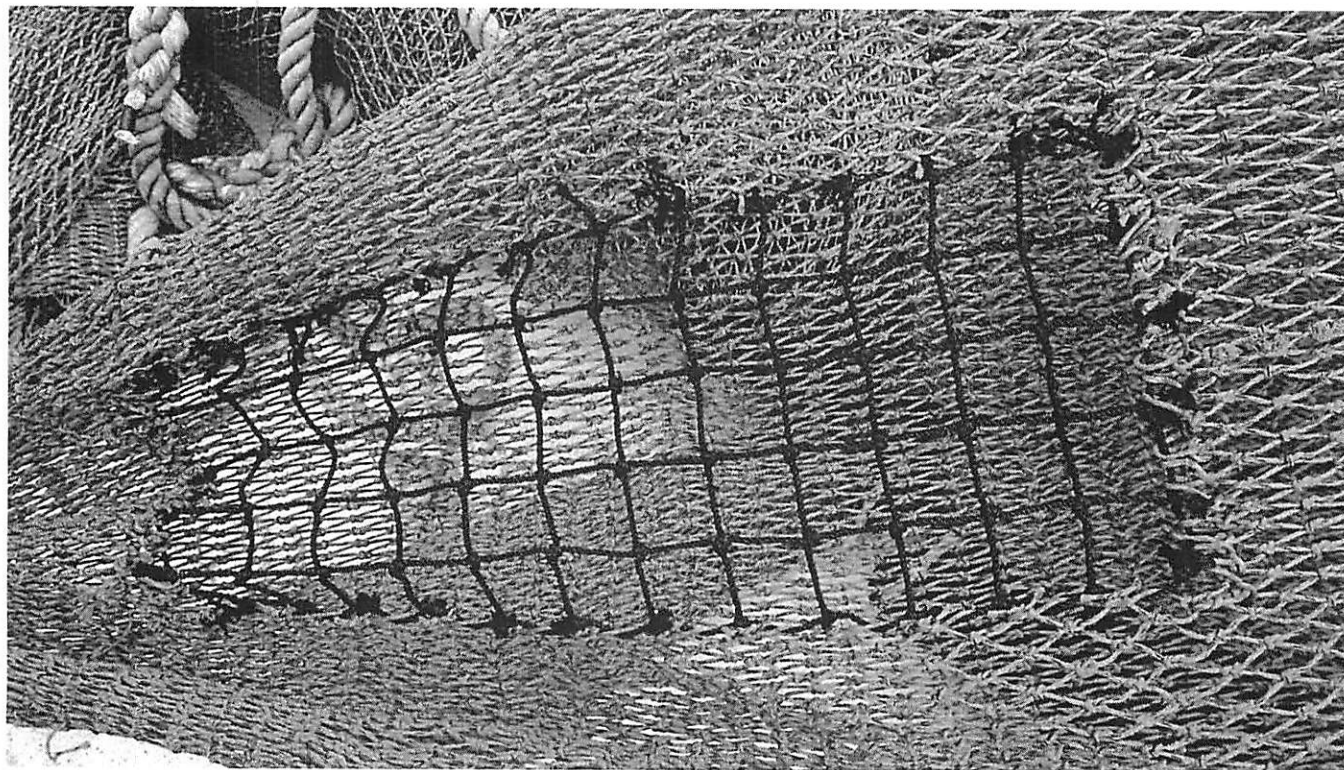


Inside view of a shrimp net with a composite BRD. Photo courtesy NOAA





Texas Sea Grant College Program Fisheries Specialist Gary Graham (foreground) measures the angle of a turtle excluder device in a shrimp net aboard a boat in Brownsville to confirm it complies with federal regulations. Photo by Tony Reisinger, courtesy Texas Sea Grant.



Larger mesh netting sewn into shrimp net. Photo by Tony Reisinger, courtesy Texas Sea Grant



MEDIA ADVISORY

Texas A&M University, MS-4115 • College Station, Texas 77843 • 979/845-3854 • FAX 979/845-7525

For Immediate Release: August 2, 2012



Science At Work For Texans
<http://texas-sea-grant.tamu.edu>

For more information contact:
Jim Hiney,
Communications Coordinator
Office: (979) 862-3773
bohiney@tamu.edu

Texas suffers hypoxic areas of its own making

COLLEGE STATION, Texas — This is one time it's better that not everything is bigger in Texas.

Texas A&M University (TAMU) oceanographer Dr. Steven DiMarco and Oceanography doctoral student Ruth Mullins-Perry have documented periodic hypoxic zones — areas of water with very low levels of dissolved oxygen — off the Texas coast. These Texas zones are often not related to the more famous “Dead Zone” spreading from the mouth of the Mississippi River and, at their zenith, cover just one-fourth the area of their better-known cousin.

These zones are also most certainly not dead.

“We tend not to use the term ‘Dead Zone’ anymore because it is a misnomer,” says DiMarco, whose research was funded by the Texas Sea Grant College Program. “‘Dead Zone’ implies there is no life in it and even though an area has low oxygen, it does not mean it is devoid of life. In fact, it could be teeming with life, even in low oxygen conditions.”

That said, hypoxic zones warrant concern among scientists and the general public because there is still much about them and their impacts on sea life that remains unknown.

“If you like to fish or catch crabs, then you should care about hypoxic zones,” Mullins says. “They become a coastal hazard, a stressor to the benthic community and a stressor to the fisheries.”

Hypoxic zones are not new phenomena and are not exclusive to the Gulf of Mexico. Areas of low dissolved oxygen exist around the world on continental shelves and are typically associated with areas where there are large amounts of nutrients entering the area. “Nutrients cause algal blooms and these blooms go through a lifecycle — the phytoplankton live and they die,” DiMarco explains. “When they die, they sink to the bottom where they decay. The process of decay uses oxygen.”

The low oxygen levels persist in places where freshwater inflows from land meet saltwater. “Just like oil and water, freshwater and saltwater have different densities so they don't mix, they remain in separate layers and this stratification presents a barrier for getting oxygen from the atmosphere down to the lower layers of the ocean,” DiMarco says.

The hypoxic zone off the Mississippi River is both well known and well documented. The river pours nutrients and freshwater into the Gulf of Mexico, creating textbook conditions for persistent low dissolved oxygen levels. Texas, too, has experienced occasional hypoxic zones for years along the upper coast. Conventional wisdom held that the Texas hypoxic zones were created when Mississippi River water traveled down coast in the summertime, when there were no significant winds to mix the layers of water and when heat and dry conditions exacerbated the problem, DiMarco says.

“Then, in 2007 while we were on a cruise off Louisiana, we received data from National Oceanic and Atmospheric Administration (NOAA) that showed a region of hypoxia extending from 70 miles southwest of Freeport,” he says. “That got our attention and rang the alarm that there was this very large area of low oxygen off Texas and we needed to get out into it.”

Rapid response money from Texas Sea Grant allowed DiMarco to fund a data collection cruise to the area. Their research, published in a subsequent paper, found that Brazos River flooding caused by torrential rains dumped larger than normal amounts of freshwater into the Gulf of Mexico, effectively placing a cap on top of the saltwater and allowing dissolved oxygen levels to fall. Through collaboration with TAMU geologists Drs. Ethan Grossman and Josiah Strauss to look at stable isotopes of oxygen, DiMarco and Mullins were able to determine that the freshwater came from the Brazos River. “This discovery changed the game and proved that in some circumstances you can have local Texas causes of the Texas hypoxia,” Di Marco says.

-More-



In 2010, DiMarco received a \$95,000 research grant from Texas Sea Grant to study the locations, frequencies, durations and possible causes of hypoxic zones in Texas waters. He combined this funding with money from NOAA earmarked for hypoxia research and partnered with the Texas General Land Office to conduct cruises where his team collected data and deployed moored buoys equipped with instruments that continually monitor the surrounding waters. Data collected during the cruises provided DiMarco with a snapshot of water conditions over a large area while the buoys gave him long-term information on specific areas.

When the data revealed hypoxic areas, DiMarco and Mullins tried to tie the incidents to physical causes like freshwater inflows and diminished winds.

“One of the unique things we’re seeing on the Texas side is hypoxic zones are not limited to the summer,” says Mullins-Perry, noting that the Mississippi River hypoxic zone usually appears in April or May, peaks in July and usually disappears in September. “The Brazos is not as big as the Mississippi, but when there is water coming out of the Brazos, it can, at times, provide enough freshwater to stratify the system. Instead of a persistent summertime hypoxia, we will see episodic shorter events, maybe on the order of days, in the early spring and even through the late fall.”

Unlike the Mississippi River, Texas rivers do not carry significant amounts of nutrients — primarily nitrates and phosphates — from large scale agriculture operations to fuel algal blooms. DiMarco believes the nutrients contributing to Texas’ hypoxic zones come from much deeper in the Gulf of Mexico.

“Our idea is the Louisiana side is a large river dominated system. There is a huge signal from the Mississippi and the paradigm is that there is a large amount of nutrients available in the river and the wetlands, and there is a lot of freshwater, so you get this whole system that can very easily go hypoxic” DiMarco says. “Off the Texas coast it is more like a traditional continental shelf. There are benthic processes that contribute to consuming oxygen, but where do the nutrients come from to create that carbon on the sea floor? In most systems around the world that don’t have a huge freshwater source like the Mississippi, the nutrients come from upwelling. Texas appears to be a typical upwelling system.”

Upwelling refers to the process by which warm, less-dense surface water is drawn away from along a shore by offshore currents and replaced by cold, denser water brought up from greater depths.

“In June the winds change a bit here. Cold water comes up along the Texas coast every summer and that water brings nutrients with it,” he continues. “There is typically a phytoplankton bloom associated with this upwelling. Decay of phytoplankton is not an issue until the water stratifies and there is no way to ventilate the bottom layer of water. What we’re seeing in Texas is the need for a freshwater event to cause the stratification and hypoxia.”

DiMarco characterizes his theory of upwelling nutrients as a “working hypothesis” that has yet to be fully tested, and finding proof is not an easy next step. “We must separate the upwelling carbon out from an offshore source or from the Louisiana side, where the bloom comes from the river runoff,” he says. “Finding the driver will take a different kind of approach than what we are doing now, but we want to pursue it.”

Understanding how hypoxic zones affect fisheries may prove just as difficult as finding the cause. Fish, shrimp and other sea life tend to flee hypoxic areas, so they do not die but “they will be displaced, so you may need to go farther offshore or down the coast to find them,” DiMarco says. “There is also some indication now that chronic low oxygen conditions can interfere with the reproduction cycles and physiology of some commercially valuable fish. We are trying to identify quantifiable impacts of hypoxia, but that has been elusive. We’ve been trying to find impacts in Louisiana and haven’t, which may indicate a resilience in the fish. The problem is that in other areas around the world with hypoxia, the fisheries have collapsed, so understanding the system will lead us to have more information about whether the system is close to collapse and how much that particular system can take.

“Fisheries are economically important to Texas and Texans. Our coastal areas are places where we get a lot of seafood and do a lot of recreation,” he continues. “We don’t want to lose these things so understanding the system is important.”

The Texas Sea Grant College Program is a partnership of university, government and industry focusing on marine research, education and outreach. It is administered through the National Oceanic and Atmospheric Administration (NOAA) and is one of 32 university-based Sea Grant Programs around the country. Texas Sea Grant is based in the College of Geosciences Texas A&M University.



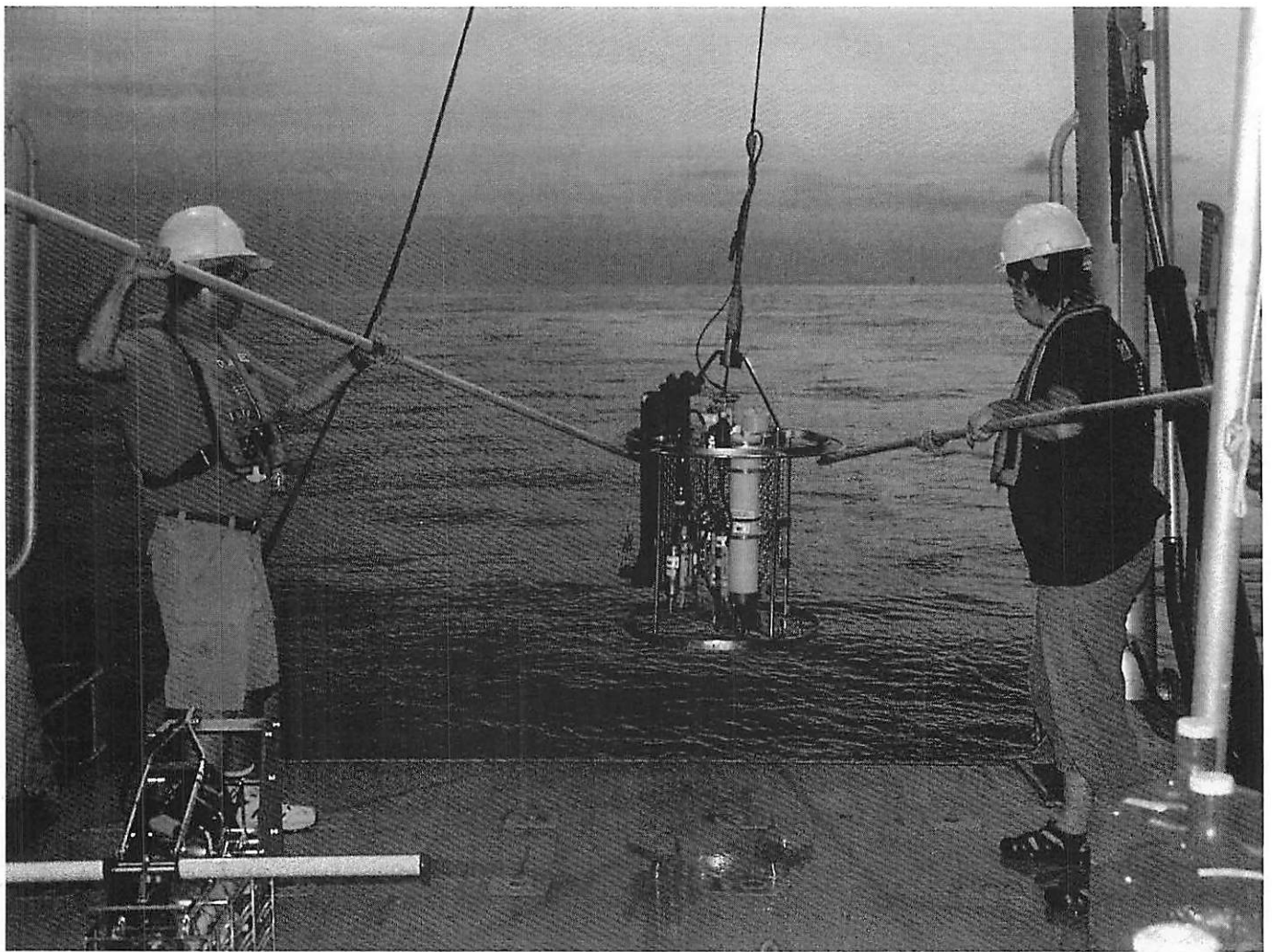


Photo by Ruth Mullins-Perry

Dr. Steve DiMarco (L) and Dr. Antionetta Quigg, associate professor of marine biology at Texas A&M University at Galveston, deploy a CDT profiler into the Gulf of Mexico off the Texas Coast. The profiler collects information on water temperature, salinity and dissolved oxygen as part of DiMarco's research on hypoxic areas in Texas coastal waters.





Photo by Ruth Mullins-Perry

Water samples taken from different locations in the Gulf of Mexico off the Texas coast reveal varying levels of dissolved oxygen after undergoing chemical treatment. Water samples that turn brown (L) are adequately oxygenated. Hypoxic samples turn white, like those on the right.





Photo by Jim Hiney

Ruth Mullins-Perry and Dr. Steve DiMarco look over a poster featuring results of their research on hypoxic areas off the Texas Coast.



MEDIA ADVISORY

Texas A&M University, MS-4115 • College Station, Texas 77843 • 979/845-3854 • FAX 979/845-7525

For Immediate Release: August 27, 2012



Science At Work For Texans
<http://texas-sea-grant.tamu.edu>

For more information contact:
Les Casterline,
TPWD Law Enforcement Division
(361) 289-5566

Officials to discuss recreational saltwater fishing regulations

COLLEGE STATION, Texas — The Texas Sea Grant College Program will co-host five public workshops on offshore recreational fishing regulations at various locations along the Texas coast during the first week in September.

The workshops, presented free of charge in partnership with the Texas Parks and Wildlife Department (TPWD) and National Oceanic and Atmospheric Administration (NOAA) Fisheries Service, are intended to clarify for the public existing recreational fishing regulations that apply to state and federal waters off the Texas coast. These regulations include license and permit requirements, seasons, equipment and size limits.

The workshops will focus on current regulations only and will not include public discussion on proposed or pending regulations. For more information, contact TPWD Game Warden Les Casterline at (361) 289-5566.

The workshop schedule is:

- Tuesday, Sept. 4, 1 p.m., Port Isabel Fire Hall, 205 N. Longoria St., Port Isabel.
- Tuesday, Sept. 4, 7 p.m., Chamber of Commerce Pavilion, 101 E. Port Drive, Port Mansfield.
- Wednesday, Sept. 5, 7 p.m., Port Aransas Outdoor Pavilion, Roberts Point Park, JC Barr Blvd., Port Aransas.
- Thursday, Sept. 6, 7 p.m., Bauer Exhibit Hall, Calhoun County Fairgrounds, CR 101, Port Lavaca.
- Friday, Sept. 7, 7 p.m., TPWD Dickinson Lab, 1502 Pine Dr. (FM 517), Dickinson.

The Texas Sea Grant College Program is a partnership of university, government and industry focusing on marine research, education and outreach. It is administered through the National Oceanic and Atmospheric Administration and is one of 32 university-based Sea Grant Programs around the country. Texas Sea Grant is based in the College of Geosciences Texas A&M University.



WATER ADVISORY

Water Advisory - [Faded text]

For more information contact:
[Faded text]

Water Advisory - [Faded text]

[Faded text]

[Faded text]

[Faded text]

[Faded text]

[Faded text]



MEDIA ADVISORY

Texas A&M University, MS-4115 • College Station, Texas 77843 • 979/845-3854 • FAX 979/845-7525

For Immediate Release: August 29, 2012



Science At Work For Texans
<http://texas-sea-grant.tamu.edu>

For more information contact:
Tony Reisinger,
Cameron County Extension Agent
Coastal & Marine Resources
956-493-8129

Red Tide Ranger training to delve into the mysteries of red tide

SOUTH PADRE ISLAND, Texas – Discovery of a red tide in the Galveston Bay area earlier this month has prompted leaders of the award-winning Red Tide Rangers to schedule training for volunteers who want to join the first responders should the harmful algal bloom (HAB) move into far south Texas waters.

The training will be held at The University of Texas-Pan American Coastal Studies Lab, located in Isla Blanca Park, from 10 a.m. to noon on Wednesday, Sept. 12. Participants will learn how to collect water samples, identify the red tide organism — *Karenia brevis* — and count the number of cells.

Brigette Goza, Education Coordinator with the Coastal Studies Lab, will relate lessons learned from recent red tide events and Meridith Byrd, Texas Hazardous Algal Bloom Response Coordinator with the Texas Parks and Wildlife Department (TPWD), will talk about the dangers posed by *K. brevis* and *Dinophysis ovum*, another HAB organism found in Texas coastal waters. Byrd will also explain the roles played by TPWD and the Department of State Health Services during a HAB and how the state uses monitoring data collected by Red Tide Rangers and others to determine bay closures, seafood advisories and public health warnings.

Paul Zimba, Ph.D., Director of Center for Coastal Studies at Texas A&M University-Corpus Christi, will reveal recent research findings on brevetoxin — the toxin released by red tide cells — and its affects on humans and wildlife.

Cost for the training is \$10 payable to the Rio Grande Valley Chapter Texas Master Naturalist. Registration is required and seating is limited. To register for the workshop, call Diane Abbott at the Coastal Studies Lab, 956-761-2644.

HAB training is also one of three courses required for volunteers seeking certification as Texas Coastal Naturalists — a new program that prepares volunteers in the Laguna Madre area to be first responders to coastal natural emergencies like cold stunned sea turtle strandings, marine mammal strandings and oil tainted wildlife. Current Red Tide Rangers and Coastal Naturalists are invited to take the HAB training as a refresher or as a continuation of the three courses, free of charge.

-More-

The Red Tide Ranger and Texas Coastal Naturalist programs provide a volunteer base for the Coastal Studies Lab, Sea Turtle Inc. and the Cameron County Extension Service. In 2006, the Red Tide Rangers were honored with a Gulf Guardian Award from the Gulf of Mexico Program of the U.S. Environmental Protection Agency for their work during a major red tide bloom in 2005.

Both the Red Tide Ranger and Texas Coastal Naturalist programs are sponsored by the Rio Grande Valley Chapter Texas Master Naturalists, Texas Sea Grant College Program, the Texas A&M AgriLife Extension Service, TPWD's Harmful Algal Bloom Working Group, the Gladys Porter Zoo and The University of Texas at Brownsville.

The Texas Sea Grant College Program is a partnership of university, government and industry focusing on marine research, education and outreach. It is administered through the National Oceanic and Atmospheric Administration and is one of 32 university-based Sea Grant Programs around the country. Texas Sea Grant is a non-academic research center in the College of Geosciences Texas A&M University.

Texas Sea Grant Extension is a joint outreach program of Texas Sea Grant, Texas A&M AgriLife Extension Service and the Commissioners Courts in participating counties.

