2017 Texas Bays and Estuaries Meeting

Photo Credit: Meaghan Cuddy

The University of Texas Marine Science Institute
Port Aransas, Texas
April 12-13, 2017

Texas Bays and Estuaries Meeting

TBEM

MISSION ★ ARANSAS
NATIONAL ESTUARINE RESEARCH RESERVE

The University of Texas at Austin
Marine Science Institute

Table of Contents



Welcome!

The University of Texas Marine Science Institute is proud to host the 13th annual Texas Bays and Estuaries Meeting. We have a great program of talks and posters this year from presenters all around the state! We are truly excited for the great turnout.

Please remember that all campus buildings, grounds, and outdoor spaces are nonsmoking. Restrooms are located across from the auditorium in the Marine Science Education Center. Mustang Island Food Company will be providing lunch on both days of the meeting. The poster session will be held on Wednesday evening from 4:00 to 6:30 p.m. in the UTMSI Lyceum. Beer, wine and heavy hors d'oeuvres, catered by La Playa Restaurant, will be provided at the poster session. You may wander freely with your drinks, but please do not leave the campus with them. A social will proceed the poster session at Rockin B's Bar and Grill with drink specials and s'mores.

Once again, thank you for participating and we hope you enjoy the meeting.

See you again next year!

Texas Bays and Estuaries Meeting Committee

Jace Tunnell Dana Sjostrom Katie Swanson

A special thank you goes out to the 2017 Student TBEM Committee:

Chris Biggs
Derek Bolser
Christina Bonsell
Victoria Congdon
Aubrey Converse
Angelina Dichiera
Sarah Douglas
Thomas Nguyen
John O'Conner
Erin Reed
Charles Tang

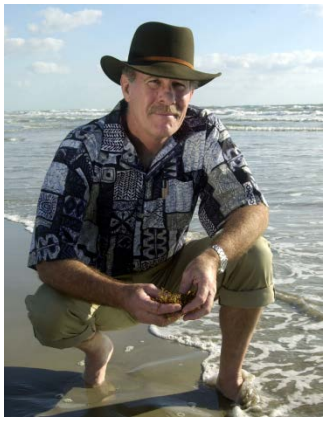
Follow the meeting on social media with #TBEM2017

Internet Wireless Name: UTMSIGuest
Password: D20A5CE57D


Welcome to
TBEM2017
Texas Bays and Estuaries Meeting
Thank you to our sponsors!
THE UNIVERSITY OF TEXAS MARINE SCIENCE INSTITUTE
MISSION • ARANSAS
NATIONAL ESTUARINE RESEARCH RESERVE
COASTAL BEND BAYS & ESTUARIES PROGRAM
TEXAS A&M UNIVERSITY CORPUS CHRISTI
HARTE RESEARCH INSTITUTE FOR GULF OF MEXICO STUDIES
Sea Grant Texas
AT TEXAS A&M UNIVERSITY
Coastal Bend Bays Foundation
A Partnership for Conservation
#TBEM2017

Invited Speakers Biographies

Dr. Wes Tunnell, Endowed Chair of Biodiversity and Conservation Science at the Harte Research Institute for Gulf of Mexico Studies, and Professor Emeritus, Regents Professor, and Fulbright Scholar in the Department of Life Sciences, College of Science and Engineering, Texas A&M University-Corpus Christi



Dr. Wes Tunnell is Endowed Chair of Biodiversity and Conservation Science at the Harte Research Institute for Gulf of Mexico Studies, and Professor Emeritus, Regents Professor, and Fulbright Scholar in the Department of Life Sciences, College of Science and Engineering, Texas A&M University-Corpus Christi (TAMUCC). He earned his Ph.D. from Texas A&M University (1974) in Biology.

Dr. Tunnell began his career at TAMUCC in 1974, where his teaching and research broadly focused on marine biology and ecology. His primary research interests lie in coral reef ecology in Mexico, mollusks (seashells) of Texas and Mexico, oil spill impacts in the marine environment, and most recently, biodiversity of the Gulf of Mexico.

Dr. Tunnell advised numerous MS and Ph.D. students during his career, published over 150 papers, book chapters, and technical reports, as well as 7 books, and he is currently the editor of two book series for Texas A&M University Press. He has also received numerous honors and awards, including: Fellow Texas Academy of Sciences (1981); Fulbright Scholar Award to Mexico (1985-86); Regent's Professor (1998); Alumni Distinguished Professor Award (2003); Gulf Guardian Award (2006 and 2008); Fellow National in the Explorer's Club (2007); TAMU-CC Excellence in Scholarly Activity Award (2007), Harvey Weil Professional Conservationist of the Year Award (2011); Harte's Hero Award in 2013; and, Professor Emeritus in 2015. In 2015, an underwater feature in the northwestern Gulf of Mexico was names after him (Tunnell Mound), and in 2016, a fellowship was established in his name in perpetuity (Dr. Wes Tunnell Gulf of Mexico Fellowship Program).

Dr. Lisa Campbell, Professor and William R. Bryant Chair in the Department of Oceanography, with a joint appointment in Biology at Texas A&M University

Dr. Lisa Campbell is a Professor and William R. Bryant Chair in the Department of Oceanography, with a joint appointment in Biology at Texas A&M University. Her research focuses on phytoplankton ecology. She has conducted field work in all oceans, but her current research centers on harmful algal blooms in the Gulf of Mexico where she has deployed the Imaging FlowCytobot to obtain a high temporal resolution phytoplankton time-series. This continuous, autonomous system has successfully provided early warning of potential toxic blooms eight times since 2007.

Dr. Campbell received her M.S. in Marine Environmental Science and Ph.D. in Oceanography from Stony Brook University, NY. Prior to joining the faculty at Texas A&M University in 1996, she held Research Scientist positions at University of Hawaii (1987-1996), Bigelow Laboratory for Ocean Sciences in Maine (1986-1988) and the Oceanic Institute (1985-1986). She currently serves on the Board of Directors of the Association for the Sciences of Limnology and Oceanography and has published over 90 peer-reviewed publications and 8 book chapters.

Schedule

Wednesday, April 12, 2017

8:00 AM - **Registration,** Marine Science Education Center, The University of Texas Marine Science Institute, 855 East Cotter Avenue, Port Aransas Texas

9:00 AM - **Welcome and Opening Remarks,** Dr. Robert Dickey, Director, The University of Texas Marine Science Institute

HABITAT RESTORATION AND STEWARDSHIP

9:15 AM - **ReefBlk TM – Oyster Reef BioEngineering, Mad Island Preserve, Texas: A Case Study**
Cassandra Hart* and Mark Gagliano; Coastal Environments, Inc.

9:30 AM - **The Economic Impacts of Increased Recreational Fishing from the Half Moon Reef Restoration**
Andrew Ropicki; Texas Sea Grant College Program

9:45 AM - **Landscape scale habitat restoration and enhancement with shoreline breakwaters and beneficial use of dredge material**
Todd Merendino* and Kevin Hartke; Ducks Unlimited

10:00 AM - **Evaluating Buyer's Interest in an Ecosystem Services Exchange**
[1]Quinn McColly*, [1]David Yoskowitz, [1]Richard Mclaughlin, and [2]Jim Blackburn; [1]Harte Research Institute for Gulf of Mexico Studies, Texas A&M University-Corpus Christi; [2]Rice University (*Student presentation*)

10:15 AM - **An Entrepreneur's View of Blue Carbon, Mitigation Banking, and Coastal Resiliency**
[1]Dave Pietruszynski* and [2]Dana Sjostrom; [1]Seagrass Consulting LLC; [2]Mission-Aransas National Estuarine Research Reserve at the University of Texas Marine Science Institute

10:30 AM - **BREAK (30 MINUTES)**

11:00 AM - **The Leash and the Muzzle Are Off: A 38-Year Coastal Environmental Career Retrospective**
Ken Teague; PWS, Certified Senior Ecologist, Independent coastal scientist (retired)

11:15 AM - **USACE and GLO Planning Efforts**
[1]Tony Williams* and [2]Kelly Burks-Copes Ph.D.; [1]Texas General Land Office; [2]US Army Corps of Engineers

Wednesday, April 12, 2017 (continued)

11:30 AM - **Third Coast Science for You: A Scientific Responsibility and Obligation of Bridging the Communication Gap**
[1]Heidi Heim-Ballew*, [2]Melissa McCutcheon, and [1]Lee Pinnell; [1]Department of Life Sciences, Texas A&M University-Corpus Christi; [2]Department of Physical and Environmental Sciences, Texas A&M University- Corpus Christi (*Student presentation*)

11:45 AM - **Marine Debris – Advances and Setbacks at the Local, State and International Levels**
Neil McQueen; Vice Chair - Surfrider Foundation, Texas Coastal Bend Chapter

12:00 PM - **LUNCH (Catered by Mustang Island Food Company) in the Marine Science Education Center lobby**

WATER QUALITY

1:00 PM - **The Laguna Madre of Texas and Tamaulipas**
John W. Tunnell, Jr.; Harte Research Institute for Gulf of Mexico Studies at Texas A&M University-Corpus Christi *(Invited Speaker)*

1:30 PM - **Spring phytoplankton bloom dynamics in Baffin Bay, Texas**
Emily Cira* and Michael Wetz; Texas A&M University – Corpus Christi (*Student presentation*)

1:45 PM - **Modeling of Dissolved Oxygen Dynamics in Baffin Bay**
[1]Hongjie Wang*, [1]Xinping Hu, [2]Michael Wetz, and [2]Kenneth Hayes; [1]Department of Physical and Environmental Sciences, Texas A&M University - Corpus Christi; [2]Department of Life Sciences, Texas A&M University - Corpus Christi (*Student presentation*)

2:00 PM - **Bioavailability and molecular structure of dissolved organic nitrogen (DON) in five south Texas rivers**
[1]Kaijun Lu*, [1,2]Kai Wu, and [1]Zhanfei Liu; [1]The University of Texas Marine Science Institute; [2]State Key Laboratory of Marine Environmental Science, Xiamen University (*Student presentation*)

2:15 PM - **BREAK (30 MINUTES)**

2:45 PM - **Tidal Freshwater Zones as Hotspots for Biogeochemical Cycling: Sediment Organic Matter and Oxygen Consumption in the Lower Reach of Mission and Aransas Rivers**
[1]Xin Xu*, [1]Hengchen Wei, [2]Grayson Barker, [1]Kylie Holt, [3]Tricia Light, [4]Sierra Melton, [5]Ana Salamanca, [6]Kevan Moffett, [1]James McClelland, and [1]Amber Hardison; [1]The University of Texas Marine Science Institute; [2]Appalachian State University; [3]Scripps College; [4]Colorado College; [5]Texas A&M University Corpus Christi; [6]Washington State University Vancouver (*Student presentation*)

Wednesday, April 12, 2017 (continued)

3:00 PM - **Spatial and temporal variations of N concentrations and the composition of the N pool in the tidal freshwater zone of two coastal rivers in South Texas**
Hengchen Wei*, Xin Xu, Amber Hardison, and James McClelland; The University of Texas Marine Science Institute (*Student presentation*)

3:15 PM - **Spatial and seasonal patterns of total dissolved amino acids in Lavaca and San Antonio Bays, Texas**
[1]Jianhong Xue*, [1]Kai Wu, [2]Mike Wetz, and [1]Zhanfei Liu; [1]The University of Texas Marine Science Institute; [2]Department of Life Sciences, Texas A&M University- Corpus Christi

3:30 PM - **Imaging Colonization, Growth and Change in the Epiphyte Communities of Seagrasses**
[1]Kirk Cammarata*, [1]Whitney Roberson, [2]Susan Shanks, [1]Amie Cuvelier, Meherube [3]Mehrebeoglu, [2]James Simons, [1,2]Paul Zimba, [1]Melissa Fisher, and [1]Ariana Kavandi; [1]Department of Life Sciences, Texas A&M University-Corpus Christi; [2]Center for Coastal Studies, Texas A&M University-Corpus Christi; [3]Department of Engineering, Texas A&M University-Corpus Christi

4:00 PM - **Poster Session / Hors d'oeuvre Hour** (Catered by La Playa) located in the Marine Science Institute's Lyceum, between the main laboratory building and administrative building.

6:00 PM - **Poster Session Complete.** Please join us for the 2017 TBEM Social

6:15 PM - **2017 TBEM Social** at Rockin' B Bar & Grill, located at 905 TX-361, Port Aransas

9:00 PM - **End of social event.**

Thursday, April 13, 2017

8:00 AM - **Registration,** Marine Science Education Center, The University of Texas Marine Science Institute, 855 East Cotter Avenue, Port Aransas Texas

HABITATS AND ECOSYSTEMS

9:00 AM - **Imaging FlowCytobot provides novel insights on phytoplankton community dynamics**
Lisa Campbell; Departments of Oceanography and Biology, Texas A&M University *(Invited Speaker)*

9:30 AM - **Long-term monitoring of the Mission-Aransas Estuary: Effects of pulsed freshwater inflows on planktonic ecosystems**
Edward J. Buskey*, Cammie J. Hyatt, and Lindsay P. Scheef; Mission-Aransas National Estuarine Research Reserve at the University of Texas Marine Science Institute

9:45 AM - **Effect of freshwater inflow on oyster habitat suitability change in Texas bays**
[1]Evan L. Turner*, [2]Kelley Savage, [3]Joe Trungale, [2]Terry A. Palmer, and [2]Paul A. Montagna; [1]Texas Water Development Board; [2]Harte Research Institute for Gulf of Mexico Studies at Texas A&M University-Corpus Christi; [3]Trungale Engineering and Science

10:00 AM - **First record of *Cucurbitula*, a curious and unusual bivalve, from Padre Island National Seashore, Texas**
Fabio Moretzsohn; Department of Life Sciences, Texas A&M University-Corpus Christi

10:15 AM - **Cataloguing Texas Estuarine Species Interactions for Coastal Managers, Scientists, and Educators**
[1]James Simons*, [1]Theresa Mitchell, and [2]Jorrit Poelen; [1]Center for Coastal Studies, Texas A&M University-Corpus Christi; [2]Independent Software Developer, Oakland, CA

10:30 AM - **BREAK (30 MINUTES)**

11:00 AM - **Side Scan and Parametric Sonar Mapping of a Shallow Seagrass Habitat and Associated Organic Carbon**
Austin Greene*, Abdullah Rahman, and Richard Kline; University of Texas, Rio Grande Valley (*Student presentation*)

11:15 AM - **Ecological indicators for assessing seagrass ecosystem condition in the Gulf of Mexico**
Victoria M. Congdon* and Kenneth H. Dunton; The University of Texas Marine Science Institute (*Student presentation*)

Thursday, April 13, 2017 (continued)

11:30 AM - **Multi-Scale Voxel Segmentation for Terrestrial Lidar Data within Marshes**
[1]Chuyen T Nguyen*, [1,2]Michael J Starek, [2]Philippe Tissot, [3]Jim Gibeaut; [1]College of Science and Engineering, Texas A&M University-Corpus Christi; [2]Conrad Blucher Institute for Surveying and Science, Texas A&M University-Corpus Christi; [3]Harte Research Institute for Gulf of Mexico Studies, Texas A&M University-Corpus Christi (*Student presentation*)

11:45 AM - **Low-profile goes the extra mile: The importance of including low-profile patch reefs into artificial reef design**
D. Alex Alder* and Richard Kline; School of Earth, Environmental, and Marine Sciences, University of Texas Rio Grande Valley (*Student presentation*)

12:00 PM - **LUNCH (Catered by Mustang Island Food Company) in the Marine Science Education Center lobby.**

FISH AND FISHERIES

1:00 PM - **The novel membrane androgen receptor ZIP9 mediates pro- and anti-apoptotic responses in an ovarian follicle size-dependent manner in Atlantic croaker granulosa cells**
Aubrey Converse* and Peter Thomas; The University of Texas Marine Science Institute (*Student presentation*)

1:15 PM - **Investigating Environmental Contamination in the Lower Laguna Madre through CYP1A Expression in Pinfish (*Lagodon rhomoides*) Liver and Microplastic Content**
[1]Stephanie DuBois*, [2]Abdullah Faiz Rahman, and [1,2]Md Saydur Rahman; [1]Department of Biology, University of Texas, Rio Grande Valley; [2]School of Earth, Environmental, and Marine Sciences, University of Texas, Rio Grande Valley (*Student presentation*)

1:30 PM - **Dietary DHA influences DHA amounts in southern flounder eggs throughout spawning season**
Corinne Burns* and Lee Fuiman; The University of Texas Marine Science Institute (*Student presentation*)

1:45 PM - **Spatial Distribution of Spotted Seatrout Spawning Sites within a South Texas Estuary**
[1]Christopher Biggs*, [1]Erin Reed, [2]Sue Lowerre-Barbieri, [2]Sarah Walters, [2]Joel Bickford, and [1]Brad Erisman; [1]The University of Texas Marine Science Institute; [2]Florida Fish and Wildlife Conservation Commission, Fish and Wildlife Research Institute, St. Petersburg (*Student presentation*)

2:00 PM - **Spatio-temporal Trends of Alligator Gar *Atractosteus spatula* in Texas's Bays and Estuaries**
Evan Pettis; Texas Parks and Wildlife Department - Coastal Fisheries Division

Thursday, April 13, 2017 (continued)

2:15 PM - **BREAK (15 MINUTES)**

2:30 PM - **Determining Effective Release Methods for Reducing Discard Mortality in the Gulf of Mexico Red Snapper Recreational Fishery**
Alex K. Tompkins*, Judson M. Curtis, and Greg W. Stunz; Harte Research Institute for Gulf of Mexico Studies at Texas A&M University-Corpus Christi (*Student presentation*)

2:45 PM - **Relationships between climate, growth, and fisheries production in a commercially exploited marine fish from the Gulf of California**
[1]Erin Reed*, [1]Bryan Black, [2]Martha J. Román, [3]Ismael Mascareñas, [4]Catalina Lopez-Sagastegui, [5]Octavio Aburto-Oropeza, [6]Kirsten Rowell, and [1]Brad Erisman; [1]The University of Texas Marine Science Institute; [2]Comisión de Ecología y Desarrollo Sustentable del Estado de Sonora, Sonora C.P., Mexico; [3]Centro para la Biodiversidad Marina y la Conservacíon, La Paz, Mexico; [4]UC MEXUS, University of California Riverside; [5]Scripps Institution of Oceanography, University of California San Diego; [6]University of Colorado Boulder (*Student presentation*)

3:00 PM - **Managing commercial harvest of Eastern Oysters (*Crassostrea virginica*) in Texas - Applying a 2-metric traffic light approach in Copano Bay, Texas**
Cindy Kelly*, Christopher Mace, Evan Pettis, Stephen Hale, Austin Orr, Luis Uballe, and Moises Hinojosa; Texas Parks and Wildlife Department – Coastal Fisheries Division

3:15 PM - **Fishful of Dollars: Seafood & Fishing Economics**
[1]Rebekka Dudensing, Ph.D. and [2]Rhonda Cummins*; [1]Community Economic Development, Texas A&M AgriLife Extension Service; [2]Calhoun County, Texas Sea Grant Extension

3:30 PM - **Student Award Presentations**
Thank you to the Coastal Bend Bays and Estuaries Program and Coastal Bend Bays Foundation for sponsoring this year's student awards.

4:00 PM - **2017 TBEM Closed**

Student Awards

Student presentations and posters are an important aspect of this meeting. The best student awards for presentations acknowledge excellence in research. The best student oral presentation awards are generously sponsored by the Coastal Bend Bays & Estuaries Program ($200 for 1st Place, $150 for 2nd Place and $100 for 3rd Place). The best student poster awards are generously sponsored by the Coastal Bend Bays Foundation ($150 for 1st Place, $100 for 2nd Place and $50 for 3rd Place).

Previous Oral Presentation Winners:

2013: **Jud Curtis**, Texas A&M University-Corpus Christi, 1st Place
Kimberly Bittler, The University of Texas Marine Science Institute, 2nd Place
Brittany Bloomberg, Texas A&M University-Corpus Christi, 3rd Place

2014: **Philip Jose,** Texas A&M University-Corpus Christi, 1st Place
Rachel Arney, The University of Texas- Brownsville, 2nd Place
Quentin Hall, Texas A&M University-Corpus Christi, 3rd Place

2015: **Meredith Evans,** The University of Texas Marine Science Institute, 1st Place
Kathryn Mendenhall, Texas A&M University-Corpus Christi, 2nd Place
Juliet Lamb, Clemson University and Department of Forestry and Environmental Conservation, 3rd Place

2016: **Meredith Evans,** The University of Texas Marine Science Institute, 1st Place
Nick Reyna, The University of Texas Marine Science Institute, 2nd Place
Victoria Congdon, The University of Texas Marine Science Institute, 3rd Place

Previous Poster Winners:

2013: **Xinxin Li**, Texas A&M University, 1st Place
Allan Jones, The University of Texas at Austin, 2nd Place
Aubrey Lashaway, The University of Texas Marine Science Institute, 3rd Place

2014: **Melissa McCutcheon,** Texas A&M University-Corpus Christi, 1st Place
Kevin DeSantiago, Texas A&M University-Corpus Christi, 2nd Place
John Mohan, The University of Texas Marine Science Institute, 3rd Place

2015: **Ashley Whitt,** Texas A&M University-Galveston, 1st Place
Jason Jenkins, The University of Texas Marine Science Institute, 2nd Place
Eric White, Texas A&M University-Corpus Christi, 3rd Place

2016: **Natasha Breaux,** Texas A&M Corpus Christi, 1st Place
Rachael Edwards, Texas A&M Corpus Christi, Harte Research Institute, 2nd Place
Jake Loveless, Texas A&M Corpus Christi, 3rd Place

COASTAL BEND BAYS & ESTUARIES PROGRAM

COASTAL BEND BAYS FOUNDATION
Dedicated to protecting our bays and estuaries

Abstracts for Oral Presentations

HABITAT RESTORATION AND STEWARDSHIP

ReefBlk ™ – Oyster Reef BioEngineering, Mad Island Preserve, Texas: A Case Study
Cassandra Hart* and Mark Gagliano; Coastal Environments, Inc.

ReefBlk ™ is a system that uses a vertical, triangular-shaped structure filled with cultch (oyster shell, limestone, or concrete) to create a living shoreline and aid in the growth of new marsh. Each structure promotes oyster recruitment with an open space in its center that allows for maximization of surface area and water filtration. When aligned together, a series of these structures creates a linear breakwater of oyster-reef habitats. ReefBlk ™ living shorelines have been deployed in nine locations throughout the Gulf of Mexico, with success in reducing shoreline erosion and accreting sediment and new shell material shed from the reef. This allows for the creation of new marsh to develop between the reef and the existing shoreline. Information on ReefBlk ™ projects located on land managed by The Nature Conservancy at the Mad Island Preserve in Matagorda County, will be presented.

The Economic Impacts of Increased Recreational Fishing from the Half Moon Reef Restoration
Andrew Ropicki; Texas Sea Grant College Program

Oyster reefs provide many valuable ecosystem services including nutrient regulation, water filtration, and provision of fish habitat. Historic degradation from dredging, harvesting, and water flow changes have decreased the size and number of oyster reefs in Texas. Recently, oyster reef restoration efforts have increased due to the important role these reefs play in Texas bays and estuaries; being able to quantify the economic benefits of oyster reef restoration projects can provide policy makers with valuable information on the potential economic returns of restoration projects and allow for better informed decisions regarding future projects. In 2014, work was completed on a 54-acre sub-tidal restoration of Half Moon Reef in Matagorda Bay. Historically, Half Moon Reef was quite large, covering approximately 500 acres, before essentially disappearing due to overuse (harvesting and dredging) and water flow changes. The restored reef has created habitat for many species and biodiversity at Half Moon Reef is 40% higher than surrounding bay floor. The restoration project has led to greater recreational fishing effort at the reef which has led to economic benefits for Matagorda Bay communities and the Texas economy. In 2016, Texas Sea Grant staff, working with The Nature Conservancy, calculated the economic impacts on the State of Texas from increased recreational fishing due to the reef restoration project. This presentation highlights the techniques used for that project and results obtained; in addition, the technique outlined can be applied to other reef restoration projects to calculate economic benefits from recreational fishing.

Landscape scale habitat restoration and enhancement with shoreline breakwaters and beneficial use of dredge material

Todd Merendino* and Kevin Hartke; Ducks Unlimited

Coastal resiliency planning is a topic of major discussion among coastal communities, coastal planners, and resource agencies. Those same tools and techniques that can provide for coastal resiliency, such as shoreline breakwaters and beneficial use of dredge material, can also provide for improved wildlife habitat. Habitat restoration efforts being implemented by Ducks Unlimited and project partners are aimed at mixing science and planning with proven conservation practices at a landscape level. Ducks Unlimited has completed a decision support tool for targeting high priority areas for shoreline protection along the Gulf Intracoastal Waterway. The design and use of that effort will be discussed as well as some recently completed projects. Another planning effort will involve the beneficial use of dredge material. From 1998 to 2012, an average of 6.2 million cubic yards were dredged each year from the main channel of the Gulf Intracoastal Waterway (GIWW) in Texas. Most of this dredged material went to either confined or open bay placement areas. This method of disposal of dredged material is an unfortunate lost opportunity. Texas is losing biologically productive coastal wetlands at a rate of more than 5,700 acres annually. A major cause of this loss is insufficient sediment supply. Previous BU projects and future planning efforts will be discussed.

Evaluating Buyer's Interest in an Ecosystem Services Exchange

[1]Quinn McColly*, [1]David Yoskowitz, [1]Richard Mclaughlin, and [2]Jim Blackburn; [1] Harte Research Institute for Gulf of Mexico Studies, Texas A&M University-Corpus Christi; [2]Rice University (*Student presentation*)

Ecosystem services provide essential benefits that humans rely on for life, and humans have put substantial pressures on these systems. Numerous efforts have been made to halt, or reverse, this trend; however, new mechanisms are needed to support restoration and conservation efforts. Payment for ecosystem services (PES) is an approach by which money can be funneled toward these objectives. While compensatory mitigation markets are in place—and are evolving—research regarding the interests of market participants in voluntary arrangements is underdeveloped. It is important to remember that compensatory mitigation is geared toward "no net loss" compliance, so cannot be said to be improving the status quo. To better understand the interests and expectations of the voluntary buyer, we wanted to know if they are willing to participate in a voluntary market, how they would like it to function, and what they might want it to deliver. After surveying 300 respondents, from three separate groups of 100 each (architects, businesses, NGO's), results suggest there is significant enough interest in these voluntary purchases to develop them further. In addition, survey respondents expressed the desire to engage with a voluntary market that would also support business objectives.

An Entrepreneur's View of Blue Carbon, Mitigation Banking, and Coastal Resiliency

[1]Dave Pietruszynski* and [2]Dana Sjostrom; [1]Seagrass Consulting LLC; [2]Mission-Aransas National Estuarine Research Reserve, University of Texas Marine Science Institute

Market-driven sustainability concepts continue attracting policymakers, entrepreneurs, large businesses, and researchers. Some see the carbon-storage and sequestration potential in coastal

habitats, particularly saltmarshes and mangrove stands as key in generating carbon credits for cap and trade markets, or the monetizing of those credits as a means of encouraging the preservation of rather than destruction of wetlands by developers/landowners. This presentation, by a hopeful skeptic and entrepreneur, cuts through some of the hype surrounding market-driven sustainability. Based on numbers and current policy, we aim to outline practical sustainability methods that are already being used or can be used effectively. We will also discuss the size and viability of voluntary and regulatory carbon markets, implications for carbon tax initiatives, and example projects that highlight conclusions.

The Leash and the Muzzle Are Off: A 38-Year Coastal Environmental Career Retrospective

Ken Teague; PWS, Certified Senior Ecologist, Independent coastal scientist (retired)

After 38 years working in research, environmental management, and restoration of coastal Texas and Louisiana, I recently retired from the U.S. Environmental Protection Agency. During this time, I developed a personal perspective regarding what may be the most significant human-caused environmental changes on the Texas coast, and how successful we have been in responding to these. The human responses to these problems have been inadequate, but have been far better than would exist absent the environmental protection legal and organizational infrastructure, and limited budgets and political will, that have existed since the 1970s. Of course, this assessment includes the EPA. However, while EPA has played a critical role in Texas coastal protection and restoration, and this role should be supported and even increased in the future, the agency's efforts have been limited by variations in political will and budgets, and by certain agency cultural characteristics. I hope this talk will serve as a starting point for future presentations that will "drill down" into the details of my perspective and experiences.

USACE and GLO Planning Efforts

[1]Tony Williams* and [2]Kelly Burks-Copes Ph.D.; [1]Texas General Land Office; [2]US Army Corps of Engineers

The Texas General Land Office (GLO) has recently completed Phase I of the Texas Coastal Resiliency Master Plan, and is working with the US Army Corps of Engineers (USACE) to develop a Comprehensive Plan under the Coastal Texas Protection and Restoration Feasibility Study. The Master Plan is a state plan to provide a framework for community, socio-economic, ecological, and infrastructure protection from coastal hazards. This is accomplished by working with local experts to identify issues of concern along the coast, and projects best suited to address the highest priorities in each watershed. Phase I is designed for immediate implementation, and the GLO is developing Phase II. The authorization for the Coastal Texas Study requires the USACE to develop a Comprehensive Plan for the coastal area of Texas, that includes ecosystem restoration and storm risk management projects recommended to congress for construction. The Comprehensive Plan will build on the Master Plan, and will develop an overarching, long-term strategic vision of a resilient Texas coast. The study will be completed in 2021, but the tentatively selected plan will be identified by May 2018.

Third Coast Science for You: A Scientific Responsibility and Obligation of Bridging the Communication Gap

[1]Heidi Heim-Ballew*, [2]Melissa McCutcheon, and [1]Lee Pinnell; [1]Department of Life Sciences, Texas A&M University-Corpus Christi; [2]Department of Physical and Environmental Sciences, Texas A&M University- Corpus Christi (*Student presentation*)

The Texas coastal bend is rich in scientific research spanning many institutions and agencies and many disciplinary fields. This research elucidates a better understanding of the natural processes that surround and influence our daily lives. Although these resources are rich, there is an ever-existing disparity between the scientific community and their findings and the community in which these topics and findings impact. Acknowledging this disparity is the first necessary step in bridging this gap. The next step, and the one discussed here, is implementing a program that brings the scientific and general communities closer. Third Coast Science for You is an outreach initiative that will provide scientific information, written by experts to the public, with the primary goal of having a more informed community. Through biannual print and online bilingual publications, these articles will address local topics of local interest ranging from water quality to fisheries research in a way that may hopefully be understood and appreciated by all. The goals of this initiative are threefold; 1) to initiate community-wide collaborations of both scientific and non-scientific community groups; 2) provide a valuable service to the community; and, 3) provide professional advancement for scientific persons of all academic levels. We invite participation through article submission, service as a board member, and journal dissemination and sponsorship to scientists and scientific organizations throughout academic institutions, government agencies, and the private sector as this initiative continues to grow.

Marine Debris – Advances and Setbacks at the Local, State and International Levels

Neil McQueen; Vice Chair - Surfrider Foundation, Texas Coastal Bend Chapter

Public awareness about plastic marine debris continues to grow as the mainstream media features stories showing marine wildlife impacted by it and shorelines littered with it. While public will for positive change has increased and consumer habits have improved somewhat to reduce plastic consumption and the resultant problems, we have a long way to go to solve the global marine debris problem. The presentation will discuss advances and setbacks regarding marine debris during the last year at the local, state and international levels.

INVITED SPEAKER

The Laguna Madre of Texas and Tamaulipas

John W. Tunnell, Jr.; Harte Research Institute for Gulf of Mexico Studies at Texas A&M University-Corpus Christi

In 1998 The Nature Conservancy (TNC) asked me, along with Frank Judd, to do a "Compendium of Laguna Madre" information prior to their international ecosystem and conservation program focus in the region. Tunnell, Judd, Liz Smith, and Kim Withers primarily wrote this 9-month, TNC project to the Center for Coastal Studies at Texas A&M University-Corpus Christi. The project also included a "Comprehensive Bibliography of the Laguna Madre

of Texas and Tamaulipas", which included almost 1,400 citations over a 70 year time span, and included ecosystem highlights. The Compendium subsequently became a Texas A&M University Press book entitled *The Laguna Madre of Texas and Tamaulipas* (2002), and led to the establishment of the TAMU-CC Gulf Coast Books series. That book series now has 30 titles in it, and the newer Harte Research Institute for Gulf of Mexico Studies book series, started in 2007, has 13 titles. Since the original Laguna Madre book (2002) has been out of print for several years, since new science and conservation issues have arisen, and since it is still in common use among scientists, students, NGOs, agency personnel, and the educated public, we have decided to do an update/revision. The first edition had 19 chapters and 9 authors, and the second edition will have 23 chapters and 27 authors, with numerous leading experts joining as co-authors of the revised edition. The presentation will cover an overview of the Laguna Madre ecosystem and conservation issues, and it will cover plans, new chapters, and new authors for the second edition.

WATER QUALITY

Spring phytoplankton bloom dynamics in Baffin Bay, Texas
Emily Cira* and Michael Wetz; Texas A&M University – Corpus Christi (*Student presentation*)

Spring phytoplankton blooms are a typical seasonal feature of many estuarine systems. Seasonal changes in environmental conditions (light, temperature) are known to affect spring bloom dynamics, but the extent to which long-term changes in springtime nutrient loading in Baffin Bay may be influencing the spring bloom dynamics in Baffin Bay has not yet been described. For the past three years, a monthly water quality monitoring program in Baffin Bay has shown that there is a distinct spring bloom in the system. In 2016, a higher frequency monitoring effort was added, in combination with a series of nutrient-light-temperature manipulation experiments, in order to understand controls upon the timing/magnitude of the spring bloom. Monitoring data suggest that abrupt increases in chlorophyll concentrations through the spring generally coincide with decreases in salinity and increases in inorganic nutrient concentrations, reflecting the importance of storm events and nutrients to phytoplankton dynamics in spring months. Results from the experiments suggest that in the early spring, light and temperature are important factors controlling short term phytoplankton growth, and thus spring bloom development. While light intensity remains an important factor for phytoplankton growth through the spring months, the role of temperature diminishes while that of nutrients becomes more important. These findings are critical to understand controls upon the spring phytoplankton bloom in Baffin Bay, particularly because there have been long-term seasonal (spring) increases in nutrient and chlorophyll concentrations in the system, and likewise spring water temperature has increased over the past 4 decades.

Modeling of Dissolved Oxygen Dynamics in Baffin Bay
[1]Hongjie Wang*, [1]Xinping Hu, [2]Michael Wetz, and [2]Kenneth Hayes; [1]Department of Physical and Environmental Sciences, Texas A&M University - Corpus Christi; [2]Department of Life Sciences, Texas A&M University - Corpus Christi (*Student presentation*)

In order to evaluate the contributions of different sources and sinks that control dissolved oxygen (DO) dynamics and evaluate effects of environmental changes in Baffin Bay, we built a

DO budget model based on one years' worth of field data. Model parameters included water column photosynthesis, respiration, surface aeration, vertical turbulence, and benthic oxygen consumption. Field data showed that DO was lower in bottom water than surface water during warmer months and reached hypoxia threshold (DO<2 mg/L) in June 2015. The DO model could predict the water column DO at uncertainty less than ±0.7 mg/L. Based on the DO model, we found that both photosynthesis and respiration were highly dependent on Chl *a* level in the water column. Overall, the DO level would increase by 1.3~1.5 mg/L when Chl *a* level was twice as high as the present state (~14 μg/L). However, the bottom layer was very sensitive to the vertical turbulent diffusion, which was a function of stratification between surface and bottom layers. For example, the bottom DO would further decrease 1 mg/L when the surface water temperature increased by only 0.5 °C based on the present level. These findings provide fundamental information to understand low oxygen formation and oxygen dynamics under anthropogenic and natural forcing in Baffin Bay.

Bioavailability and molecular structure of dissolved organic nitrogen (DON) in five south Texas rivers

[1]Kaijun Lu*, [1,2]Kai Wu, and [1]Zhanfei Liu; [1]The University of Texas Marine Science Institute; [2]State Key Laboratory of Marine Environmental Science, Xiamen University (*Student presentation*)

As an important subset of the dissolved organic matter (DOM) pool, dissolved organic nitrogen (DON) remains elusive due to its chemical complexity and technical limitation in molecular level characterization. In this study, seasonal variations of bioavailability of DON, together with its molecular structural information, were investigated in five South Texas rivers. DON bioavailability was examined through microcosm incubation experiments in winter (January) and summer (July). The results showed that bioavailable DON (BDON) ranged from 9.3% to 19.3% and 14.6% to 38.0% in summer and winter respectively, with the highest percentage of BDON observed in the Aransas River sample in winter. Statistical analysis further showed that phosphate concentration, total dissolved amino acids (TDAA)-C/ dissolved organic carbon (DOC) ratio, and TDAA-N/DON ratio are positively correlated with BDON. The seasonal variations of BDON indicate that riverine DON is more labile in winter than in summer, probably related to the less degradation of DON during the inflow in winter. Molecular level information of DON was obtained using Ion Mobility Quadrupole Time Of Flight (Q-TOF) Liquid Chromatography Mass Spectrometry (IM QTOF LC/MS). The LC/MS data showed that natural DOM from Aransas River generally has smaller 3D configuration compared with standard biomolecules, indicating the higher degradation state of DOM in environment. Also, numerous isomers were identified for a given molecular formula, as the first study of this kind. More LC/MS data during the incubation will be presented.

Tidal Freshwater Zones as Hotspots for Biogeochemical Cycling: Sediment Organic Matter and Oxygen Consumption in the Lower Reach of Mission and Aransas Rivers

[1]Xin Xu*, [1]Hengchen Wei, [2]Grayson Barker, [1]Kylie Holt, [3]Tricia Light, [4]Sierra Melton, [5]Ana Salamanca, [6]Kevan Moffett, [1]James McClelland, and [1]Amber Hardison; [1]University of Texas Marine Science Institute; [2]Appalachian State University; [3]Scripps College; [4]Colorado College; [5]Texas A&M University - Corpus Christi; [6]Washington State University Vancouver (*Student presentation*)

The tidal freshwater zone (TFZ) is the segment of a lowland river before it reaches the estuary, where the river flow slows down under tidal influence but salt water does not intrude. While TFZs have long water residence time which can lead to distinct biogeochemical processes, little is known regarding how TFZs transform nutrient and organic matter input from land to estuarine ecosystems. To characterize organic matter transformation in TFZs, especially at the sediment-water interface, shallow sediment cores were collected from the Mission and Aransas rivers out of and within the TFZs over multiple seasons and years, and analyzed for porosity, organic matter content, and oxygen microprofiles. Relationships between sediment physical characteristics and organic matter remineralization were consistent across both rivers, with sediment organic matter content and oxygen consumption rate strongly correlated with sediment porosity. Average sediment porosity, oxygen consumption rate, and organic matter were higher within the TFZs than at locations upstream of the TFZs. Overall, sediments in the Mission River TFZ are finer, more porous, and more organic-rich than sediments in the Aransas River TFZ, while sediment organic matter in the Aransas River has lower C:N ratio. Sediment organic matter in the Aransas River TFZ was more labile, indicating more contribution of algal material, probably because of higher nutrient loading from agricultural land in the Aransas River watershed. Our findings suggest that sediments in TFZs may be hotspots for biogeochemical cycling within river networks, and play an important role in modifying nutrient fluxes from watersheds to estuaries.

Spatial and temporal variations of N concentrations and the composition of the N pool in the tidal freshwater zone of two coastal rivers in South Texas

Hengchen Wei*, Xin Xu, Amber Hardison, and James McClelland; The University of Texas Marine Science Institute (*Student presentation*)

River-supplied nitrogen (N) is recognized as a major driver of coastal eutrophication world-wide, yet estimates of N inputs from rivers to estuaries generally do not account for biogeochemical processing in tidal freshwater zones (TFZs) that may significantly modify amounts and forms of N that are delivered to estuaries. In this research, we studied the potential role of TFZs as hotspots for N losses and transformations by measuring concentrations and forms of N in waters above (non-tidal) and within the TFZs of the Mission River (MR) and Aransas (AR) River. Sampling was conducted during two winters and two summers. Dissolved inorganic nitrogen (DIN) and particulate organic nitrogen (PON) concentrations were higher in winter than summer in both rivers, whereas PON:DIN ratios were lower in winter than summer. During both seasons, PON concentrations increased from non-tidal to TFZ stations. These increases in PON were accompanied by large decreases in DIN between non-tidal and TFZ stations in the AR, but not in the MR. The difference in observed DIN responses (i.e., change between non-tidal and TFZ stations) between the two rivers is likely related to the higher DIN concentrations in the non-tidal waters of AR than MR. Our results support the idea that TFZs are important sites for N transformations between rivers and estuaries.

Spatial and seasonal patterns of total dissolved amino acids in Lavaca and San Antonio Bays, Texas

[1]Jianhong Xue*, [1]Kai Wu, [2]Mike Wetz, and [1]Zhanfei Liu; [1]The University of Texas Marine Science Institute; [2]Department of Life Sciences, Texas A&M University- Corpus Christi

Total dissolved amino acids (TDAA) are one of the most labile fractions, but also a major component, of dissolved organic matter in estuarine and marine environments. Knowing their concentration and composition can help evaluate production and cycling of organic matter in bays and estuaries. We investigated the spatial and seasonal patterns of TDAA in surface waters of Lavaca and San Antonio Bays from October 2015 to July 2016. Large seasonal, but not spatial, variances of TDAA were observed in San Antonio Bay with concentrations highest in January. Within each season, concentrations of TDAA (1.9-11.2 μM) were negatively correlated with salinities (i.e., low at inner bay & high at outer bay), indicating the importance of physical mixing. In Lavaca Bay, however, TDAA concentrations (1.7-7.3 μM) were higher at inter mediate salinity zone (12-20 psu), indicating the importance of biological production in the bay. Principal Component Analysis of TDAA shows that surface waters collected in both bays in January 2016 were enriched in GLY and SER, which were depleted in April and July 2016.

Imaging Colonization, Growth and Change in the Epiphyte Communities of Seagrasses

[1]Kirk Cammarata*, [1]Whitney Roberson, [2]Susan Shanks, [1]Amie Cuvelier, Meherube [3]Mehrebeoglu, [2]James Simons, [1,2]Paul Zimba, [1]Melissa Fisher, and [1]Ariana Kavandi; [1]Department of Life Sciences, Texas A&M University-Corpus Christi; [2]Center for Coastal Studies, Texas A&M University-Corpus Christi; [3]Department of Engineering, Texas A&M University-Corpus Christi

Seagrass provision of critical food and habitat is challenged by anthropogenic stressors which limit light, enhance eutrophication or alter hydrology. Seagrass interactions with the environment are mediated by poorly understood biofilms of epiphytic algae, fungi, bacteria and invertebrates. Our goal is to characterize stressor-driven variation in the accumulation patterns of epiphyte biofilms on seagrasses. The underlying hypothesis is that environmental change impacting the epiphyte community will manifest as alterations in light availability, gas exchange or chemical signals impacting the seagrass host. We studied accumulation levels and patterns of algal epiphytes in several studies using visible, fluorescence and hyperspectral imaging, as well as traditional biomass measures and pigment analyses. The relationships among these community indicators were compared across different sites and through manipulative experiments altering water column nutrients or epiphyte grazing pressure. Fluorescence-quantified epiphyte levels correlated with epiphyte biomass to varying degrees, which we interpret as higher correlations observed for samples with similar algal communities, and lower correlations observed for samples with dissimilar algal communities. Fluorescence characteristics (ratios) provided evidence of algal community change. Comparisons of 3 sites in Redfish Bay, TX yielded similar ordination of epiphyte levels estimated by biomass, fluorescence and hyperspectral imaging, and diatom pigment levels. Both nutrient-dosing of the water column and reduction of amphipod and shrimp grazers of epiphytes significantly increased epiphyte loading. Future work will include calibration of image analysis through morphological and molecular identification. Support: TGLO, TPWD, USDA, TAMU-CC

INVITED SPEAKER

Imaging FlowCytobot provides novel insights on phytoplankton community dynamics
Lisa Campbell; Departments of Oceanography and Biology, Texas A&M University

The Imaging FlowCytobot (IFCB) combines flow cytometry and video technology to capture images of individual cells which, together with machine-learning technology, enables near real-time reporting of individual phytoplankton species abundance and community composition. Sustained operation of the IFCB at the Texas Observatory for Algal Succession Time series (TOAST) site has shown Port Aransas to be an effective "hot spot" for harmful algal bloom detection. Since 2007, IFCB has provided successful early warning for eight harmful algal bloom events. In addition, the data have been used in models to identify HAB sources and to forecast HAB occurrences. Observations of novel interactions among the plankton (e.g., parasites, symbionts, life cycle stages) are recorded by this decade-long time series at TOAST and furnish new insights on the dynamics of the phytoplankton community.

HABITATS AND ECOSYSTEMS

Long-term monitoring of the Mission-Aransas Estuary: Effects of pulsed freshwater inflows on planktonic ecosystems
Edward J. Buskey*, Cammie J. Hyatt, and Lindsay P. Scheef; Mission-Aransas National Estuarine Research Reserve at the University of Texas Marine Science Institute

The Mission-Aransas Estuary is in an arid region of South Texas with limited rainfall. During periods of extended drought the upper reaches of the estuary become hypersaline. The low freshwater inflows can be replaced with large pulses due to occasional storm events that can deliver up to 50% of annual nutrient inputs. Over the past 9 years, water quality data have been collected at 15 minute intervals, and nutrient, phytoplankton, and zooplankton samples have been collected monthly at 5 locations throughout the estuary. These data reveal the impacts of extended periods of drought punctuated by major inflows of freshwater to the estuary on phytoplankton biomass, zooplankton abundance, and community composition. Phytoplankton biomass is positively correlated with inorganic nitrogen, water temperature, and wind speed. Periods of high freshwater inflow and lower salinities as well as periods of extended drought and hypersalinity are characterized by dominance of a single species of copepod, *Acartia tonsa*, while periods of normal inflow and moderate salinities result in higher diversity of zooplankton. To determine the effects of specific environmental conditions on the abundance of dominant zooplankton groups, multiple regressions were applied to the time series of environmental and plankton data. Prior to analysis, environmental data were averaged over various time intervals preceding the zooplankton sampling dates to determine whether there were delayed population responses to changes in environmental variables. Salinity had the highest regression coefficient values for major zooplankton groups at various time lags up to 56 days prior to zooplankton sampling.

Effect of freshwater inflow on oyster habitat suitability change in Texas bays

[1]Evan L. Turner*, [2]Kelley Savage, [3]Joe Trungale, [2]Terry A. Palmer, and [2]Paul A. Montagna; [1]Texas Water Development Board; [2] Harte Research Institute for Gulf of Mexico Studies at Texas A&M University- Corpus Christi; [3]Trungale Engineering and Science

Freshwater inflow is critically important for foundational estuarine invertebrate species such as the Eastern Oyster, *Crassostrea virginica*. This empirical study tests the viability of the proactive management strategy of the release of supplementary freshwater inflow into two Texas bays to increase oyster health. An oyster habitat suitability index was created through regression analyses to test the effect of altered inflows. We demonstrate the inflow requirement to lower salinities from base marine (35 PSU) conditions to polyhaline (25 PSU) conditions is possible within human release activities if directed in Tres Palacios Bay and Caranacahua Bay, Texas. Even small inflow supplements such as 5,000 acre-ft of additional freshwater added during the summer months can enhance oyster health. This health improvement is due to lowering the risk of the oyster parasite *Perkinsus marinus* (Dermo) prevalence by decreasing salinities to between 20 and 25 PSU.

First record of *Cucurbitula*, a curious and unusual bivalve, from Padre Island National Seashore, Texas

Fabio Moretzsohn; Department of Life Sciences, Texas A&M University-Corpus Christi

In December 2016, a volunteer at Padre Island National Seashore (PINS), Ms. Marion McNabb, found an empty giant cockle valve, *Dinocardim robustum*, with a strange structure attached to it. The shell had several holes on the exterior side, and nine “igloos” or crypts on the interior, with seven still intact. The specimen was kindly donated for study. It turns out to be an unusual but well-known boring clam in the family Gastrochaenidae, genus *Cucurbitula*. Although it was first described in 1783, this clam is seldom reported in the literature. It is often overlooked by biologists and shell collectors, despite it being easily recognized by the curious crypts it builds as the animal grows. Apparently, this is the first record of the genus in the Western Atlantic. Three living and a few fossil species are currently recognized in the Mediterranean, southern Australia and Japan. After carefully opening one of the crypts, a pair of small, thin valves of the boring clam was found, along with sand, suggesting the clam had long been dead when the cockle was found. *Cucurbitula* shells and boreholes resemble those of other gastrochaenids; however, *Cucurbitula* seems to choose relatively thin clam or gastropod shells as substrate, and build crypts with agglutinated sand, lined with calcium carbonate, instead of the similarly shaped chambers bored into coral or limestone. The ongoing study is needed to confirm this discovery represents a large geographical extension or perhaps a species new to science.

Cataloguing Texas Estuarine Species Interactions for Coastal Managers, Scientists, and Educators

[1]James Simons*, [1]Theresa Mitchell, and [2]Jorrit Poelen; [1]Center for Coastal Studies, Texas A&M University-Corpus Christi; [2]Independent Software Developer, Oakland, CA

Data on interactions between species is vital to understand how ecosystems function. Species interaction data are key components of some fisheries models and knowledge of these interactions can play a role in management of spills, or in response to natural disasters. But access to such data can be difficult at best. While general texts, reports and literature give

summaries of these interactions, usually it is not precise. The solution is a publically accessible, online database from which all recorded species interactions can be easily queried, reviewed, and downloaded. The Gulf of Mexico Species Interaction (GoMexSI) database and webpage (an application of GloBI), is cataloguing all published and unpublished species interactions for the Gulf of Mexico. Currently, GoMexSI has 89,034 species interactions (predator/prey) online. These are from the entire Gulf ecosystem, and have been extracted from 136 (17%) of approximately 800 fish trophic data references. For Texas, we have extracted data from 40 (58%) of 69 fish references. We also have trophic data references for five marine mammals (14 refs); 14 sea and shore birds (22 refs); four sea turtles (15 refs); 11 arthropods (10 refs), 1 mollusk (2 refs), and one echinoderm (1 ref), for a total of 108 diet references for Texas fauna. We are completing entry of species interaction data into GoMexSI for all taxa for which we have data for Texas estuarine waters, which will make Texas the first region in the Gulf to have all available species interaction (predator/prey) data entered into GoMexSI.

Side Scan and Parametric Sonar Mapping of a Shallow Seagrass Habitat and Associated Organic Carbon

Austin Greene*, Abdullah Rahman, and Richard Kline; University of Texas, Rio Grande Valley (*Student presentation*)

Seagrass meadows are widely recognized as a significant carbon sink, having been widely studied using a range of techniques. Despite their value, seagrass habitats are in global decline. Conservation efforts require efficient, accurate mapping techniques capable of covering large areas including shallow regions (depth < 2 m) typically underrepresented in the literature. This work presents two advancements for the remote study of seagrass habitat metrics: an inexpensive side scan array capable of collecting high-resolution imagery in less than 1 m of water, and the results of a study investigating measurement of soil carbon content using low-frequency parametric sonar. A side scan array constructed from consumer grade components is shown a having high utility in extremely shallow environments at a cost of less than 2,000 USD. Parametric sonar is demonstrated as capable of detecting multiple sediment layers beneath a seagrass ecosystem, and this data is used to estimate organic carbon content for a large study site by exploiting the patchy distribution of seagrass meadows.

Ecological indicators for assessing seagrass ecosystem condition in the Gulf of Mexico

Victoria M. Congdon* and Kenneth H. Dunton; The University of Texas Marine Science Institute (*Student presentation*)

Seagrasses are “coastal barometers” and frequently used to assess ecosystem health and condition. Monitoring programs worldwide measure a suite of seagrass indicators because they are effective water quality integrators. Robust indicators and metrics have a direct relationship between environmental and anthropogenic drivers, and ecosystem response and function. This study aims to model the most important ecological and human processes influencing seagrass ecosystems for the Gulf of Mexico, and identify the measures used to assess ecosystem status. We developed a conceptual ecological model (CEM) describing the most suitable, affordable, and functional indicators and metrics for seagrass ecosystems in the Gulf of Mexico. We identified ten indicators and eleven metrics commonly collected and measured by 39 monitoring programs across the Gulf Coast. We formulated a set of metric ratings and assessment points unique to an individual metric, which are used to evaluate ecosystem condition across multiple

spatial and temporal scales. The CEM serves as a tool to assist resource managers by connecting physical and biotic parameters, and ecosystem function and structure to major climatic and anthropogenic drivers. The metric ratings and assessment points provide a way to derive ecosystem condition scores at the bay or basin scale. The scores are easily reported using a red-yellow-green scheme that summarizes and relays information in an accessible format for resource managers, stakeholders and policy-makers. Moreover, the metric ratings and assessment points are widely applicable and provide a comprehensive assessment of the status and trends of seagrass habitats across the entire Gulf of Mexico that are economically feasible across large spatial scales.

Multi-Scale Voxel Segmentation for Terrestrial Lidar Data within Marshes

[1]Chuyen T Nguyen*, [1,2]Michael J Starek, [2]Philippe Tissot, [3]Jim Gibeaut; [1]College of Science and Engineering, Texas A&M University-Corpus Christi; [2]Conrad Blucher Institute for Surveying and Science, Texas A&M University-Corpus Christi; [3]Harte Research Institute for Gulf of Mexico Studies, Texas A&M University-Corpus Christi (*Student presentation*)

The resilience of marshes to a rising sea is dependent on their elevation response. Terrestrial laser scanning (TLS) is a detailed topographic approach for accurate, dense surface measurement with high potential for monitoring of marsh surface elevation response. The dense point cloud provides a 3D representation of the surface, which includes both terrain and non-terrain objects. Extraction of topographic information requires filtering of the data into like-groups or classes, therefore, methods must be incorporated to identify structure in the data prior to creation of an end product. A voxel representation of three-dimensional space provides quantitative visualization and analysis for pattern recognition. The objectives of this study are threefold: 1) apply a multi-scale voxel approach to effectively extract geometric features from the TLS point cloud data, 2) investigate the utility of K-means and Self Organizing Map (SOM) clustering algorithms for segmentation, and 3) utilize a variety of validity indices to measure the quality of the result. TLS data were collected at a marsh site along the central Texas Gulf Coast using a Riegl VZ 400 TLS. Octree segmentation is applied to create a tree data structure of voxels containing the points. The features extracted from the voxelization are then used as input for clustering of the points using the K-means and SOM clustering algorithms. Results for different combinations of the feature space vector and differences between K-means and SOM clustering will be presented. The developed method provides a novel approach for compressing TLS scene complexity in marshes, such as for vegetation biomass studies or erosion monitoring.

Low-profile goes the extra mile: The importance of including low-profile patch reefs into artificial reef design

D. Alex Alder* and Richard Kline; School of Earth, Environmental, and Marine Sciences, University of Texas Rio Grande Valley (*Student presentation*)

A wide range of materials have been utilized to construct artificial reefs in the Gulf of Mexico (GOM). While these artificial reef placements have been found to enhance habitat for a large diversity of reef-associated species, juvenile habitat required by some important reef species is lacking. Currently, reef materials and configurations are being explored with the aim of providing the optimal amount of low-profile nursery habitat needed by reef-associated species. To understand how low-profile artificial reef patch size affects juvenile recruitment, eight

concrete block arrays were deployed and arranged around the culvert reef site PS-1047, nearshore to Port Mansfield, TX, at a depth of 21 m. Each array contained replicates of 1, 2, 4, and 16 blocks with 0.08, 0.16, 0.32, and 1.32 m^2 surface area, respectively. Initial visual surveys were completed by divers at 6, and 8 months post-deployment. Juvenile fish recruited to all replicates with a maximum number of fish-per-block observed at the 0.32 m^2 patches, suggesting that an intermediate patch size is optimal. Low-profile patch reefs may provide habitat-limited juvenile reef fish in the northwestern GOM critical refugia during the early stages of development, when mortality rate is high. When low-profile patch reefs are used in combination with larger materials within a reefing area, a range of habitats complimentary to those seen in natural systems can be provided.

FISH AND FISHERIES

The novel membrane androgen receptor ZIP9 mediates pro- and anti-apoptotic responses in an ovarian follicle size-dependent manner in Atlantic croaker granulosa cells

Aubrey Converse* and Peter Thomas; The University of Texas Marine Science Institute (*Student presentation*)

Nongenomic steroid actions have been reported for all of the major classes of sex steroids, which has prompted the discovery and research on novel membrane steroid receptors unrelated to members of the nuclear steroid receptor superfamily. While membrane progesterone and estrogen receptors were characterized over a decade ago, our research group recently cloned and characterized the androgen membrane receptor ZIP9 from Atlantic croaker ovarian tissue. ZIP9 mediates an apoptotic pathway in croaker ovarian granulosa cells collected from fish at the peak of their reproductive season. Interestingly, granulosa cells isolated from croaker with regressing ovaries respond to testosterone in an antiapoptotic fashion, which prompted us to question which androgen receptor mediates this response. By isolating granulosa cells from ovarian follicles under 300 µm in diameter, we have found that this antiapoptotic response is abrogated when the cells are transfected with small interfering RNA targeting ZIP9, thus indicating that ZIP9 mediates this response. Granulosa cells isolated from follicles over 400 µm in diameter show the ZIP9-mediated apoptotic response that was originally observed in reproductively mature fish. Our results demonstrate that ZIP9 can mediate opposite physiological responses in an ovarian follicles size-dependent manner even within a single fish. ZIP9 has also been shown to mediate androgen-induced apoptosis in a number of human cancer cell lines. Thus, it is of interest to determine the means by which ZIP9 can switch its apoptotic response in croaker granulosa cells in order to better understand the potential mechanisms of the receptor in other models.

Investigating Environmental Contamination in the Lower Laguna Madre through CYP1A Expression in Pinfish (*Lagodon rhomoides*) Liver and Microplastic Content

[1]Stephanie DuBois*, [2]Abdullah Faiz Rahman, and [1,2]Md Saydur Rahman; [1]Department of Biology, University of Texas Rio Grande Valley; [2]School of Earth, Environmental, and Marine Sciences, University of Texas Rio Grande Valley (*Student presentation*)

Marine debris are man-made, solid materials that enter the sea directly through littering or indirectly via rivers, estuaries and coastal waters. Debris slowly degrade into smaller pieces

known as microplastics that adversely impact the health of aquatic organisms. Cytochrome P450 1A (CYP1A) is a monooxygenase enzyme used as a toxicological biomarker for environmental contaminants in tetrapod and teleost fishes. When environmental contaminants are present, CYP1A is highly expressed and appears as strong signals in the liver, a vital organ in vertebrates for xenobiotic metabolism. Pinfish (*Lagodon rhomboides*) is an abundant saltwater species found in the Atlantic coast and Gulf of Mexico. In our study, pinfish were collected by angling from five sampling sites in the Lower Laguna Madre. Fish liver and stomach were collected and preserved in paraformaldehyde for analysis. Three fish were also kept in the laboratory aquariums for three months to serve as control before their liver and stomach were removed. Stomach and intestines were examined under microscope for presence of microplastics. CYP1A expression was determined by immunohistochemical analysis to compare the environmental contaminant level in pinfish liver tissues. Microplastics were not found in stomach or intestines of pinfish collected from Lower Laguna Madre. Higher signals of hepatic CYP1A were observed in pinfish collected from Lower Laguna Madre compared to fish in laboratory condition. Our results suggest that other environmental pollutants, not microplastics, present in the Lower Laguna Madre, are impacting the health of marine organisms as seen in high expression of CYP1A in pinfish liver.

Dietary DHA influences DHA amounts in southern flounder eggs throughout spawning season

Corinne Burns* and Lee Fuiman; The University of Texas Marine Science Institute (*Student presentation*)

Embryos and early larvae rely on maternally derived docosahexaenoic acid (DHA, 22:6 (n-3), an essential fatty acid, in the yolk to meet their nutritional requirements. The amount of DHA a female deposits into her eggs can change due to variations in maternal diet but the timeframe varies among species. This study aimed to determine whether changes in DHA content of the maternal diet of southern flounder, *Paralicthys lethostigma*, alters the DHA composition of their initial spawns. Six broodstock tanks were divided into 3 dietary groups: high DHA (19.9% DHA), low DHA (10.4% DHA), and control DHA (15.2% DHA). One female from each tank was hormonally induced to spawn each week. Eggs were analyzed using gas chromatography for fatty acid composition. In 2016, DHA content of eggs increased over time for the high DHA and control treatments. There was no effect of diet in the low DHA treatment. In 2017, DHA content changed over time in both the high DHA and low DHA treatments, with egg composition increasing and decreasing in DHA, respectively. Differences between years may be due to differences in time that broodstock were held on the control diet prior to the diet change (2016 - 3 months, 2017 - 7 months). These results suggest that the amount of DHA in southern flounder eggs may change depending on how long females feed offshore before spawning. Early results show that DHA content of the egg may later influence offspring quality and survival in southern flounder larvae.

Spatial Distribution of Spotted Seatrout Spawning Sites within a South Texas Estuary

[1]Christopher Biggs*, [1]Erin Reed, [2]Sue Lowerre-Barbieri, [2]Sarah Walters, [2]Joel Bickford, and [1]Brad Erisman; [1]The University of Texas Marine Science Institute; [2]Florida Fish and Wildlife Conservation Commission, Fish and Wildlife Research Institute, St. Petersburg (*Student presentation*)

Spotted seatrout (*Cynoscion nebulosus*) are among the most sought after fish by recreational anglers throughout the Gulf of Mexico. While information exists on the spawning season and reproductive biology for seatrout, little is known about the distribution of spawning aggregations in Texas. We lack knowledge about how spawning activity or fish abundances coincide with specific habitats (e.g. seagrass beds, oyster reefs, structures, navigation channels) or how they vary with changes in environmental conditions (e.g. salinity, temperature, depth). Male Seatrout produce unique courtship sounds during spawning, which can be used to identify spawning sites. We used a mobile hydrophone and a stratified random sampling design to identify seatrout spawning sites within the Mission-Aransas National Estuarine Research Reserve and Corpus Christi Bay May-August 2016. We observed large spawning aggregations at 176 of the 378 stations sampled. The distribution of spawning sites among habitat types (seagrass, mud/sand, channel, reef/structure) was proportional to those sampled. Average distance between large aggregations was 2.54 ± 0.61 (SEM) km. Although there were not differences in temperature at spawning and non-spawning sites, salinity was greater at large aggregation sites than non-spawning sites. This information will assist in the successful management of the fishery and can help to identify and preserve the most productive areas of the estuary. Also, the methods and technology utilized in this project may be applied to many other recreationally important species within the Gulf of Mexico such as Black Drum, Red Drum, and Atlantic Croaker.

Spatio-temporal Trends of Alligator Gar *Atractosteus spatula* in Texas's Bays and Estuaries

Evan Pettis; Texas Parks and Wildlife Department - Coastal Fisheries Division

Though historically considered a nuisance species, there is now a growing recreational fishery for the euryhaline alligator gar *Atractosteus spatula* in the rivers and lakes of Texas. Until recently, fisheries managers have devoted little research to the ecology and life history of this species, particularly regarding their use of brackish and saline habitats. The Texas Parks and Wildlife Coastal Fisheries Division routinely encounters alligator gar during their gill net sampling and creel survey programs in environments with salinities as high as 55 ppt. For this study, we analyzed thirty years of fishery independent and fishery dependent data to assess the spatio-temporal trends of gar abundance within Texas's bays and estuaries. As expected, we detected significant changes of abundance in response to fluctuating salinities driven by periods of drought and decreased freshwater inflows. The strength of these patterns varied across both the large-scale extents of entire bay systems and smaller-scale extents based on proximity to sources of freshwater inflow. The results of this study, in addition to other studies conducted on freshwater habitat use and seasonal movement of gar, can be utilized to help assess Texas's alligator gar populations and evaluate potential strategies for management.

Determining Effective Release Methods for Reducing Discard Mortality in the Gulf of Mexico Red Snapper Recreational Fishery

Alex K. Tompkins*, Judson M. Curtis, and Greg W. Stunz; Harte Research Institute for Gulf of Mexico Studies at Texas A&M University-Corpus Christi (*Student presentation*)

Discard mortality in Red Snapper (*Lutjanus campechanus*) may be one impediment towards a rapid stock recovery for this economically important Gulf of Mexico fishery. Red Snapper are highly susceptible to pressure-related injuries (i.e., barotrauma) that compromise survival after catch-and-release. Barotrauma intensity and subsequent mortality is affected by many variables, with the most important being capture depth. To determine the relationship between capture depth, barotrauma impairment intensity, and post-release survival, we tagged Red Snapper with ultrasonic acoustic transmitters to estimate catch-and-release mortality. Approximately 270 fish were released at five incremental depths ranging from 30 to 80 m, and of those 270, 14 were tagged at each depth. The number of visible barotrauma symptoms was recorded and converted into an impairment score to compare with survival. Twenty Red Snapper from each depth treatment were released at 1/3 depth, 2/3 depth, or the bottom using two different rapid recompression devices, the SeaQualizer™ and the Blacktip Catch & Release Recompression Tool™. GoPro cameras were used to observe release behavior and predict survival rates. Estimates from this study can be integrated into stock assessment models to achieve better calculations of overall mortality and inform managers on effective release methods to maximize survival in discarded Red Snapper.

Relationships between climate, growth, and fisheries production in a commercially exploited marine fish from the Gulf of California

[1]Erin Reed*, [1]Bryan Black, [2]Martha J. Román, [3]Ismael Mascareñas, [4]Catalina Lopez-Sagastegui, [5]Octavio Aburto-Oropeza, [6]Kirsten Rowell, and [1]Brad Erisman; [1]The University of Texas Marine Science Institute; [2]Comisión de Ecología y Desarrollo Sustentable del Estado de Sonora, Sonora C.P., Mexico; [3]Centro para la Biodiversidad Marina y la Conservacíon, La Paz, Mexico; [4]UC MEXUS, University of California Riverside; [5]Scripps Institution of Oceanography, University of California San Diego; [6]University of Colorado Boulder (*Student presentation*)

Climate variability can affect fish populations and fisheries production in numerous ways, including inducing measurable fluctuations in fish growth, condition, and fisheries production. Unfortunately, linkages between and mechanisms driving climate, fish populations, and fisheries is poorly understood for most exploited species, which hinders effective management. The purpose of this study was to use the Gulf Corvina (*Cynoscion othonopterus*), a heavily exploited marine fish in the Gulf of California, Mexico, as a model to investigate the relationship between El Niño Southern Oscillation (ENSO), sea surface temperature (SST) and river flow compared with three parameters: adult condition, growth rate, and fisheries production. Fish condition was assessed using annual variations in length to weight ratios in relation to all variables using an exponential model. Fish growth rate was measured using otolith chronologies for adult and juvenile growth. Lastly, annual catch data was compared for relationships between climate and fisheries production. Results indicate that adult condition and juvenile growth rate are enhanced during El Niño conditions. Additionally, climatic conditions and SST during the birth year showed a positive relationship with fisheries production at the peak age of capture five years later. A positive relationship between river flow and growth rate

in juveniles and adults was also found. Our results suggest that relationships between these factors can be used in a predictive manner to adjust harvest limits based on climate variability.

Managing commercial harvest of Eastern Oysters (*Crassostrea virginica*) in Texas - Applying a 2-metric traffic light approach in Copano Bay, Texas

Cindy Kelly*, Christopher Mace, Evan Pettis, Stephen Hale, Austin Orr, Luis Uballe, and Moises Hinojosa; Texas Parks and Wildlife Department – Coastal Fisheries Division

In 2012, the Texas Parks and Wildlife Department (TPWD) and the commercial oyster industry formed a cooperative workgroup to develop guidelines and sampling protocols to determine if public oyster reefs were being overworked during the commercial oyster harvest season. The relative percentage of undersized oysters was evaluated, and determined to be limited in functionality. Subsequently, market oyster catch rates were combined with percent undersized oysters in a "traffic light" three tiered approach to evaluate whether or not an area could support commercial oyster harvest. During 2014, extensive sampling of oyster reefs in Copano Bay, Texas was initiated after TPWD received reports of high percentages of illegal undersized oysters in sacks of commercially harvested oysters. Based on results from this sampling, Copano Bay was closed to oyster harvest in April, 2014, and remained closed for an extended period. Despite the closure, continued sampling of Copano Bay did not show the mean percentage of undersized oysters was improving as expected. Between April, 2014 and January, 2016 the percentage of undersized oysters increased from 70.2% to 74.0%. These results caused biologists and oyster industry workgroup members to question the effectiveness of managing by this single metric. We hypothesized the high spat recruitment from the summer of 2014, and subsequent recruitment of these juvenile oysters into the 26-50mm and 51-76mm categories, was driving the increase in the percentage of undersized oysters. However, since sampling during January, 2016 showed market oyster catch rates in the "good" threshold level at 1277/h, Copano Bay re-opened to oyster harvest in February, 2016 despite the high number of undersized oysters. This allowed commercial oyster boats to harvest an estimated 60,720 sacks during 33 days, with an ex-vessel value of over $2.17M. Consequently, we believe applying the traffic light approach with two metrics allows for improved management of the oyster fishery in Texas.

Fishful of Dollars: Seafood & Fishing Economics

[1]Rebekka Dudensing, Ph.D. and [2]Rhonda Cummins*; [1]Community Economic Development, Texas A&M AgriLife Extension Service; [2]Calhoun County, Texas Sea Grant Extension

Much of the Texas coast is changing from a commercial fishing focus to a tournament and recreational fishing location. Fishing is big business and both types of fishers spend fistfuls of dollars, helping support businesses in coastal communities and beyond. Texas Sea Grant and the Texas AgriLife Extension Service recently completed an analysis of economics of seafood and fishing in Calhoun County. This presentation will review some changes in the coastal landscape and highlights from the study results.

Abstracts for Poster Presentations

Preliminary Results of a Survey for the Oyster Parasite *Bonamia* sp. in Texas Bay Systems
Hailey M. Boeck* and John Scarpa; Texas A&M University—Corpus Christi (*Student presentation*)

Texas Parks and Wildlife Department has been working on expanding the existing private oyster lease program and developing an Oyster Aquaculture Plan for Texas. Movement of oysters from one Texas bay system to another is restricted because of potential disease transfer and genetic differences in natural oyster stocks. Oyster diseases, such as Bonamiosis, which was found serendipitously in 2007 in Florida waters, have not been characterized in Texas bays. Therefore, the objective of this project is to examine American oysters, *Crassostrea virginica*, from different Texas bays for the presence of *Bonamia*. Thirty oysters were collected from five different bays during October-December 2016: Copano Bay, San Antonio Bay, Galveston Bay, Sabine Lake, and Matagorda Bay. Oysters were weighed and shell parameters (height, length, width) measured. Oysters ranged in shell height from 30.5 to 140.3 mm and were not significantly different in any shell height ($P=0.11$, mean = 72.5 ±0.1mm), total weight ($P=0.08$, mean = 76.6 ±0.1g), or meat content (% of total weight: $P=0.15$, mean = 0.089 ±0.01g) among the sampled bays. A small sample of tissue was taken for future PCR analysis for *Bonamia* sp. as well as a 5-10mm thick cross-section of the oyster meat for future histological evaluation. The project data will assist in guiding science-based policy for movement of oysters between Texas bay systems as well as potentially extending the known global range of *Bonamia*.

What are we really measuring? Considerations for individual growth modelling in an exploited marine fish
Derek Bolser*, Erin Reed, Mark Lopez, and Brad Erisman; The University of Texas Marine Science Institute (*Student presentation*)

The relationship between age and size has long been crucial to fisheries assessments. Typically, parameters from some form of the von Bertalanffy growth model play a large role in stock status determination in current stock assessments. Rooted in bioenergetics, the von Bertalanffy growth model is intended to provide a biologically-relevant representation of the relationship between age and size in the population being assessed. However, despite a foundation in biological relevance the model is not robust to external factors that influence growth and population structure. Furthermore, some growth models used instead of von Bertalanffy (e.g. Schnute 1981) are based more on statistical fit than biological relevance. Thus, sampling design and model fitting approach inherently influence model output. Taken at face value, growth patterns and parameter estimates influenced by such factors may be unrealistic, leading to inappropriate and potentially dangerous inferences about stock status. Here, we use the Gulf Corvina (*Cynoscion othonopterus*) as a model species to compare the performance of several individual growth models (von Bertalanffy, Gompertz, logistic, Schnute, and Schnute-Richards) in a highly-exploited species. Based on statistical fit alone, we found that the Schnute-Richards model describes our data best, but we pose that it may not accurately represent the relationship between age and size in Gulf Corvina. We discuss the influence of exploitation, sampling, model fitting approach, and biology on our results, and urge for more discretion in the model selection process beyond measures of statistical fit.

Long-Term Water Quality Trends in Texas Estuaries: Relationships with Climatic Variability and Watershed Land Use Change

Kalman Bugica*, Blair Sterba-Boatwright, and Michael S. Wetz; Texas A&M University-Corpus Christi (*Student presentation*)

Estuaries are critical habitats for numerous bird, fish, and shellfish species, and play a major role in the economy of coastal communities. Despite this, eutrophication, with accompanying water quality and habitat degradation, is becoming pervasive in many estuaries. Here we report findings from a study of long-term water quality trends across 77 estuarine sites along the Texas coast. Results show localized evidence of eutrophication (i.e., high pH, high organic matter and chlorophyll concentrations), primarily in Baffin Bay but also parts of the Upper and Lower Laguna Madre as well as Galveston Bay. Multidecadal seasonal increases in water temperature were observed for most systems, as were inter-annual changes in salinity that have previously been linked to the ENSO index. In the case of Baffin Bay and Galveston Bay, it appears as if chlorophyll has increased over the past several decades. Each location has a different suite of potential land use drivers of these trends, such as urbanization (Galveston Bay), agricultural and wastewater loadings (Baffin Bay), and agricultural runoff (Lower Laguna Madre). Future work will address the influence of these and other land use patterns. In addition, climate variability (i.e., ENSO) and longer-term trends in water temperature and salinity may also play a role and will be addressed.

Rising Above: Impacts of Coastal Policies with Respect to Sea Level Rise in Galveston Bay, Texas

Rachel Edwards*, James Gibeaut, Marissa Dotson, Mukesh Subedee, and Richard McLaughlin; Harte Research Institute for Gulf of Mexico Studies at Texas A&M University- Corpus Christi

Galveston Bay, Texas is at particular risk of sea level rise (SLR) induced hazards because of its unique geography and geology, including relatively high subsidence rates due to mineral and groundwater extractions. SLR is an exceptionally difficult public policy problem because shorelines have a dynamic nature while typically laws are static. This study examines the effects that different development strategies could have on landscape structure. Using the Sea Level Affecting Marshes Model (SLAMM), the possible effects of SLR under four development strategy scenarios and three SLR scenarios are examined in four regional subsites that each represents a different natural and built environment. The scenarios are (1) Armoring Removed which serves as a control and employs no shoreline protection, (2) Current Armored Shoreline which models the current situation regarding development and armoring, (3) Green Infrastructure which shows what may happen if living shorelines were used instead of armoring, and (4) All Armored which describes the armoring of the entire site. SLAMM predicted that Developed and Undeveloped Uplands were greatest under the AA scenario and that Marshes and Flats were greatest under the LS scenario. The predictions that armoring would protect uplands and LS would result in more marshes is expected given knowledge of how these strategies work. Action should be taken immediately to develop policies that foster resiliency and avoid the worst outcomes for both human and natural wetland communities in Galveston Bay. This work is part of a larger study on living with sea level rise along the Texas coast.

Investigating the effects of mangrove versus salt marsh on the foraging rates of higher order predators

Jenelle Estrada*, Tyler Loughran, and Lauren Yeager; The University of Texas Marine Science Institute (*Student presentation*)

Coastal wetlands are vital habitats that provide foraging areas for many species of juvenile and adult fishes and wetland-derived productivity often subsidies sub-tidal food webs. Consistent warm winters over the past 30 years in southern Texas have allowed for the expansion of the more tropical black mangrove (*Avicennia germinans*) into historically salt marsh (*Spartina alterniflora*) dominated wetlands. As the habitat structure varies between salt marsh grass and woody mangroves, the increase in mangrove abundance could alter predator-prey interactions within these wetlands. This study compared predation rates between black mangrove and Spartina habitat by tethering live shrimp along the edges of each habitat and quantifying the number eaten after a 16-h overnight trial. Preliminary results show no difference in predation among habitats with a 64% predation rate in Spartina and 62% in black mangrove. These results suggest that predators may be just as likely to feed along mangrove shorelines as Spartina marsh shorelines, indicating mangroves may still represent important foraging areas for higher-order predators. Future studies examining differences in prey communities and trophic links between these two habitats will provide further information on whether climate-driven mangrove expansion is altering estuarine food webs.

Dust and Soil Enrichment Effects on Phytoplankton Growth in Baffin Bay, TX

Kelsey Fisher* and Michael Wetz; Department of Life Sciences, Texas A&M University – Corpus Christi (*Student presentation*)

Land use coverage in the Baffin Bay watershed is >40% agricultural, and strong winds are common in the area. This suggests that Baffin Bay may at times receive inputs of dust blown off surrounding lands, especially during droughts, and may also receive soils that are washed off during rain events. In this study, we experimentally determined the effects of nutrients derived from dust and agricultural soils on phytoplankton growth and community composition in Baffin Bay. Results from the experimental microcosms showed that soil deposition treatments, as well as individual nitrate and ammonium additions stimulated phytoplankton growth during the fall and spring months. Changes were also observed in the phytoplankton community composition in response to the various treatments. These results suggest that nitrogen limits phytoplankton growth in Baffin Bay, and that nitrogen source and form may have a significant effect on phytoplankton community composition.

Characterization of a Membrane Androgen Receptor's Apoptotic Response in *Danio rerio* Ovarian Follicle Cells

Heather Genuise*, Aubrey Converse, and Peter Thomas; The University of Texas Marine Science Institute (*Student presentation*)

Apoptosis or programmed cell death plays an integral role in multiple physiological processes within vertebrates. The breakdown of postovulatory and unovulated follicles is essential in the health and fecundity of female fish and relies on the intricate signal transduction pathways of apoptosis. Therefore, characterization of apoptotic responses in the ovary is critical for understanding the reproductive physiology of female fish. Furthermore, the significance of

apoptosis in the ovary is emphasized in species that allocate energy towards the production of hundreds to thousands of eggs before spawning, such as many teleost fish. Ovarian follicles consist of oocytes surrounded by multiple layers of follicle cells that produce steroids such as testosterone. Previous studies found that testosterone activation of the membrane androgen receptor, ZIP9, induces apoptosis and intracellular zinc transport in Atlantic croaker ovarian follicle cells. In this study, we characterized the androgen-induced apoptotic response of ovarian follicle cells in the model organism zebrafish (*Danio rerio*). We found that testosterone treatment resulted in significantly higher amounts of apoptosis of zebrafish ovarian follicle cells compared to vehicle (ethanol). In addition, testosterone treated ovarian follicle cells demonstrated significantly higher levels of intracellular zinc, which is associated with ZIP9 activation. Consequently, our results show testosterone induces an apoptotic response in zebrafish ovarian follicle cells similar to as seen in the Atlantic croaker ZIP9-mediated model. Thus, ZIP9 mediation of ovarian cell apoptosis may be a shared mechanism of teleosts, and possibly higher vertebrates. Future studies will be able to build upon our research by developing ZIP9-knockout zebrafish.

Using Citizen Scientists to Collect Shark Data along the Texas Coast

[1]Kesley J. Gibson*, [1]Ashley B. Ferguson, [2]Matthew J. Ajemain, and [1]Gregory W. Stunz; [1]Center for Sportfish Science & Conservation, Harte Research Institute for Gulf of Mexico Studies, Texas A&M University-Corpus Christi; [2]Florida Atlantic University, Harbor Branch Oceanographic Institute (*Student presentation*)

Texas has been home to a large, land-based recreational shark fishery since the 1960s. Recently, the majority of anglers representing this fishery have transitioned from harvesting sharks to a catch-tag-release method. This unique set of circumstances has provided an opportunity to gather data for the entire Texas coast at a rather low cost and engaged a large number of anglers as citizen scientists. This tagging initiative began in 2008 and by the end of 2016, approximately 4,000 sharks had been tagged from shore by recreational anglers with over 80 sharks recaptured. For all years combined, Blacktips (*Carcharhinus limbatus*) and Bull sharks (*Carcharhinus leucas*) comprised about 77% of the reported catch (47% and 30%, respectively). Overall, more females were tagged than males (74.5% and 27.5%, respectively); however, this ratio differed among species. Additionally, these data revealed two primary shark fishing hotspots with 47.8% of tagged sharks off Padre Island National Seashore and 31% off Matagorda Island. The number of tagged sharks per year doubled in 2014 with the first annual Texas Shark Rodeo (TSR), which partnered with the Harte Research Institute recreational shark tagging initiative to tag and release sharks along the entire Texas coast. In the first six years (2008-2013) of this tagging initiative (pre-TSR), a combined 981 sharks were tagged, while tagged sharks increased to >800 sharks in 2014 alone, >1400 in 2015, and >800 sharks in 2016. Large-scale tagging initiatives, like this one, are greatly improved and almost impossible to accomplish without the help of local recreational anglers.

Assessing the ichthyoplanktonic food web and influence of microplastics in the Texas Coastal Bend

Polly Hajovsky*, Michelle Bromschwig, Sarah Tominack, Cristian Camacho, Daniel Hardin, and Simon Geist; Texas A&M University - Corpus Christi (*Student presentation*)

The availability of food in terms of quantity and quality is an important factor regulating survival of early life stages of fish, as it determines the rate of development of bodily function and somatic growth. Understanding food web interactions is thus an important component of determining essential fish habitat needs during the larval stage. Microplastic pollution and its negative consequences when entering the food web has come into focus of research in recent years, as the uptake of microplastic particles mistaken as food can lead to emaciation despite having a full stomach. Food web processes and the effects of microplastics on pre-settlement larval fish in the Texas Coastal Bend are not well known. This study seeks to evaluate the larval food web in the Corpus Christi Bay system in three aspects: by analyzing the gut contents of larval fish, determining zooplankton availability as prey items, and evaluating microplastic presence and possible incidences of ingestion, for which first results are presented. Sample sites are in the main body of the Corpus Christi Bay as well as the two inlets that serve it, namely Packery Channel and Port Aransas, as well as the Upper Laguna Madre and Cedar Bayou. Snapshot sampling episodes are conducted during the fall, winter, and spring spawning seasons of estuarine-dependent fish.

Shifting preferences among anglers between two recreationally important species along the Texas Coast

Jacob Harris*, Evan Pettis, and Brian Bartram; Texas Parks and Wildlife Department – Coastal Fisheries Division

The objective of this study was to show the shift in angler preference based on fisheries dependent and independent data by Texas Parks and Wildlife for two recreationally important species: the Spotted Seatrout (*Cynoscion nebulosus*) and the Black Drum (*Pogonias cromis*). Data was analyzed and collected from three different major bays along the Texas coast: San Antonio Bay, Aransas Bay, and Corpus Christi Bay. The data was gathered at harvest surveys between 1991 and May of 2016. Guided and non-guided trips were compared for harvest surveys. Gill net catch rates from these three bay systems from 1991 through 2015 were analyzed in order to determine if population trends are following the same patterns as the angling pressure. There was a shift in angling pressure from *C. nebulosus* to *P. cromis* over time. However, in 2014 there was a small shift in pressure from *P. cromis* to *C. nebulosus*. There was a clear indication that as the percentage of anglers targeting *P. cromis* increased, there were declines in the percentage of anglers targeting *C. nebulosus*. Examining guided trips, the data indicates that during several years guides caught more *P. cromis* than did recreational anglers. Resource data shows a general trend that as the angling pressure went up for *P. cromis*, there was a decline in our catch rates from the gill nets. This shift in angler preference could possibly be due to increased abundance of *C. nebulosus* while *P. cromis* abundance is decreasing.

Assessing periphyton dynamics: determining whole ecosystem metabolism in coastal saltwater ponds

Hayden Hays* and Jeffrey R. Wozniak; Department of Biological Sciences, Sam Houston State University (*Student presentation*)

The coastal salt marshes of Aransas National Wildlife Refuge (ANWR) are characterized by a highly heterogeneous landscape comprised of salt marshes, tidal creeks, and saltwater ponds. This heterogeneity is built upon subtle micro-topographical differences and is driven by hydrology, largely dictated by wind and lunar tides. The result is a dynamic landscape of saltwater ponds that are hydrologically connected, intermittently connected, or isolated from the estuarine waters of adjacent San Antonio Bay. Periphyton assemblages are located throughout this landscape and are found in many different forms including thick epipelic mats, sponge-like metaphyton, and thin epipsammic layers. This study will define the periphyton community composition and whole ecosystem metabolism in saltwater ponds occurring across the hydrological gradient at ANWR. Specifically, periphyton community composition will be determined through species identification and whole ecosystem metabolism will be calculated using both a biochemical oxygen demand (BOD) light-dark bottle technique and a whole ecosystem metabolism method using continuous, in situ, diel oxygen data. Periphyton community structure and function are key drivers of whole ecosystem metabolism in the ANWR salt marsh landscape - greatly affecting nutrient cycling rates, macrophyte productivity and higher trophic level interactions. Determining how periphyton dynamics vary across the ANWR landscape is a key step in understanding how hydrological connectivity affects the overall ecology of this unique coastal ecosystem.

Is Baffin Bay 'Eutrophic'?

[1]Kenneth C. Hayes*, [1]Michael S. Wetz, [2]Emily K. Cira, [2]Hongjie Wang, and [2]Xinping Hu; [1]College of Science & Engineering, Department of Life Sciences, Texas A&M University - Corpus Christi; [2]Department of Physical and Environmental Sciences, Texas A&M University - Corpus Christi (*Student presentation*)

Coastal Texas is one of the fastest growing regions in the United States, prompting concern for the potential effects of coastal development on estuarine health. Baffin Bay is a shallow (~1-2 m), long-residence time (>1 year) estuary that experiences persistent blooms of the brown tide organism, *Aureoumbra lagunensis*, episodic hypoxia and mortality of important fish and shellfish species. Using the classification schemes of the NOAA National Estuarine Eutrophication Assessment (NEEA), the 2010 USEPA National Coastal Condition Report (NCCR) and the 2012 TCEQ guidance for assessing and reporting surface water quality, we assessed the water quality health of Baffin Bay. Nitrogen levels were predominantly classified as "highly" eutrophic according to NEEA criteria (based on total dissolved nitrogen, TDN), but were mostly classified as "good" or "no concern" according to NCCR criteria and TCEQ screening levels which are based on dissolved inorganic nitrogen, DIN. Dissolved *organic* nitrogen (DON) concentrations are very high in Baffin Bay and are the dominant nitrogen form. Since some fraction of the DON is likely labile, usage of TDN for eutrophication assessment in these shallow bay systems is warranted as opposed to DIN. Chlorophyll *a* levels were predominantly "high-to-hypereutrophic" (NEEA), "poor" or "concerned" (NCCR and TCEQ) from during warmer months, while more than 85% were classified as "fair" to "poor" year

around. Based on the data presented here, Baffin Bay is exhibiting impaired water quality and eutrophication.

Applications using Ion Mobility–Mass Spectrometry

[1]Ryan Hladyniuk*, [1]Kaijun Lu, [1]Zhanfei Liu, and [2]Srinath Palakurthi; [1]The University of Texas Marine Science Institute; [2]Rangel College of Pharmacy, Texas A&M University Kingsville

The Core Facilities Laboratory at the University of Texas at Austin – Marine Science Institute (UTMSI) acquired an Agilent 6560 Ion Mobility Quadruple Mass Spectrometer (IM-QTOF) in 2015. In combination with liquid chromatography (Agilent 1260 Infinity), the completely integrated LC-IM-QTOF system has the ability to: (i) separate compounds in complex mixtures (LC), (ii) characterize compound structures (MS/MS) and (iii) resolve compounds based on cross-sectional areas (IM) in a variety of applications. An ongoing project in marine sciences includes characterizing the dissolved organic matter (DOM) pool in south Texas riverine and estuarine environments. Previous analytical limitations have precluded measurement and classification of this important carbon pool. Using LC-IM-QTOF, preliminary data suggests that natural DOM – mostly – has smaller 3D configurations as compared with standard biomolecules, perhaps a relic of environmental degradation. Of particular importance was the detection of numerous isomeric structures that compose of the DOM pool, a first to elucidate such features. Other ongoing applications include low-level (picograms of compound per microliter injection on column) detection and quantification of pharmaceutical drugs. A current *in vitro* drug permeation study on a topical formulations has the potential to demonstrate drug-tissue interactions from the initial point of application, a challenge to traditional analytical techniques. As demonstrated, the ranges of analytical applications are broad and novelty of the LC-IM-QTOF is apparent.

Spawning Patterns and Relative Exploitation of Sheepshead (*Archosargus probatocephalus*) in Port Aransas, Texas

[1]Ka'ohinani Kawahigashi*, [1]Derek Bolser, [1]Tyler Loughran, [1]Christopher Biggs, [1]Erin Reed, [1]Martha Romero, [2]Will Heyman, and [1]Brad Erisman; [1]The University of Texas Marine Science Institute; [2]LGL Ecological Research Associates Inc., Bryan, TX (*Student presentation*)

Sheepshead (*Archosargus probatocephalus*) is a commonly fished species in the northern Gulf of Mexico and an important component to its inshore recreational fishery, especially in south Texas. Despite their high proportion of landings, little is known about their life history traits, spawning behavior, or population structure in the region. From January through April 2017, Sheepshead were collected on a daily basis from Robert's Point filet station in Port Aransas, TX, to determine their spawning season and relative abundance in the recreational catch. Visual and microscopic assessments of gonadal development in females indicated that spawning began in late February and continued through early April. The proportion of spawning females by week and month were compared to the previous year's data to determine whether temporal spawning patterns were different between years. Sheepshead abundance relative to all species surveyed at the fillet station was used to determine the relative importance of Sheepshead to the recreational fishery of Port Aransas. Maximum relative abundance of Sheepshead in the local recreational catch coincided with peak spawning activity, which indicated that fishers disproportionately target the spawning aggregations of Sheepshead when they occur. The results

of our study indicate that spawning aggregations are an important component of the regional Sheepshead fishery and should be a focus for future monitoring and management efforts.

A comparison of percent cover and salinity conditions for seagrasses in the subtropical Laguna Madre

Clay C. McClure*, Victoria M. Congdon, and Kenneth H. Dunton; The University of Texas Marine Science Institute (*Student presentation*)

Seagrasses are vital systems that provide many ecosystem services. Many of the seagrass habitats along the Texas coast are subject to intense environmental conditions such as hypersalinity. With the probable increase in drastic weather events such as droughts, it is important to understand the response of seagrass species to intense environments. Seagrass and environmental data for the Laguna Madre along the Texas coast have been monitored from 2011-2015. This monitoring program offers a data set of instantaneous readings from 587 sites that provides key information into understanding relationships between the abundance of seagrass species with changing environmental factors. The 0.25 m^2 quadrats percent cover for five seagrass species were compared between the upper and lower sections of Laguna Madre. The salinities of the test sites were also taken into consideration. Over the five years of data, periods with high salinity were compared to the quadrat percent cover in order to determine if declines in the percent cover correlates with drought-like conditions. The Upper Laguna Madre (ULM) experienced significantly higher salinities over all five years than the Lower Laguna Madre. The salinities in 2011 were the highest overall for both sites with over 30% of the salinity measurements in the ULM being extremely high (Salinities 50-70). Preliminary percent cover results showed a drastic decrease in *Syringodium filiforme* percent cover over the five years of data in the ULM.

Characterizing riverine dissolved organic matter (DOM) using a novel thermal slice pyrolysis gas chromatography mass spectrometry technique

[1]John O'Connor*, [2]Laodong Guo, and [1]Zhanfei Liu; [1]The University of Texas Marine Science Institute; [2]The University of Wisconsin-Milwaukee (*Student presentation*)

Understanding biogeochemistry of riverine DOM is crucial, as DOM provides a critical source of energy and nutrients to coastal systems. However, our understanding of DOM is limited at the molecular level. Here we use our newly developed technique, thermal slice pyrolysis gas chromatography mass spectrometry to analyze ultrafiltered DOM from 10 rivers, three in the Yukon and seven in the Mississippi River Watersheds. This "sliced" pyrolysis-GC/MS technique allows temperature to gradually increase from 50-650°C in five thermal slices during the pyrolysis, which can differentiate intact molecules from the original DOM matrix and cracked products under high temperature. Our data from 10 rivers reveal markedly different DOM characteristics both within and between watersheds. The preliminary data indicate that although total DOM in the Yukon and Mississippi Rivers did not differ much, there is a greater diversity of molecules present in the Mississippi River, while the Yukon River is characterized by more degraded OM. The Mississippi River DOM also contained more molecules indicative of agricultural practices on land. There also appears to be a gradient of increasing OM degradation from tributaries to the main branch of the river. Most of the pyrolyzed DOM products in all rivers were detected in the 290-370°C and 370-530°C slices, with the bulk of the OM in the former being biomarkers for microbial degradation of lignin and polysaccharides,

while the latter appeared to be primarily composed of the cracking products of more stable DOM molecules. Further datamining and carbon and nitrogen isotopic analyses are ongoing.

The Use of Otolith Chemistry to Determine Age in Swordfish (*Xiphius gladius*)

Zachary R. Russell*and Benjamin Walther; Texas A&M University- Corpus Christi (*Student presentation*)

Highly migratory fish are an important income for the nation and the age of the fish is an important statistic needed to correctly assess fish stock. Unfortunately, aging methods in these highly migratory fish are often difficult to perform. Because of this, alternative methods for aging should be considered for potential new and more efficient techniques. One potential aging method could come from otolith chemistry. Otolith chemistry has been highly successful in tracking migration over environmental gradients for diadromous fish. Because the pelagic environment is fairly stable with little to no environmental gradients, physiological effects on the otolith could be used to age migratory pelagic fish. This project focused on using elemental compositions of swordfish (*Xiphias gladius*) otoliths obtained from the Gulf of Maine by preforming transects across the otoliths for the complete life history using laser ablation ICP-MS. The elements looked at were magnesium, manganese, potassium, strontium, and barium. Using these elements, oscillations were compared to the age of the individual to see if there was agreement between both aging methods. Because of the relatively homogenous elemental makeup of the pelagic environment, physiologically-induced oscillations would be easier to see and potentially predict age.

Behavioral Conditioning through Habituation to Increase Post-Release Survival of Hatchery-Reared Red Drum *Sciaenops ocellatus*

[1]Tyler Schacht*, [1]Kim Withers, [2]Robert Vega, and [1]John Scarpa; [1]Texas A&M – Corpus Christi University; [2]Texas Parks and Wildlife Department – Coastal Fisheries Division, Stock Enhancement Program (*Student presentation*)

Three sets of experiments were conducted from July to December to investigate whether habituation and habitat complexity in rearing ponds (0.2 ha) affected post-stocking predation of hatchery-reared red drum, *Sciaenops ocellatus*. Three structurally different habitat treatments (non-vegetated (normal rearing), artificial seagrass, and artificial seagrass with predator exclusion cages) were used to assess if habitat complexity influenced growth and condition. Survival from predation was assessed by exposing red drum to free-roaming predators (pinfish, *Lagodon rhomboides*) in experimental 'wild' ponds (0.2 ha) for 24 hours. Fish growth (TL) was found to be affected by trial (i.e., temporal) but not by any treatment ($P < 0.0001$ and $P = 0.178$, respectively). Prior to the introduction to red drum into experimental 'wild' ponds with predator exposure, condition factor (K) of fish was found to be affected by trial and treatment with an interaction ($P < 6.95e\text{-}16$, $P = 0.0013$, $P = 0.006$, respectively). Condition factor was significantly lower in the artificial seagrass treatment with predator exclusion cages ($K = 0.82$), as compared to the non-vegetated and artificial seagrass treatments ($K = 1.06$ and $K = 1.09$, respectively), prior to predator exposure. Although condition factor may have been affected by the addition of predator exclusion cages, data suggests that survival during culture increased with habitat complexity. In conclusion, habitat complexity improved behavioral mechanisms (i.e., foraging, predator-avoidance), thus increasing post-release survival of hatchery-reared red drum.

Determining benthic nitrogen fluxes along a hydrological connectivity gradient in saltwater ponds of coastal Texas

T.M.S.D.G. Silva* and Jeffrey R. Wozniak; Department of Biological Sciences, Sam Houston State University (*Student presentation*)

Hydrologic connectivity is a critical factor in aquatic ecosystems for maintaining the overall integrity and organization of the system, including the regulation of nutrient cycling, species diversity and primary production. The micro-tidal coastal salt marshes of the Aransas National Wildlife Refuge (ANWR) are a heterogeneous, spatially-complex landscape that is highly regulated by the degree of hydrologic connectivity across the system. This study will investigate how benthic nitrogen (N) fluxes in coastal saltwater ponds change along a hydrological connectivity gradient. A sediment core incubation method and in situ water samples will be used to qualify and quantify N cycling in hydrologically isolated, intermittently connected and permanently connected coastal saltwater ponds. Specifically, vertical nutrient fluxes (nitrate, nitrite and ammonium) between sediment and overlying water column will be determined through a laboratory-based core incubation method. We hypothesize that the magnitude and frequency of hydrologic connectivity results in a "switching on and off" of different nitrogen pathways. We further hypothesize that the release of ammonium will be increased during the periods of high bay water levels in all three types of ponds. We predict that this hydrologically mediated N is of critical importance to salt marsh food web dynamics across the ANWR landscape because N availability can regulate the abundance of essential food resources such as wolfberry fruit and blue crabs for a wide range of higher trophic organisms, including the endangered whooping crane.

Metabolic recovery of red drum (Sciaenops ocellatus) following exhaustive exercise.

Julia Small*, Rasmus Ern, and Andrew Esbaugh; The University of Texas Marine Science Institute (*Student presentation*)

Ocean acidification, the decreasing pH of oceanic surface waters due to rising atmospheric carbon dioxide (CO2), impacts a wide range of organisms including corals, bivalves, phytoplankton, and fishes. The extent of OA's impact on marine teleost fishes has been widely studied, however, the additive impacts of OA and metabolic acid-base disturbances – such as those following exhaustive exercise – have been largely ignored. While prior work in fish has described the general pathways of exercise recovery, it is important to consider how these processes may be impacted by OA. This study aims to determine the baseline metabolic recovery of juvenile red drum (*Sciaenops ocellatus*) following exhaustive anaerobic exercise, and the impacts of various CO2 environments on recovery. Individuals (n=4/timepoint; 8.11 ± 2.19) were exercised to exhaustion, placed in individual recovery chambers, and allowed to recover for up to 24h. White muscle samples were collected and analyzed for a suite of metabolic recovery markers – lactate and intracellular pH. A future second series of experiments will expose individuals to varying levels of CO2 – up to 6,000 μatm – to explore the effects of OA on intracellular pH, while a third will investigate OA effects coupled with exhaustive exercise on metabolic recovery and physiology. Data from this study will be instrumental in determining the mechanisms of recovery to exhaustive anaerobic exercise in marine teleosts.

Tracking hypoxia induced trophic shifts of Atlantic Croaker (*Micropogonias undulatus*) in the Gulf of Mexico using stable isotopes

Tyler Steube*, Benjamin Walther, and Matthew Altenritter; Texas A&M University- Corpus Christi (*Student presentation*)

Seasonal hypoxia in the northern Gulf of Mexico (nGoMex) can have sublethal effects on fishes by impairing reproductive capabilities, displacing individuals to suboptimal habitat, and altering trophic interactions. Atlantic Croaker, (*Micropogonias undulatus*), are demersal omnivorous fish found throughout the nGoMex hypoxic zone. Bottom-water hypoxia may displace Atlantic Croaker from their preferred benthic prey to pelagic alternatives. Pelagic shifts will not occur if resilient consumers can withstand hypoxia long enough to continue foraging on stressed benthic prey. Stable isotopes can be used to resolve benthic to pelagic food web shifts given known isotopic endmembers. We used microchemical otolith markers for hypoxia (manganese) and salinity (barium) to identify recent hypoxia and estuarine residence, thereby clustering fish by exposure histories. Time periods of recent otolith exposure histories were matched to experimentally-validated turnover rates of $\delta^{13}C$ and $\delta^{15}N$ in croaker muscle and liver, allowing direct comparisons between exposure type and food web dynamics. Mean isotope values niche widths can reveal whether trophic shifts are induced by hypoxia exposure or estuarine residence, and whether any shifts are uniform or variable among individuals. Combining otolith microchemistry with stable isotopes enhances our understanding of sub-lethal hypoxia response and trophic webs for key fish species in the Gulf of Mexico.

Comparison of whooping crane behavior in natural saltmarsh and urban upland habitats

[1]Lindsey A. Tiegs*, [2]Elizabeth H. Smith, and [1]Jeffrey R. Wozniak; [1]Sam Houston State University; [2]International Crane Foundation (*Student presentation*)

The Aransas-Wood Buffalo population of whooping cranes (*Grus americana*) have overwintered exclusively in coastal salt marshes along the Texas Gulf Coast for decades. However, as the population size increases and expands spatially across the landscape, cranes are confronted with an increasing number of interactions with more urbanized habitats. Residents who maintain game feeders in their yards, which may provide a resource subsidy to cranes, further contribute to the increase in whooping crane use of urban upland habitats. The main objective of this research project was to explore the differences in whooping crane behavior between natural saltmarsh and urban upland sites. Behavioral surveys were conducted during the winters of 2015-16 and 2016-17 in natural saltmarsh territories (n=83 and 88, respectively) and in urban upland sites (n=10 and 17, respectively). Individual crane behavior (e.g., foraging, alert, resting, comfort/maintenance, locomotion, or interaction) was recorded at 15 second intervals over a 20 minute observational period. Data analysis indicates that cranes in natural saltmarsh territories spent more time foraging ($P<0.001$) and cranes at urban upland sites spent more time resting and in comfort/maintenance activities during both winters ($P<0.001$). There was no significant difference in time spent on alert or in interaction across the two habitat types either year ($P>0.05$). Cranes in natural saltmarsh territories spent more time in locomotion than cranes at urban upland sites during the second study year ($P=0.003$). Herein, we will present the dichotomy in habitat attributes at each site and discuss possible linkages to observed whooping crane behaviors.

The Importance of Low Salinity Habitat to Red Drum

Louisa Torrance* and Benjamin Walther; Texas A&M University – Corpus Christi (*Student presentation*)

The Corpus Christi/Aransas-Copano Bay complex provides vital nursery habitat for larval, juvenile and sub-adult red drum (*Sciaenops ocellatus*). Texas Parks and Wildlife monitors red drum within these bays biannually, but lack sampling in low salinity environments such as tidal creeks and rivers. We seek to address the importance of low salinity habitat to red drum by characterizing the proportion of our study population that migrate into low salinity habitats, and quantify when, how often, and how long these migrations occur using a retrospective approach based on otolith chemistry analysis. We also hypothesize that red drum are engaging in trophic interactions while in low salinity habitats, and will analyze muscle and liver tissue using stable isotope analysis. This work will provide a more comprehensive habitat use assessment and understanding of life history diversity within this red drum population, with important implications for Essential Fish Habitat designation and recreational fisheries management.

Correlation between Environmental Temperature and Gonadal Development of Sea Urchin in the Gulf of Mexico

[1]Andre Torruco*, [2]Eleazar Hernandez, [2]Jocelyn Martinez, [2]Mariana Saenz, and [1,2]Md Saydur Rahman; [1]School of Earth, Environmental, and Marine Sciences, University of Texas Rio Grande Valley; [2]Department of Biology, University of Texas Rio Grande Valley (*Student presentation*)

Sea urchins are among the oldest living sea creatures in the world. Sea urchins are unique invertebrates and differ to other marine organisms due to their notable lack of organs. The importance of sea urchins is often overlooked, yet they place a major role environmentally and economically. Our research has been focused on Atlantic purple sea urchin, *Arbacia punctulata* (Arbacia, an important species used for sea food e.g. Japanese Sushi). In order to prevent extinction, our objective is to determine the reproductive cycle of sea urchin and focus on the correlation between environmental temperature and gonadal development of Atlantic purple sea urchin in the Gulf of Mexico. Monthly changes in oocyte development in the ovary and sperm production in the testis of Arbacia were investigated morphometrically and histologically. The gonadosomatic index (gonad weight/body weight*100) values of both male and female were high in July and August, and significantly decreased after August and were maintained at low levels from September through March. The ovaries were occupied by mature eggs in July and August. The testes were also fully contained by large amount of sperm during the summer months. These results suggest that Arbacia sea urchin starts spawning several times during the summer months of July and August in Texas waters.

Assessment of Shorebird Populations in Galveston Bay using Conventional Techniques and Unmanned Aerial Vehicles

[1]Anna Vallery*, [2]George Guillen, and [2]Mustafa Mokrech; [1]College of Science and Computer Engineering, University of Houston – Clear Lake; [2]Environmental Institute of Houston (*Student presentation*)

Nearly 75% of U.S. bird species utilize Texas coastal wetlands as either a permanent or seasonal habitat (TCELCP, 2010). Intertidal habitat including mudflats, marshes and oyster

reefs are utilized by many of these species for foraging. These intertidal habitats are, however, at risk due to coastal development and predicted changes associated with climate change. It is predicted that a large majority of these habitats will be lost as a result of these factors within the Galveston Bay system over the next 50 years. In order to understand how these factors may affect intertidal habitat and associated bird species, and to develop effective management methods to mitigate impacts, it is first necessary to gain a better understanding of current population sizes and densities in of these species in coastal areas. Gathering this information for Galveston Bay is difficult due to the size and complexity of this estuary and the logistics of surveying intertidal habitat and bird populations using traditional methods. New techniques that utilize Unmanned Aerial Vehicle (UAV) technology, however, have the potential to make conducting large-scale surveys of intertidal areas possible both safely and with less expense and effort than previous attempts using ground surveys only and/or manned aerial surveys. Our objective is to test whether UAV technology can be used to gather information on foraging shorebird numbers and what level of disturbance is exhibited. Distribution of these shorebirds on various intertidal habitats, including oyster reefs, would then be documented using this technology.

Seasonal and Interannual Variability in Dissolved Oxygen Levels in Baffin Bay, Texas
Lily Walker*, Michael Wetz, and Kenneth Hayes; Department of Life Sciences, Texas A&M University- Corpus Christi (*Student presentation*)

Baffin Bay is a eutrophic, hypersaline lagoon located on the South Texas coast. This study examined high frequency dissolved oxygen and supporting water quality monitoring data from two sites in Baffin Bay from 2015 to 2016. Lower oxygen levels occurred during the warmer spring-fall months. In several cases during both 2015 and 2016, hypoxia events lasting up to five days were observed, primarily from April through September. Dissolved oxygen was persistently lower in 2016 compared to 2015, with a higher percentage of recorded days beneath the hypoxia threshold noted in 2016. Hypoxia events were often preceded by sharp increases in temperature and salinity. These findings indicate that in addition to typical diel O_2 cycles, Baffin Bay can undergo prolonged hypoxia, that is likely linked to the high chlorophyll and organic matter concentrations observed in the system. If Baffin Bay continues the long term trend of increased nutrients, chlorophyll, and water temperatures, hypoxic conditions are likely worsening.

Predator and prey interactions of fishes in the Gulf of Mexico: an isotopic and genetics approach
Tracy Weatherall* and James Simons; Center for Coastal Studies at Texas A&M University-Corpus Christi

As the fisheries world moves toward using an ecosystem based approach to management, the need for good monitoring data is of utmost importance. An important component of the manager's toolbox are fishery ecosystem models (e.g. Ecopath, Atlantis, OSMOSE), all of which are either directly or indirectly dependent on diet data of fishes. As part of a NOAA MARFIN grant, we are collecting demersal and pelagic fishes from around the northern and southern Gulf of Mexico, and performing gut content analysis. In addition to diet we are also analyzing fish tissue for stable isotopes of C and N. These data will be uploaded into the Gulf of Mexico species interaction (GoMexSI) database. The fishes have been collected by trawl

(NOAA groundfish survey), longline (NOAA longline survey), and hook and line (charter boats and Mexican fishermen). We will report on the status of catch and preliminary diet of selected species from the US waters in this paper. To date we have collected 1994 fish specimens. The highest numbers caught include *Lutjanus campechanus* (231), *Prionotus longispinosus* (129), *Upeneus parvus* (116), *Lepophidium brevibarbe* (102), and *Scomberomorus cavalla* (109). An additional 22 species have greater than 20 specimens. A total of 54 species have been collected. Rationale for the fish collected and locations of collection included a) lack of data for a species, b) very old data for a species, c) lack of data for a species in a particular location, or d) recommendations by management and ecosystem assessment scientists.

Hydrologic control on CO_2 fluxes in subtropical estuaries

Hongming Yao* and Xinping Hu; Department of Physical and Environmental Sciences, Texas A&M University - Corpus Christi (*Student presentation*)

Hydrologic control on estuarine CO_2 flux is not well understood. This lack of understanding in part contributes to the high uncertainty in estimating global estuarine carbon budgets. Meanwhile, changing precipitation patterns and human activities such as the increasing demand for freshwater due to population increase near the coast also alter hydrologic cycle in a way that inevitably changes the amount and frequency of riverine materials delivered to the estuaries and coastal waters. In subtropical estuaries of the northwestern Gulf of Mexico, hydrologic conditions play a significant role in determining water residence time. In a relatively narrow latitudinal gradient, estuarine water residence time varies by at least one order of magnitude, and this variation is also subject to large-scale climate patterns such as the El Niño-Southern Oscillation. In this work, we report highly variable CO_2 flux values across four estuaries of different water residence time and contrasting hydrologic conditions. A bimodal distribution of CO_2 flux can be seen as a function of salinity. Different controls such as high water pCO_2 levels at low salinities due to abundant freshwater input and high wind speed when freshwater input is scarce may explain this type of distribution. This finding may have significant implications toward understanding CO_2 budget in subtropical estuaries in general.

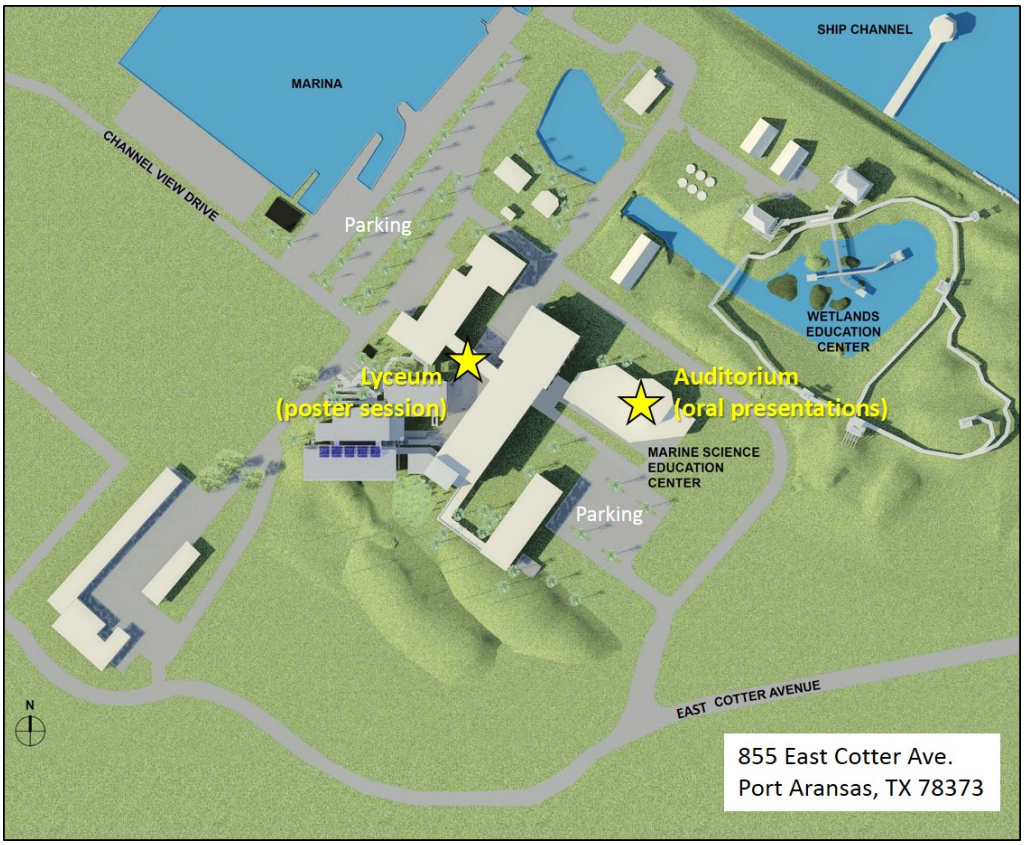
Effects of Disease and Salinity on Scope for Growth of Oysters *Crassostrea virginica*

Danielle Zimmermann*, Kim Withers, and Jennifer Pollack; Texas A&M University – Corpus Christi (*Student presentation*)

Eastern oyster (*Crassostrea virginica*) community structure depends largely on freshwater inflows, and its influence on salinity. Increasing salinity decreases oyster growth and increases the susceptibility of oysters to parasitism by the protozoan parasite, *Perkinsus marinus*, which causes Dermo disease. The goal of this study is to examine how varying salinity and Dermo disease levels interact to affect oyster response to stress using the physiologically based index scope for growth. Scope for growth is useful in determining the effects of environmental and stress conditions on an organism's physiology, including those caused by changes in temperature and salinity. Oysters will be collected quarterly from restored and natural sites on Lap Reef in Copano Bay. Oysters will be brought back to the lab, and subjected to a range of salinities (<5, 5, 10, 15, 20, and 25). Physiological parameters such as oxygen consumption, ammonia excretion, clearance rate, and absorption efficiency of each oyster will be measured to determine the overall energy that is available for growth and reproduction at the different salinities. After scope for growth has been determined, oysters will be sacrificed to determine

Dermo infection intensity. Results will be analyzed to determine the effects varying salinity and disease levels have on the potential for oyster growth.

Campus Map



Main campus of The University of Texas Marine Science Institute

The University of Texas Marine Science Institute is dedicated to the three central functions of a major university (research, education, and outreach) as they apply to the Texas coastal zone and other marine environments. As an organized research unit of The University of Texas at Austin, the main goal of the Marine Science Institute is to improve our understanding of the marine environment through rigorous scientific investigations.

Greening the TBEM 2017

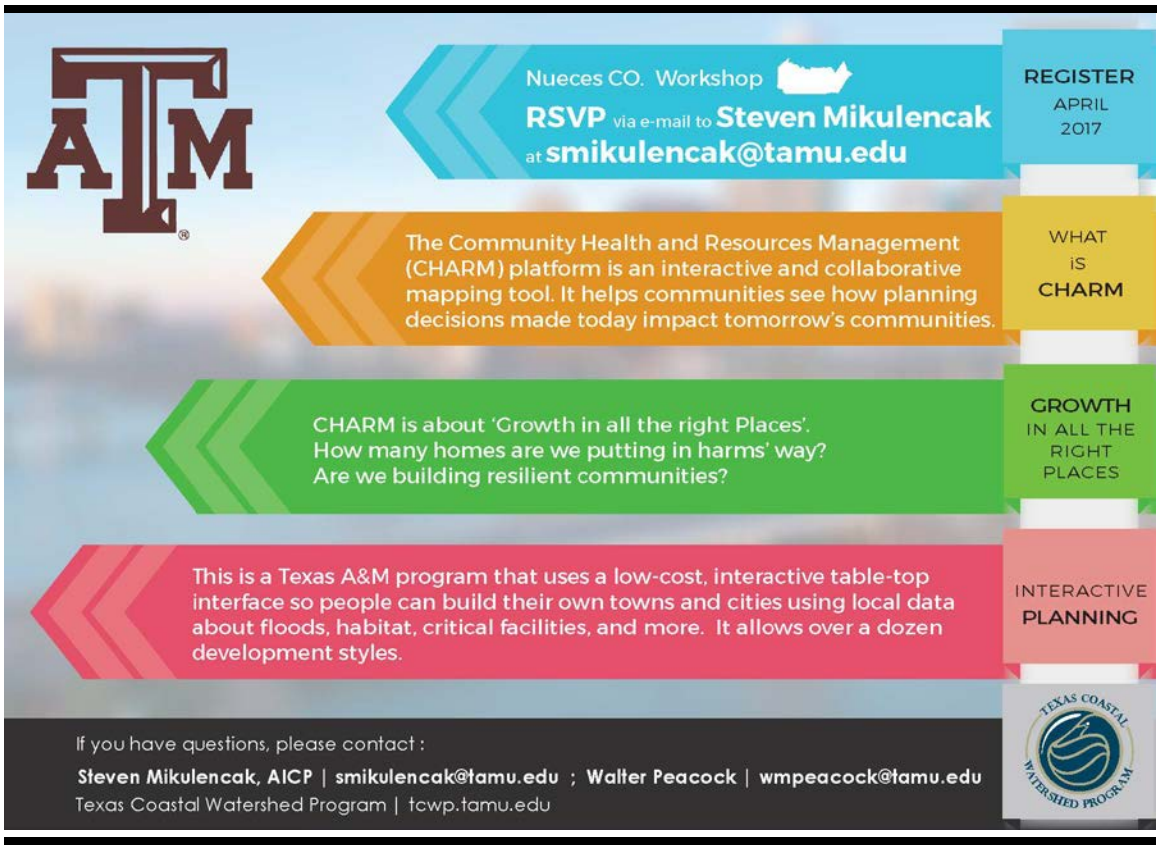
Bringing people together for a large meeting like Texas Bays and Estuaries can create significant environmental impacts. As professionals in our field, it is important for the Mission-Aransas Reserve and The University of Texas Marine Science Institute to lead by example. The following list highlights the steps we've taken to reduce the impact of TBEM 2017:

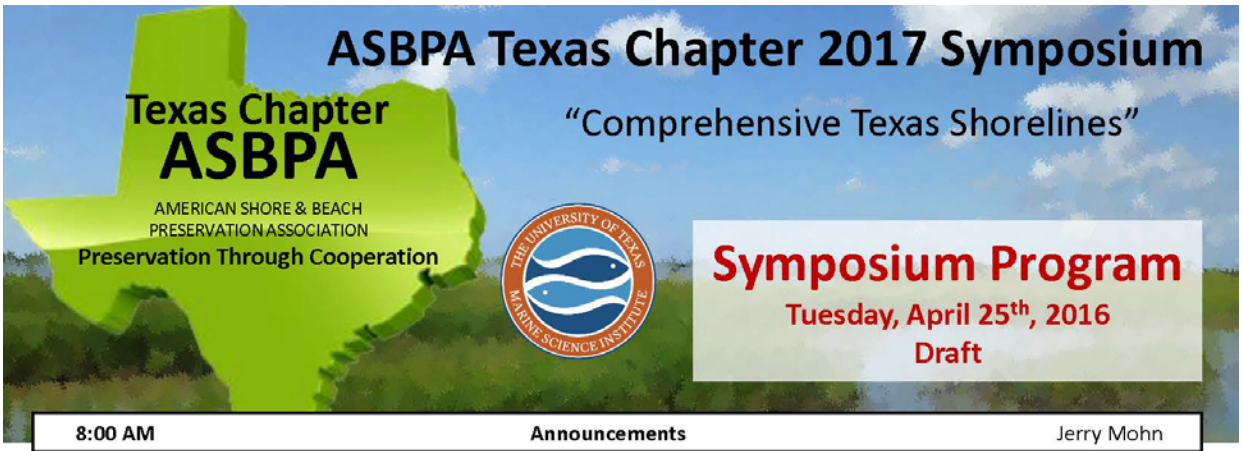
- Providing paper coffee mugs (please keep and reuse throughout day if possible)
- Convincing vendors to use Styrofoam alternatives
- Reusable bags for meeting materials
- Reusable nametag wallets
- Recycling bins provided by the UTMSI Green Team
- Limited paper use through duplex printing where possible
- Using materials with as much recycled content as possible
- Providing electronic copies of meeting materials to registered participants
- Contracting with local vendors whenever possible

To learn more about the Mission-Aransas Reserve and UTMSI efforts to reduce their environmental impact, check out the UTMSI Green Team (www.utmsi.utexas.edu/greenteam)!

Upcoming Events and Meetings

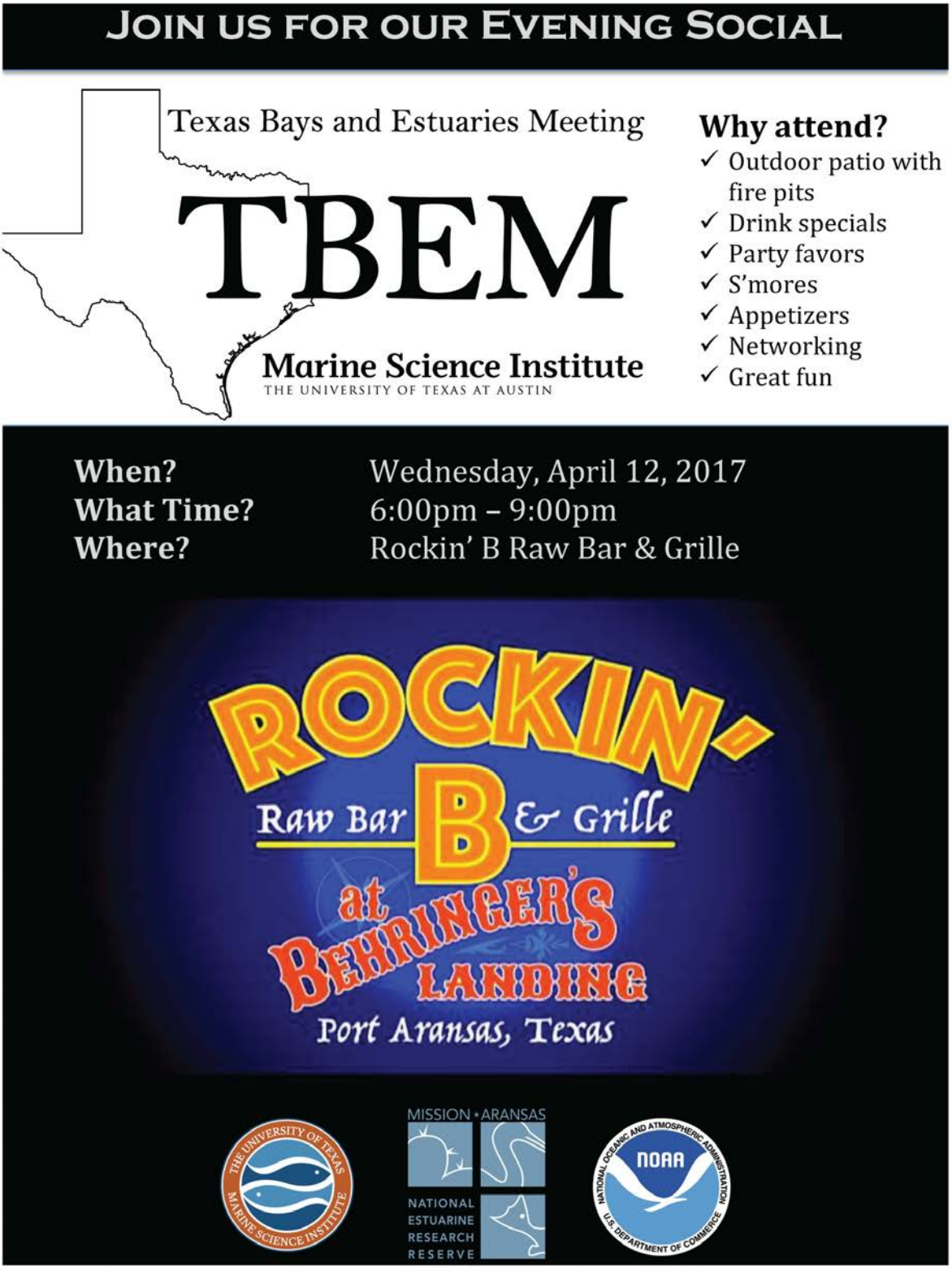

CHARM
Resiliency Workshop
www.communitycharm.org 2017
April 19 12:30-5:00 pm
CORPUS CHRISTI
April 20 4:00-8:30 pm
ROBSTOWN
RSVP info on the back
AN INTERACTIVE PLANNING TOOL
FEMA
Texas A&M AgriLife Extension
Sea Grant
Scenario 360


Nueces CO. Workshop
RSVP via e-mail to Steven Mikulencak at smikulencak@tamu.edu
REGISTER APRIL 2017
The Community Health and Resources Management (CHARM) platform is an interactive and collaborative mapping tool. It helps communities see how planning decisions made today impact tomorrow's communities.
WHAT iS CHARM
CHARM is about 'Growth in all the right Places'. How many homes are we putting in harms' way? Are we building resilient communities?
GROWTH IN ALL THE RIGHT PLACES
This is a Texas A&M program that uses a low-cost, interactive table-top interface so people can build their own towns and cities using local data about floods, habitat, critical facilities, and more. It allows over a dozen development styles.
INTERACTIVE PLANNING
If you have questions, please contact :
Steven Mikulencak, AICP | smikulencak@tamu.edu ; Walter Peacock | wmpeacock@tamu.edu
Texas Coastal Watershed Program | tcwp.tamu.edu
TEXAS COASTAL WATERSHED PROGRAM



8:00 AM	**Announcements**	Jerry Mohn
8:10 AM	Texas Commission on Environmental Quality Watermaster Program	Katherine Bricken
8:30 AM	Spatial Variability of Relative Sea Level Rise in the coastal bend and Impact on Nuisance Flooding	Philippe Tissot
8:50 AM	Nuisance Tidal Flooding and Sea Level Anomalies on the Texas Coast	James Naismith
9:10 AM	Sea Level Changes on the Texas Coast	Skip Davis
9:30 AM	Hydrodynamic Modeling of Packery System and Extension	Larry Dell
9:50 AM	**15 min. break**	
10:05 AM	Completion of Texas Largest-Ever Beach Nourishment	Gerald Songy
10:25 AM	Results from the Texas Coastal Sediment Sources: A General Evaluation Study	Juan Moya
10:45 AM	From Mud to Marsh – Restoring Lost Marsh Habitat In the Soft Soils of Dickenson Bayou	Philip Blackmar
11:05 AM	**Case Study: Follets Island, Brazoria County, TX Restoration of Dune and Habitat System** Destroyed by Hurricane Ike	C. Connor
11:25 AM	Offshore Sand Resources along the Texas Coast – Lessons Learned from a Statewide Sand Resource Assessment and Constructed Beach Nourishment Projects	Lindino Benedet
11:45 AM	**Lunch (Provided by Texas Chapter and Sponsors)**	
1:00 PM	The Texas Coastal Resiliency Master Plan – A Look Back and the Path Forward	Chris Levitz
1:20 PM	Federal funding for coastal projects and coastal infrastructure	Derek Brockbank
1:40 PM	**Economic Impacts of Beach Nourishment in Texas**	**Michael Walther**
2:00 PM	Beach Nourishment in Galveston Texas- A Long Term Plan for Success	Reuben Trevino
2:20 PM	Planning for the Beneficial Use of Dredged Material: A Success Story in Mississippi and an Opportunity in Texas	**Leah Bray**
2:40 PM	Aransas County Coastal Resiliency Initiative	Aaron Horine
3:00 PM	**15 min. break**	
3:15 PM	Involving Texas Students in Coastal Science	Tiffany Caudle
3:35 PM	Living Shoreline Demonstration Project – Recent Experience on Design and Construction	Josh Carter
3:55 PM	The Virginia Point Wetland Protection Project (Galveston Bay, Texas)	Taylor Nordstrom
4:15 PM	Adaptive Management for Successful Marsh Restoration in Galveston West Bay	Christian LaPann-Johannessen
4:35 PM	Restoring and protecting bird habitat on Shamrock Island	Luis Maristany
4:55 PM	Don't Forget the Bay Shores	Rhonda Cummins
5:15 PM	Closing remarks	
5:20 PM	**Poster Presentations**	Various presenters
6:00 PM	**Close Symposium**	

NOTES


JOIN US FOR OUR EVENING SOCIAL
Texas Bays and Estuaries Meeting
TBEM
Marine Science Institute
THE UNIVERSITY OF TEXAS AT AUSTIN
Why attend?
✓ Outdoor patio with fire pits
✓ Drink specials
✓ Party favors
✓ S'mores
✓ Appetizers
✓ Networking
✓ Great fun
When? Wednesday, April 12, 2017
What Time? 6:00pm – 9:00pm
Where? Rockin' B Raw Bar & Grille
ROCKIN-
Raw Bar B & Grille
at BEHRINGER'S LANDING
Port Aransas, Texas
THE UNIVERSITY OF TEXAS MARINE SCIENCE INSTITUTE
MISSION • ARANSAS
NATIONAL ESTUARINE RESEARCH RESERVE
NOAA
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE