2009

Texas Bays and Estuaries Meeting

Marine Science Institute

The University of Texas at Austin

Port Aransas, Texas

April 28-30, 2009

Welcome to the 2009 Texas Bays and Estuaries Meeting!

This marks the 5th[rd] year of this revived meeting and is the first year we have had participants from Mexico. This year we are hosting a continuation of a *Sargassum* management symposium held previously in Corpus Christi. John Adams is the convener, so thank him for his efforts. As in past years, a notice board will be set up next to the Visitor Center's office, and a payphone is located near the restrooms. During the meeting, please refrain from smoking in the buildings. Restrooms are located in the Visitor's Center next to the library. Lunch will be served under the laboratory overhang next to the parking lot. Dinner will be served either outside or in the Visitor's Center lobby, depending on the weather. Beer and wine are available at dinner for one ticket (one ticket = $2.00). There is a ticket in your registration envelope to get you started. You must use the tickets, as the bartender will not accept cash. You may wander freely with your drinks, but please do not leave the campus with them. Please make time to examine the posters in the auditorium. Authors will be at their posters from 5 to 5:45 or whenever the BBQ pulls them away.

We hope you enjoy the meeting and look forward to seeing you again in the future!

Tracy Villareal

Marine Science Institute

The University of Texas at Austin

Organized and Hosted by:

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The University of Texas at Austin
Tracy Villareal, Convener

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Generous sponsors of the Student Presentation Award: 1st $200, 2nd $100.

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HEB: Break goodies and snacks

Volunteers! Thank them if you see them!
Rae Mooney, Christa Belle, Laura Ryckman, Colbi Brown

Student Awards:
Student presentations are an important aspect of this meeting. The Best Student Presentation awards are one of the ways we have to acknowledge excellence in research. The Coastal Bend Bays and Estuaries Foundation has continued its support of this award ($200 for 1st, $100 for second).

2005: **Jason James**, TAMU, Corpus Christi, 1st Place, **Tatum Neeley**, TAMU, College Station, 2nd Place
2006: **Harris Mulhstein**, UT, Austin 1st Place. **Lucia B. Carreon Martinez**, UT Austin, 2nd Place
2007: **Matt Hubner** 1st Place, TAMU, Corpus Christi, 2007. **Megan Fencil**, UT Austin, 2nd Place,
2008**: John Froeschke**, TAMU, Corpus Christi, 1st place. **Laura Ryckman**m UT, Austin and **Katie Swanson**, UT, Austin, tie for 2nd place.

Texas Bays and Estuaries Meeting Program

Tuesday, April 28, 2009

0730 - Registration, Visitor's Center Lobby, UTMSI, Port Aransas, TX

0830 - Welcome and Opening Remarks

0840 – **Habitat selection patterns of sharks in northwestern Gulf of Mexico**
John T. Froeschke, Gregory W. Stunz, Harte Research Institute for Gulf of Mexico Studies

0900- **Using New Technology to Measure Fish Movement and Behavior**
Lisa Vitale, David Buzan, Andrew Labay, and Mike Weeks, , PBS&J, Austin, Texas

0920 - **Texas Longline Surveys 1978 to 2009.** Todd Neahr, Texas Parks and Wildlife Department

0940- **Characterization of the Diamondback Terrapin population in West Bay (Galveston bay, texas)** Kelli Haskett and George Guillen, University of Houston, Clear Lake

1000– BREAK

1020 **– Heightened prey responses in risky habitats: predation pressure increases prey sensitivity to risk.** Delbert Lee Smee. Texas A&M – Corpus Christi

1040 – **Geological controls on the distribution of oyster reefs in Copano Bay, Texas.** Erin Weaver, Marie Herbort and Timothy M. Dellapenna, Texas A&M University- Galveston

1100 – **Integration of hypoxia into reef restoration: Impacts on oyster growth and settlement.** Matthew W. Johnson[1], Sean P. Powers[2], Joseph Senne[2], Keyong Park. [1]Harte Research Institute, TAMU, CC.

1120 – **Oyster habitat in estuarine ecosystems: Synergy among habitat types and the role of structural complexity in nekton habitat selection.** Isis Gain, Gregory W. Stunz, Delbert L. Smee. Harte Research Institute

1140- **The remarkable site fidelity of wintering piping plovers (*Charadrius melodus*) on Mustang and San Jose barrier island Gulf beaches, Texas**. Anthony F. Amos, Lynn M. Amos, and Cheri Gratto-Trevor, The University of Texas, Austin

1200 – LUNCH catered by Robert's of MSI

1300 - **Carbonate carbon concentrations in sediments from the Bahia Grande Basin: A synoptic survey**. Ricardo Franco, Jose Adan Pena, Jesse A. Cantu and Thomas Whelan III University of Texas Pan American

1320 – **The effects of land use on the CO_2 released from subtropical rivers to the atmosphere in the US gulf coast.** Fanwei Zeng and Carrie A. Masiello, Rice University

1340 – **Evidence suggesting hyperpycnal flow within a low gradient river delta and implications for both sand and mud transport onto the shelf: Brazos River** Timothy M. Dellapenna, Christian Noll, Bryan Fielder, Robert Webster, Texas A&M University, Galveston

1400 – **A neural network spatial model for salinity in Bahia Grande.** Anthony S. Reisinger, Philippe Tissot, David W. Hicks, and James C. Gibeaut. Texas A&M University - Corpus Christi

1420 – **Delineating the water column property variability at the Aransas Pass Tidal Inlet, Texas based on multi-parameter profiler observation.** Dong-Ha Min, The University of Texas at Austin

1440 – **A Genetic Assessment of Management Strategies for Spotted Seatrout in Texas.** Joel Anderson and William Karel, Texas Parks and Wildlife Department

1500 – BREAK

1520 – **A fine scale genetic study of the spotted seatrout, *Cynoscion nebulosus*, along the south Texas Coast.** Cynthia Morales, R. Deborah Overath, Robert Vega. Texas A&M University Corpus Christi

1540 – **Genetic Studies of Hatchery-Supplemented Populations of Red Drum, *Sciaenops ocellatus*, in four Texas bays.** Evan W. Carson, S. Karlsson, E. Saillant, John R. Gold, Texas A&M University, College Station

1600 – **Fatty acid composition of eggs affects behavioral performance of red drum larvae.** Alfredo F. Ojanguren and Lee A. Fuiman, The University of Texas, Austin

1620– **The role of stress in the survival of hatchery-reared spotted seatrout (*Cynoscion nebulosus*).** J. Zane Ruddy and Rebekah J. Thomas. Texas A&M University - Corpus Christi

1640 – **Texas Seashells-A New Illustrated Guide.** J.W. Tunnell Jr., J. Andrews, N.C. Barrera, and F. Moretzsohn. Texas A&M University-Corpus Christi

1700 - Poster Session and cash bar at the UTMSI Visitor Center.

1800- BBQ Dinner and cash bar: Steve Lew's BBQ, Rockport, TX

1930 - Bar closes

Weds. April, 29, 2008

0820 - **Evidence of compartmentalized food web structure in Lavaca Bay using gut contents and stable isotopes.** James Simons, Texas Parks and Wildlife Department, Jenny Wrast, University of Houston-Clear Lake, Greg Stunz, Texas A&M University-Corpus Christi

0840 – **Golden Alga (*Prymnesium parvum*): A Potential Threat to Texas Bays and Estuaries?** Luci Cook-Hildreth, Tim Birdsong, Meridith Byrd, Janet Nelson, Texas Parks and Wildlife Department

0900- **Characterization of the Mission-Aransas National Estuarine Research Reserve: hydrography, nutrients and phytoplankton biomass**. Ed Buskey, Cammie Hyatt and Tracy A. Villareal. University of Texas, Austin

0920 – **Nitrogen Enrichment in the Galveston Bay Estuary Indicated by Stable Isotope Analyses.** Danielle Crossen , George Guillen, University of Houston Clear Lake, and and Glen Sutton, Texas Parks and Wildlife Department.

0940- **From a forest to a desert: What's happening to seagrass in Little Bay?** Colt Cook, Ken Dunton, Ed Buskey and Sally Morehead. University of Texas, Austin

1000- **Exploring the Unique Acoustic Characteristics of Seagrasses**. Christopher Wilson, Preston Wilson, Kenneth H. Dunton, University of Texas, Austin

1020 - **Break**

1040- **Relationship between salinity stress and spectral reflectance in *Thalassia testudinum* from the Lower Laguna Madre, Texas.** Thomas Whelan III, Hudson DeYoe, Michael Persans and Kenneth R. Summy. University of Texas- Pan Am

1100 – **Distribution of *Leptogorgia* spp. at the Port Aransas, Texas jetties and salinity and tolerance of *Leptogorgia virgulata*.** Emily Williamson, Kevin B. Strychar, Joe M. Fox, and Kim Withers**,** Texas A&M University – Corpus Christi

1120- **Improving coastal land-use planning through the application and interoperation of three decision support tools in the Mission-Aransas NERR.** Kiersten Madden, Sally Morehead, Ken Dunton, Patrick Crist, Doug Walker, Placeways, Dave Eslinger, John Jacob. Mission-Aransas NERR

1200 –TBEM ends, Lunch (not provided)

Sargassum Symposium 2009

Exploring New Methods of Beach Maintenance in Texas

John Adams, convener

April 29-30, 2009

1330 – John Adams, Introductory comments

1345– TGLO speaker

1430 - **The U.S. Army Corps of Engineers Regulatory Progam and how it pertains to Gulf Shore Beaches**. Lloyd Mullins, USACE

1450 **Site specific *Sargassum* maintenance on South Texas beaches**. Jennifer Smith-Engle

1510-Break

1530- **Life's a beach-Maintenance at Gulf Beach**. Derek Herzog

1550- **What has Hurricane Ike taught us about beach and dune maintenance?** Richard Watson

1610- 1630 **South Padre Island Beach Maintenance**. Reuben Trevino, Town of South Padre Island

1650 Posters & Cash bar

1800: Fish Fry

1930: Bar closes

Thursday 30 April 2009

0830- **Beach Maintenance**: City of Port Aransas

0850- **Beach Maintenance**: Nueces County

0910-**Where weed was: seasonal changes in weed lines, driving lanes and dune lines on Mustang Island Gulf Beach**. Tony Amos, Marine Science Institute, Univ. of Texas

0930-**How they do that, various approaches to *Sargassum* maintenance on Texas beaches**. Rob Conti, Texas General Land Office

0950- Break

1010- **Epifauna communities in *Sargassum* beds from El Sauzoso, Baja California Sur, México.** Alvin N. Suárez[1], Gustavo Hernández[2], Rafael Riosmena[1] & Marco A. Medina[1], [1]UABCS, [2]CICMAR-IPN, La Paz, Baja California Sur, México.

1030- **Coastal barrier island network**, Amy Williams, Texas A&M University, College Station

1050-TBA

1110-TBA

1130- ***Sargassum* from space and other news**, John Adams,

1150: Lunch

Field Trip: Car caravan from Port Aransas jetties to Packery Channel

The remarkable site fidelity of wintering piping plovers (*Charadrius melodus*) on Mustang and San Jose barrier island Gulf beaches, Texas.

Anthony F. Amos, The University of Texas Marine Science Institute, Lynn M. Amos, Port Aransas, TX and Cheri Gratto-Trevor, Science and Technology Environment Canada

The piping plover (*Charadrius melodus*), a federally listed new world shorebird, nests in three disparate areas: Eastern Seaboard beaches, the Northern Great Plains of Canada and the US and the Great Lakes. Many winter on Gulf of Mexico barrier island beaches and back-bay mud flats, especially in Texas. A survey of plovers conducted since 1978 on Mustang Island (a 12 km survey site) and since 1995 on San Jose Island (32-km) Gulf beaches, logs the number, group size and territorial habits of individual birds since a banding program on the central nesting grounds was initiated in 2002. 170 differently banded individuals have been observed, many repeatedly (a total of 2,165 banded birds in all). Several individuals have been seen more than 100 times on Mustang Island (maximum = 177 sightings of one individual) over a six-year period. They return to within a few hundred meters of the same place along the Gulf shoreline every year. Some stay there from July of one year to May the following year. Often they desert the Gulf beach in mid-winter for several weeks. On the remote San Jose Island (surveyed on an eight-day schedule rather than the bi-daily schedule on Mustang Island) some birds have been seen six or seven times and are similarly faithful to their chosen wintering sites. We discuss the behavioral differences between San Jose and Mustang Island plovers and the paucity of winter sightings of any of these birds away from the two islands' Gulf beaches.

A Genetic Assessment of Management Strategies for Spotted Seatrout in Texas.

Joel Anderson and William Karel, Texas Parks and Wildlife

The spotted seatrout (*Cynoscion nebulosus*) is an intensively managed finfish occurring in the Gulf of Mexico. In an attempt to provide meaningful data for delineation of management units, genetic divergence has previously been assessed among estuarine populations of spotted seatrout, using various types of genetic markers. However genetic data can be influenced both by contemporary gene flow and historical demography, and these processes often result in similar genetic signatures. In this study, a nested clade analysis (NCA) was used to disentangle the effects of historical and contemporary processes on the distribution of mitochondrial DNA sequence haplotypes in the western Gulf. The NCA was coupled with traditional F-statistics and a mantel-matrix procedure in order to compare the results of multiple analytical frameworks. Overall, genetic divergence among populations was low but significant (F_{ct} = 0.016, P = 0.046), and was highest between populations that were far apart geographically. Correlation between genetic and geographic distance was supported by a significant mantel matrix correlation coefficient (r = 0.717, P = 0.01), as well as two nested clades which had distributions that correlated significantly with latitude. All three statistical procedures suggest that the genetic structure of spotted seatrout in the western Gulf of Mexico can best be described by continuous change, and isolation-by-distance, rather than discreet populations. These results are examined in the context of current management strategies for spotted seatrout on the Texas coast.

Characterization of the Mission-Aransas National Estuarine Research Reserve: hydrography, nutrients and phytoplankton biomass. Ed Buskey, Cammie Hyatt and Tracy Villareal. The University of Texas Marine Science Institute.

The Mission-Aransas National Estuarine Research Reserve (NERR) is the newest in a system of 27 reserves nation-wide. We have established five permanent hydrographic monitoring stations within the reserve along a salinity gradient from the freshwater inflow of the Aransas River to the seawater exchange pass to the open Gulf of Mexico. These stations provide continuous, real time information on temperature, salinity, pH, turbidity, dissolved oxygen, chlorophyll and water level. We also collect monthly nutrient and extracted chlorophyll samples at each station, and collect diel samples at 2 hr intervals over a tidal cycle at the UTMSI pier. Initial examination of monitoring data reveals that there is a strong gradient of decreasing turbidity and phytoplankton biomass from the rivers in Copano Bay to the Aransas Ship Channel. Concentrations of silicate and phosphate also decrease along this gradient, but inorganic nitrogen concentrations are low and variable, and often below detection limits, but concentrations are typically higher in nearshore waters of the Gulf of Mexico. N/P ratios are very low in Copano and Aransas Bays, suggesting nitrogen limitation of phytoplankton growth. N/P ratios just offshore in the Gulf of Mexico are above the Redfield ratio value of 16. It appears that the Mission-Aransas Estuary is nitrogen limited and does not export nitrogen to the Gulf of Mexico, but instead nitrogen is often imported into the system from the Gulf of Mexico through tidal exchange.

Genetic Studies of Hatchery-Supplemented Populations of Red Drum, *Sciaenops ocellatus*, in four Texas bays

Evan W. Carson *Center for Biosystematics and Biodiversity, Texas A&M University, College Station, TX 77843-2258, USA,* S. Karlsson, *Nofima, P.O. 5010, 1432 Ås, Norway,* E. Saillant,*Gulf Coast Research Laboratory, 703 East Beach Drive, Ocean Springs, MS, 39564,* John R. Gold, *Center for Biosystematics and Biodiversity, Texas A&M University, College Station, Texas 77843-2258, USA*

Genetic diversity, population structure, and average, long-term genetic migration and effective size of red drum, *Sciaenops ocellatus*, in each of four Texas bays were assessed using variation in 13 nuclear-encoded microsatellites among samples from the 2004 and 2005 cohorts. Each of the four bays is supplemented annually by the Texas Parks and Wildlife Department (TPWD) with from 1.8 to 5.3 million hatchery-produced, red drum fingerlings. No significant differences in genetic diversity were detected among bays, nor was there evidence of population subdivision. Estimates of the average, long-term migration rate between adjacent bays were low, but fairly symmetric. Estimates of average, long-term effective size in the four bays ranged from 1,602 to 2,587, sufficient to offset concerns regarding population fitness and long-term persistence. The observed high levels of genetic diversity and homogeneity and the estimates of average, long-term effective size indicate that the TPWD stock-enhancement program likely has not genetically compromised the 'wild' red drum subpopulations in the four bays. A novel approach that relates effective size, potential habitat size, and red drum abundance (as measured by CPUE) will be introduced.

Golden Alga (Prymnesium parvum): A Potential Threat to Texas Bays and Estuaries?

Luci Cook-Hildreth, Tim Birdsong, Meridith Byrd, Janet Nelson, Inland and Coastal Fisheries Division Texas Parks and Wildlife Department

Golden alga (*Prymnesium parvum*) is a toxin-producing microscopic alga that occurs worldwide, primarily in estuarine waters. The first confirmed golden alga fish kill in Texas was, however, in inland waters on the Pecos River in 1985. Since 2001, Texas Parks & Wildlife Department (TPWD) has documented fish kills from toxic golden alga blooms in the Brazos, Canadian, Colorado, Red, and Rio Grande River Basins. These blooms have resulted in the loss of over 35 million fish and caused significant impacts to fish production at two state fish hatcheries. In 2006 and again in 2009, toxic golden alga blooms occurred in locations not previously on record and closer to the Texas coast than ever before; fish kills have now been confirmed in the Nueces-Rio Grande Coastal Basin and in the lower Brazos River Basin. Golden alga, a species historically associated with marine and estuarine environments outside of North America, now poses a serious threat to Texas estuarine and coastal ecosystems. This presentation will discuss current inland and coastal monitoring efforts targeted at golden alga, and highlight the results of recent research supported by TPWD focused on improving our understanding of golden alga bloom and toxin dynamics.

From a forest to a desert: What's happening to seagrass in Little Bay?

Colt Cook, Ken Dunton, Ed Buskey, Sally Morehead
Mission Aransas National Estuarine Research Reserve-The University of Texas Marine Science Institute

Little Bay is a small enclosed bay in Rockport, Texas on the eastern side of Live Oak Peninsula. The bay is connected to Aransas Bay through two outlets. Little Bay serves as the primary recipient of storm water drainage from the town of Rockport through Tule Creek and multiple storm water outfalls. In addition, Little Bay receives runoff from the adjacent subdivision of Key Allegro, a canal community that creates a barrier between Aransas Bay and Little Bay. Seagrass density and abundance has declined abruptly the past few years and is currently minimal to nonexistent. The rapid decline is likely attributed to human activity that produced inadequate light levels for seagrass growth. In an effort to determine the cause of the seagrass loss within the bay, measurements of water quality, nutrients and photosynthetic active radiation (PAR) have been collected at ten sites around the bay and in Tule Creek. Additional analysis of nutrients, seagrass density and abundance, total suspended solids, isotopic ratios and continuous measurements of PAR and water quality will be measured within the next year to further identify the causes of the seagrass decline.

Nitrogen Enrichment in the Galveston Bay Estuary Indicated by Stable Isotope Analyses

Danielle Crossen[2], George Guillen[1,2], and Glen Sutton[3]
[1]Environmental Institute of Houston, [2]School of Science and Computer Science, University of Houston Clear Lake, 2700 Bay Area, Houston, Texas 77058, [3]Texas Parks and Wildlife Department. Dickinson, Texas

Stable isotope analysis of estuarine organisms has proven to be an accurate and reliable method for investigating the primary source of nutrition and trophic level of an organism by using carbon (^{13}C) and nitrogen (^{15}N) isotopes, respectively. Because the $\delta^{15}N$ of primary producers in estuaries is dependent on the $\delta^{15}N$ of the dissolved inorganic nitrogen (DIN) pool, anthropogenic nitrogen loads into the estuary can significantly skew the isotopic composition over an entire estuary by increasing DIN values. To evaluate the effects of anthropogenic nitrogen in the Galveston Bay Estuary, stable isotope samples were taken from the predominant species in the estuary. All together, 587 samples were collected from 5 different bays (Galveston, Trinity, East, West, and Christmas). From the data, it appears that nutrient levels and associated measures of productivity appear to be more related to individual bay systems associated with various degrees of urbanization and industrialization. Specifically, nutrient cycling in the upper portion of Galveston Bay and Trinity Bay is heavily influenced by anthropogenic sources inputted by the San Jacinto and Trinity Rivers whereas other secondary bay communities including Christmas and West Bay are primarily driven by in-situ production from marshes and seagrass beds.

Evidence suggesting hyperpycnal flow within a low gradient river delta and implications for both sand and mud transport onto the shelf: Brazos River

Timothy M. Dellapenna, Department of Marine Sciences, TAMUG, Christian Noll, Oceanography Department, TAMU, Bryan Fielder, Oceanography Department, TAMU, Robert Webster, Marine Systems Sciences, TAMU-CC

Sediment transport from river mouths via hyperpycnal flow is a well documented process for high gradient rivers worldwide. However, many important hydrocarbon bearing deltaic systems were derived from lower gradient systems where hyperpycnal flow is not normally attributed. The Brazos River may provide a modern example of such a low gradient river. We had the unique opportunity to sample the mouth and proximal shelf of the Brazos River during the flooding of July 2007. Using a CTD equipped with a turbidity sensor, water column profiles were taken on both along and across shelf transects from the river mouth across and along the river plume. In addition, bottom water samples and shallow gravity cores were collected to determine the thickness of the flood deposit, suspended sediment concentration, porewater salinity and grain size distribution. We found both a high turbidly hypopycnal plume as well as a high turbidity bottom nephaloid layer, with low turbidity in the middle of the water column. Brazos River mud is characteristically red, while marine sediment is olive-grey. Preliminary result reveal a distinctively red, high-water content storm layer, composed of up to 30% sand that extended 5 km from the river mouth. The presence of sand within the storm layer and the high turbidity bottom layer suggests hyperpycnal flow existed during the flood. If this is the case, hyperpycnal flow may be a regular occurrence on the Brazos River and may be more common within low gradient river systems than previously believed, providing an additional mechanism for transporting both sand and mud across the inner shelf.

Carbonate carbon concentrations in sediments from the Bahia Grande Basin: A synoptic survey. Ricardo Franco, Jose Adan Pena, Jesse A. Cantu and Thomas Whelan III University of Texas Pan American

Since the flooding of the Bahia Grande basin in 2005, numerous studies have been conducted to determine the efficiency of this restoration into a viable estuary. One part of this effort is to determine sediment geochemistry. In August 2008 we conducted a basin wide survey of the sediment geochemistry at 75 locations (in triplicate) in a grid pattern across the entire water body. Sediment core samples were collected using a hand held PVC core barrel connected to a one –way valve and a coring handle. Undisturbed upper 5 cm sections were cut, dried, and ground to a fine powder for later processing. Five longer cores from each sector (S, NW, NE) were also taken. Inorganic carbonate concentrations were determined using weight loss following addition of HCl. Average carbonate values were calculated for each of the 3 sectors and were 16.2 % $\pm$ 2.7 for the NW, 17.3% $\pm$ 3.1 for the S, and 20.6 $\pm$ 6.6 for the NE. Contour plots showing surface sediment carbonate carbon also indicate some regional trends. Depth profiles show a carbonate peak at about 25 cm below the sediment surface in all 3 sectors. Elevated carbonate values in the NE are likely due to a high frequency of periodic flooding (relative to the NW and S) during the prevailing southeasterly winds. The consistent carbonate peak at 25 cm below the sediment surface likely represents a horizon that was exposed to seawater during the time (1940) when the Bahia was naturally flooded.

Habitat selection patterns of sharks in northwestern Gulf of Mexico
John T. Froeschke[1], Gregory W. Stunz, Harte Research Institute for Gulf of Mexico Studies and Department of Life Sciences -Texas A&M University-Corpus Christi

Dramatic declines in shark populations worldwide have occurred from overfishing and habitat loss, and designation of Essential Fish Habitat has been congressionally mandated to sustain shark populations. However, this requires detailed knowledge of habitat selection and use that is currently unknown for coastal sharks in northwestern Gulf of Mexico. This study examined habitat selection patterns of five coastal shark species using fisheries-independent gill-net monitoring data from Texas Parks and Wildlife Department (1975-2006). The goals of this study were: 1) describe shark distribution patterns in Texas Bays and 2) relate patterns to environmental and spatial ecosystem attributes. Fifteen species of sharks were collected although only 5 species: Bull, blacktip, bonnethead, Atlantic sharpnose, and finetooth sharks were common enough for analyses. The relative influence of environmental and spatial variables was examined using Boosted Regression Trees, a novel and flexible approach for characterizing fish habitat. The relative influence of environmental attributes varied among species and spatial scales. Large-scale (coast wide) patterns were linked most closely with salinity while small scale (within-bay) patterns were associated with temperature. This study provides an example of a flexible method for identifying essential habitat that can be used for inference or prediction of habitat value for rare species.

Oyster habitat in estuarine ecosystems: Synergy among habitat types and the role of structural complexity in nekton habitat selection. Isis Gain, Gregory W. Stunz, Delbert L. Smee, Harte Research Institute and Department of Life Sciences, Texas A&M University-Corpus Christi, Corpus Christi, Texas 78412, USA.

Oyster reefs are an important component of marine ecosystems and often function as habitat for estuarine species. However, few studies have focused on the interactions of oyster reef with other estuarine habitat types (e.g., seagrasses, marsh). This research was designed to characterize the macrofaunal community associated with shallow oyster reefs and examine functional habitat relationships on oyster reefs in relation to other areas. We also performed a laboratory study to evaluate the effects of structural complexity and predatory influence on habitat selection by red drum (*Sciaenops ocellatus*).We sampled replicate intertidal oyster reef, marsh edge, and seagrass habitats from 2 sites in Corpus Christi Bay, Texas using a 1-m drop sampler. Our results show that high densities of fishes and crustaceans use the oyster reefs at comparable levels to other putative areas suggesting that these locales are important estuarine habitats. The results from the laboratory selection study show that red drum habitat selection is not generally influenced by structured habitats. However, when exposed to predators, red drum demonstrate clear selection patterns for more structured habitat. Studies currently in progress include field predator exclusion experiments to elucidate the role of predators and studies that are examining the synergistic relationships with oyster reef to other estuarine habitat types. These results suggest oyster reef is an important estuarine habitat that may be functioning as a predation refuge for some species.

Characterization of the diamondback terrapin population in West Bay (Galveston bay, Texas). Kelli Haskett and George Guillen, University of Houston Clear Lake, Environmental Institute of Houston, 2700 Bay Area Blvd, Houston, Texas 77058,

The current status of the Texas diamondback terrapin in unknown but believed to be depressed. This is the only turtle species to live exclusively in brackish water. Terrapin are top-level predators that regulate coastal wetland food webs. Their numbers may be declining due to crabbing by-catch and habitat loss, and is considered endangered in many states and a “species of concern” in Texas. The primary objective of our study was to determine current terrapin in portions of the Galveston Bay system. The geographic focus of our study was an area where terrapin have been previously observed in West Bay. The study was conducted during November 2007 through December 2008. Traps, land surveys and mark recapture methods were used to monitor terrapin populations. A total of 129 individual terrapin were caught on North and South Deer Islands. Previous studies by Hogan (2002) using only traps reported 135 terrapin in the same vicinity. There were slightly more males than females captured during our study. Future research is needed in other portions of Galveston Bay and the Texas Coast in order to attain a more comprehensive assessment of the status of Diamondback Terrapin populations.

Integration of hypoxia into reef restoration: Impacts on oyster growth and settlement.
Matthew W. Johnson[1], Sean P. Powers[2], Joseph Senne[2], Keyong Park[2]; [1]Harte Research Institute, TAMU-CC, Corpus Christi, TX, [2]University of South Alabama, Mobile, AL

Reef restoration is an increasingly common technique to restore oyster populations. However, often sites are identified based on historical reef locations rather than an in depth examination of the ecological parameters (i.e. hypoxia) that affect that site. The result is many restored reefs fail to become productive habitats. Here, we develop a technique to evaluate the *in situ* effects of environmental parameters at reef restoration sites prior to reef creation. We deployed replicated oyster covered panels at three historically productive sites that experience different patterns of hypoxia (severe, moderate, and minimal). Panels were placed at different depths (bottom, 1 m, and surface) and were monitored for survival and growth. Instantaneous oyster population growth was significantly different based on location but not depth. Population growth was the least at the severely hypoxic site, moderate at the moderately hypoxic site, and greatest at the minimally hypoxic site. At the least hypoxic site, oyster populations were 3-4 times greater per panel than the other sites. Shell growth was also significantly different among the sites. The greatest growth occurred at the most hypoxic, followed by the least hypoxic site, then the moderately hypoxic site. These results may be due to reduced oyster growth at the least hypoxic site due to overcrowding. Our results suggest that extended periods of moderate hypoxia can be as detrimental as short periods of severe hypoxia. Any reef restoration at the moderately or severely hypoxic sites should result in the creation of reefs greater than 1.5 m to facilitate success.

Improving coastal land-use planning through the application and interoperation of three decision support tools in the Mission-Aransas NERR
Kiersten Madden and Sally Morehead, Mission-Aransas NERR; Ken Dunton, UT Marine Science Institute; Patrick Crist, NatureServe; Doug Walker, Placeways; Dave Eslinger, NOAA Coastal Services Center; John Jacob, Texas SeaGrant

Understanding the linkages between land-use strategies and their effect on coastal ecosystems is critical to development of sound policies that maintain social, economic, and ecological values of coastal communities. Decision support tools (DSTs) integrate land use objectives, socioeconomic indicators, ecological values, and physical characteristics to define outcomes resulting from different land-use scenarios and enable decision makers to make better land-use decisions. The objectives of this project were to use DSTs to evaluate current ecological and socioeconomic conditions, evaluate trends based on current policies and socioeconomic forces, and develop alternative sustainable land-use strategies. To accomplish these objectives, three DSTs were applied in an integrated manner to a Mission-Aransas NERR watershed. CommunityViz (Placeways, LLC) supported the development and analysis of land-use scenarios and socioeconomic indicators. Vista (NatureServe) provided the ability to depict ecological values, evaluate impacts from land-use scenarios, and develop alternative scenarios. The Non-point Source Erosion and Comparison Tool (NOAA Coastal Services Center) was used to predict sedimentation and pollution changes from land-use scenarios and identify areas that are key contributors of these inputs. A documented methodology detailing this integrated land-sea planning approach will be produced and used to assist cities and counties with analyses that demonstrate the need for increased land-use planning authority.

Delineating the water column property variability at the Aransas Pass Tidal Inlet, Texas based on multi-parameter profiler observation. Dong-Ha Min, The University of Texas at Austin, Marine Science Institute, Port Aransas, TX 78373

Mixing and water exchange processes between the local bays and the Gulf of Mexico through the Aransas pass tidal inlet are rather complex. The inlet plays an important role in exchanging living and dead organic matter, salt, and chemicals between the two systems. It is therefore important to tap into long-term as well as episodic events at this location to better understand impacts of natural and anthropogenic variability on regional ecosystem. Sets of time-series measurement of water quality throughout the water column have been made at the UT Marine Science Institute pier during the last two years. Prior to the Fall 2008, all profiling observations were made manually at roughly 4 to 6 hour intervals during the sampling periods. The system has been fully automated since December 2008. Dramatic freshwater discharge event was captured during the summer 2007, and a contrasting saltier condition was observed during the summer 2008. Preliminary data indicate that physical and biogeochemical property differences between the bays and the Gulf might be very different between summer and winter even during the same tidal cycles due to complex mixing mechanism among different water masses. The water quality profiling data will soon be accompanied by a new acoustic Doppler current profiler, by which more quantitative estimate of material exchanges can be made.

A fine scale genetic study of the spotted seatrout, *Cynoscion nebulosus*, along the south Texas Coast. Cynthia Morales, R. Deborah Overath, Texas A&M University Corpus Christi, Robert Vega, Texas Parks and Wildlife Department-CCA/CPL Marine Development Center

Cynoscion nebulosus, spotted seatrout, is a popular recreational fish along the Texas coast. As part of an ongoing fishery management strategy to reverse declines in spotted seatrout catch, the daily fishing bag and possession limit was decreased in the lower Laguna Madre region. In addition, the Texas Parks and Wildlife Department produces juvenile hatchery-reared spotted seatrout for purposes of stock enhancement to supplement 'wild' stocks. Contrary to previous studies of protein and mitochondrial DNA variation in spotted seatrout, recent DNA microsatellite studies utilizing interspecies markers have observed little population structure along the Texas coast. Genetic surveys using species-specific microsatellite loci have been recommended to provide the information needed to develop scientifically-based policies that integrate stock structure and geographic boundaries. Ten novel species-specific polymorphic DNA microsatellite loci were used to investigate the genetic variability and population structure of *C. nebulosus* along the lower Texas Coast. The number of alleles observed in the 10 loci ranged from 4 to 30 alleles, and the mean observed heterozygosity ranged from 0.69 to 0.81. Analysis of Molecular Variance (AMOVA) exhibited low but significant differentiation among populations (4.4%, P= 0.027), and pairwise distance analyses using R_{ST} revealed significant differences between the upper and lower Laguna Madre (0.077, P= 0.022). These results suggest the Laguna Madre is composed of two stocks.

Texas Longline Surveys 1978 to 2009.
Todd Neahr, Texas Parks and Wildlife Department, Coastal Fisheries Division, Corpus Christi.

Texas Parks and Wildlife Department (TPWD) Coastal Fisheries division has conducted several longline surveys, both in state waters and in federal waters since 1978. The first survey, from 1978-1980, examined the commercial potential of using bottom longline gear for harvesting finfish stocks while serving as an alternative for the wintering shrimp trawl fleet. However, sharks were the most abundant group with Atlantic sharpnose sharks the most abundant species. The next study (1989-1990) set longlines to determine changes in relative abundance and size of adult red drum populations from earlier studies; however, catch rates and sizes were similar. The 1989-1990 study was a precursor to the 1992-2008 red drum longline study which continued to monitor adult red drum populations. In 2008, TPWD began a shark longline survey because there was interest from both anglers and coastal fisheries staff to collect fishery-independent shark data. The methods of this study were adopted from the NOAA fisheries longline study. The preliminary results of this longline study can be compared to the NOAA fisheries data as all methods were consistent. This data can be used for multiple purposes at both the federal and state levels.

Fatty acid composition of eggs affects behavioral performance of red drum larvae. Alfredo F. Ojanguren and Lee A. Fuiman, University of Texas at Austin Marine Science Institute - Port Aransas

Our previous studies on behavioral performance of red drum (*Sciaenops ocellatus*) larvae revealed high variability in anti-predator skills among batches, suggesting that individuals from certain batches are more likely to survive to recruitment. Several factors, alone or combined, could explain this variability, including time within the season, variations in maternal contribution to eggs, and environment conditions experienced during early life. In this study, we explored the relationship between egg composition and larval survival skills. Eggs produced by eight captive spawned females were reared until larvae reached the size at which wild red drum settle in seagrass meadows. Escape behavior was assessed using high-speed video to determine responsiveness, latency, distance, duration, speed, and acceleration of responses to simulated predatory stimuli. Biochemical analyses of eggs from 40 batches measured total amounts of carbohydrates, proteins, and lipids, as well as fatty acid profiles. Significant proportions of the observed variability in behavioral variables were explained by egg fatty acid composition. In particular, the proportion of highly unsaturated fatty acids (HUFA) was significantly correlated with distance, duration, and speed of escape responses. Specifically, Arachidonic Acid (AA) and Docosohexaenoic Acid (DHA) were the most important fatty acids for explaining variability in escape responses. To our knowledge this is the first evidence of maternal effects, mediated by fatty acid composition, on anti-predator responses of larval fishes.

A neural network spatial model for salinity in Bahia Grande.
Anthony S. Reisinger*, Philippe Tissot*, David W. Hicks**, and James C. Gibeaut*, *Texas A&M University - Corpus Christi. **University of Texas at Brownsville.

A widely-fluctuating salinity regime has driven the community dynamics of the Bahia Grande restoration site since the 2,630 hectare basin was reflooded by a 4.5 m wide channel extending from the Brownsville Ship Channel in 2005. Two monitoring programs currently are employed in the basin, 1) a basin-wide biological sampling (benthic, epibenthic, and nekton) documents ecological dynamics, and 2) a real-time observing system, consisting of an atmospheric and three water quality monitoring stations record physical parameters. *While these sampling strategies are high resolution in terms of observing system and space for biological, both lack what the other has, therefore large spatial and temporal gaps exist*. A feet forward neural network model was developed to address the spatial and temporal gaps of salinity in the basin. The model is based on the hypothesis that the salinity can be predicated at any point across the basin utilizing only inputs from the observing system independent of flow regimen and is trained using salinity data collected for the biological sampling throughout twelve sampling campaigns. Validation of the model was based on salinities from per biological sampling campaign and the three water quality stations. This model advances the understanding of the physical processes occurring in the basin, and serves as tool for guiding the physical restoration of the Bahia Grande.

The role of stress in the survival of hatchery-reared spotted seatrout (*Cynoscion nebulosus*).
J. Zane Ruddy and Rebekah J. Thomas, Texas A&M University - Corpus Christi.

The spotted seatrout (*Cynoscion nebulosus*) is one of the most sought after sport fish along the Gulf and Atlantic Coasts. Due to increasing recreational fishing pressure, the rearing of juvenile fish in hatcheries for release in bays and estuaries has been utilized. However, there is concern that these fish may not be behaviorally and physiologically prepared to survive in the wild after being subjected to stressors in the hatchery environment and during transport. This study aimed to determine whether handling stress increases the vulnerability of these fish to predation. Sixteen groups of 16 hatchery spotted seatrout were chased and handled with a mesh dip-net until one mortality in each set was observed, resulting in 15 experimental fish presumed to be approaching critically high stress levels (n=240). Fish were placed in a filtered 30-l tank containing an artificial seagrass bottom and two adult pinfish (*Lagodon rhomboides*)—an abundant natural predator of juvenile spotted seatrout. Unstressed control fish (n=240) were permitted a 24 hr acclimation period within the experimental tanks before exposure to predators. Results indicate that stressed hatchery spotted seatrout experience significantly higher ($p<0.05$) levels of predation than unstressed fish, most notably within the first hour. The ability of a fish to evade predators until it reaches reproductive size is essential to the success of the fishery. This study shows that the ability of hatchery spotted seatrout to survive post-release may be influenced by stress.

Evidence of compartmentalized food web structure in Lavaca Bay using gut contents and stable isotopes. James Simons, Texas Parks and Wildlife Department, Jenny Wrast, University of Houston-Clear Lake, Greg Stunz, Texas A&M University-Corpus Christi

Examining food web structure is an important step toward understanding ecosystem-wide interactions and function of marine systems. Recent research has begun to question and replace the static food web model with a new paradigm that takes into account temporal and spatial dynamics. The purpose of this study was to examine spatial trophic structure associated with subtidal oyster reefs compared to other estuarine habitats types (*i.e.,* intertidal marsh and non-vegetated bottom) in Lavaca Bay, Texas. Sampling occurred seasonally from July 2006 to April 2007. The distribution of trophic links among habitat types varied, with the subtidal oyster reef habitat supporting 32 links as compared to 24 and 23 links in the marsh and non-vegetated habitats, respectively. The marsh habitat had a slightly lower mean trophic level of 2.83 as compared to that of 2.94 and 2.92 for the non-vegetated bottom and subtidal oyster reef, respectively. In addition, the taxonomic composition of the food webs differs between the habitat types. This is likely due to factors such as salinity, habitat types, and proximity to a tidal inlet. Combining stomach content and stable isotope methods provides a detailed assessment of food web structure, especially for lower trophic level species. This information is particularly timely because oyster reef coverage in the Lavaca Bay has diminished in the past 100 years.

Heightened prey responses in risky habitats: predation pressure increases prey sensitivity to risk. Delbert Lee Smee, Texas A&M – Corpus Christi

Previous studies have shown that prey living under intense consumer pressure possess stronger defenses against consumers than related species in habitats where consumer pressure is low. We tested whether prey sensitivity to risk would be heightened in habitats with elevated predation pressure and accordingly whether prey living in these areas would be more likely to initiate predator avoidance behaviors. Using the hard clams, *Mercenaria mercenaria*, as a model organism, we compared predation intensity on clams as well as their responses to predation risk from a population in Georgia to one in Maine. Previous studies have shown that clams in Georgia react strongly to chemical cues from sympatric predators. In this study, we found that with the exception of starfish, clams from Maine did not react to their predators, and only responded when presented with cues from injured conspecifics. Predation was significantly greater in Georgia than Maine, and clams from Georgia reacted more frequently and more intensely to risk than Maine conspecifics. The stronger responses from Georgia clams were observed when clams from both populations were assayed using the same level of risk (cue from injured conspecifics) and performed in the same environmental conditions. Our results suggest that prey sensitivity to chemical cues indicative of risk, and the frequency of responses to risk may be related to local consumer pressure. Prey sensitivity to risk subsequently may display a geographical pattern, as predation is generally more intense in lower latitudes.

Epifauna communities in *Sargassum* beds from El Sauzoso, Baja California Sur, México. Alvin N. Suárez[1], Gustavo Hernández[2], Rafael Riosmena[1] & Marco A. Medina[1], [1]UABCS, [2]CICMAR-IPN, La Paz, Baja California Sur, México.

The spatial and temporal variation of community structure of the epifauna inhabiting thallus of *Sargassum* and their changes as a function of the population dynamics of algae was investigated in eight fixed quadrants 20 m apart from each other. The study was carried out inside a subtidal bed, during September 2000 to August 2001 at El Sauzoso, Bahía de La Paz. We found 242,654 individuals classified in 17 taxa. The community structure didn´t show a significant spatial variation pattern. The more dominant groups based on abundance were the amphipods, copepods and gastropods. Temporally, the community structure showed a significant variation during the study time and the amphipods were the most dominant group. The relationship between the total abundance and average richness of phytal animals and morphological variables of the *Sargassum* (biomass and size), as well as the abundance of each taxon, showed that temporal variation pattern of the community was coupled with the development of the algae population. We found which epifaunal populations used the *Sargassum* as habitat during their development. The results showed the ecological role of the brown algae as a critical habitat to maintain biodiversity, in relation to the fauna inhabiting them.

Texas Seashells-A New Illustrated Guide. J.W. Tunnell Jr., J. Andrews, N.C. Barrera, and F. Moretzsohn. Texas A&M University-Corpus Christi

The last comprehensive work on Texas seashells was compiled by Jean Andrews over 30 years ago, in *Shells and Shores of Texas* (1977), which describes approximately 350 species of mollusks. In a collaborative effort, we have prepared an updated and expanded book on Texas seashells. The list of mollusks in marine environments of Texas from the shoreline to deep Gulf of Mexico is now approximately 900 species. This increase is due in part to Andrews' original work being based primarily on self-collected material from near shore habitats. Other reasons for this over two fold increase of species of marine mollusks in Texas include: broader coverage, new records and range extensions, species collected from offshore reefs and banks, deep water species, micromollusks, new species and non-indigenous or invasive species. All families and species are individually described and illustrated in new color photographs, as well as assemblage plates illustrating some of the dominant species found in different habitats. Also included are chapters on the use of shells in Texas coastal history, a chronology of marine Malacology in Texas, molluscan ecology and habitats in Texas, collecting seashells, general features of mollusks and a checklist with habitat, depth range and distribution.

Using New Technology to Measure Fish Movement and Behavior
Lisa Vitale, David Buzan, Andrew Labay, and Mike Weeks, PBS&J, Austin, Texas

Dual-frequency identification sonar referred to as DIDSON, developed by Sound Metrics, Inc., was used to monitor fish movement and behavior in a reservoir and an estuarine cooling pond in Texas. DIDSON collects digital data which provides a near-video quality image in situations where there is not visible light to support the use of underwater cameras. This relatively new technology provides an opportunity to collect extensive data about behavior of fish both as individuals and in schools during different seasons and diurnal conditions. It also allows fish to be measured and in some cases identified to species. One advantage of DIDSON is that it allows information about fish numbers, sizes, and taxonomy to be collected in situations when no traditional fish sampling gear is effective. Another advantage of DIDSON is that it can create detailed images of underwater habitat. Monitoring in some instances was conducted continuously for 24 to 70 consecutive hours during different seasons in 2008. The DIDSON imaged fish moving out of a freshwater reservoir and out of a power plant cooling pond in an estuarine environment. The DIDSON was also used to monitor fish in the open water of the reservoir during trawl sampling. Under certain conditions, organisms as small as 5 mm in length like fish larvae, larval *Chaoborus*, and large zooplankters, ex. *Daphnia lumholtzi*, were observed with this technology.

Geological controls on the distribution of oyster reefs in Copano Bay, Texas. Erin Weaver, Marie Herbort and Timothy M. Dellapenna, Texas A&M University- Galveston; James Simons, Texas Parks and Wildlife Department.

Copano Bay is a shallow (< 2-3 m), microtidal estuary in south central Texas. In an effort to both determine the distribution as well as investigate the controls on the distribution of oyster reefs, Copano Bay was surveyed using sidescan sonar, CHIRP sub-bottom profiler and single beam bathymetry in June and July of 2007. Over 200 survey lines with a spacing interval of 150 m provided maximum coverage of the seafloor. Seismic data were groundtruthed using 77 surface sediment grab samples and 22 vibra-cores collected from various locations across the bay. Samples were analyzed to obtain grain size distribution and shallow stratigraphy. Thematic ArcGIS layers of the sidescan sonar mosaic, surface sediment grain size distribution, along with CHIRP profiles, were used to delineate substrate types, including oyster reefs. CHIRP data reveal that in many cases, there appear to be antecedent geological controls or influences on the position of the oyster reefs. These controls include buried channel levees and late Holocene deltas that provided subsurface foundations which were more capable of supporting reefs than the surrounding, unstabilized bay bottoms. A better understanding of the geological controls on oyster reefs will allow for better management of existing reefs, as well as provide better selection criteria for the placement of new reefs for restoration purposes.

Relationship between salinity stress and spectral reflectance in *Thalassia testudinum* from the Lower Laguna Madre, Texas. Thomas Whelan III, Hudson DeYoe, Michael Persans and Kenneth R. Summy. University of Texas Pan American.

As a part of several experiments to study physiological responses of seagrasses to fresh water stress, we investigated the spectral reflectance of *Thalassia testudinum* in a series of mesocosm experiments. In these experiments, spectral reflectance was used to measure of the magnitude and wavelength of electromagnetic radiation reflected from the surface of a *Thalassia* blade. This information can be used to evaluate pigment differences which in turn are related to the photosynthetic efficiency and ultimately to plant health. In addition, spectral reflectance can be used to evaluate regional scale seagrass stress using satellite imagery. We collected sufficient seagrass to fill 6 drum liners with sediment, roots/rhizomes and intact plants. All *Thalassia* transplants were acclimated for 7 days at 35 ppt salinity in the seawater system at the Coastal Studies Laboratory. After one week, 3 of the 6 transplants were subjected to 13 ppt salinity. Control (35 ppt) and treatment(13 ppt) samples were collected from each mesocosm at T=0, 48, 72 and 192 hours of exposure. A total of 9 samples were analyzed at each time period. Several published indices were used to evaluate the spectral reflectance data including red-edge index, photochemical reflective index and NDVI. The only index which showed any significant difference between control and treatment samples was the Normalized Internal Reflectance (NR) at 192 hrs. Our results indicated that *Thalassia* from the Laguna Madre was more resilient to salinity reductions than reported from other regions.

Distribution of *Leptogorgia* spp. at the Port Aransas, Texas jetties and salinity and tolerance of *Leptogorgia virgulata*. Emily Williamson, Kevin B. Strychar, Joe M. Fox, and Kim Withers, Texas A&M University – Corpus Christi

Little is known regarding temperate gorgonian coral distribution along the northern coast of the Gulf of Mexico and data is notably lacking in Texas. This study will provide population data of *Leptogorgia* spp. found on the Aransas Pass, Texas jetties as well as data on salinity tolerance levels for *Leptogorgia virgulata*. Belt transect surveys were performed in July 2008 along the channel sides of the north and south jetties to determine distribution and community composition of gorgonian species present. Over 300 colonies were recorded within 500m on each jetty with an average density of 0.008895 colonies/m^2. *Leptogorgia virgulata*, *L. setacea*, and *L. hebes* were observed. *Leptogorgia virgulata* samples were then brought into the lab and tested to determine how various salinity levels (10-60psu) affect survivorship by comparing initial and final gross tissue weight after two weeks. Preliminary findings of salinity tolerance show approximately 77% tissue loss at 10psu and 100% loss at 60psu with specimens tolerating a range from 20-45psu. By describing the characteristics and ecology of these coral communities, a better understanding of south Texas inlet habitats will be obtained.

Exploring the Unique Acoustic Characteristics of Seagrasses. Christopher Wilson, Preston Wilson, Kenneth H. Dunton, University of Texas at Austin

Seagrasses serve a vital role in the function of coastal marine habitats around the world. Since the advent of underwater acoustics, it has been shown that seagrasses are acoustically unique when compared to other benthic substrates. It is hypothesized that these unique acoustic properties are caused by the air contained within the aerenchyma of the seagrass tissues. Preliminary results have shown that the acoustic responses of these plants are directly proportional to their areal biomass, which confirms the potential of this technique to assess overall seagrass productivity, both in above and below ground tissues. Current research is focused on the development of a theoretical model in order to explain the acoustic characteristics of seagrasses. Such a model could exploit these unique acoustic properties for the creation of new technologies used for measuring biological production and in situ physiological condition.

The effects of land use on the CO_2 released from subtropical rivers to the atmosphere in the US gulf coast. Fanwei Zeng and Carrie A. Masiello, Department of Earth Science, Rice University, Houston, TX

Rivers are generally supersaturated with CO_2. The rate of CO_2 evasion from rivers to the atmosphere is on an order of 1 Gt C per year globally, comparable to annual river total organic carbon (TOC) or dissolved inorganic carbon (DIC) export to the ocean. Most of the excess CO_2 in rivers originates from terrestrial organic matter. Land use, therefore, is likely an important control on the amount and sources or turnover times of riverine CO_2. In this study, we directly measured partial pressure of dissolved CO_2 (pCO_2), and carbon isotopic signatures ($\Delta^{14}C$ and $\delta^{13}C$) of DIC in two subtropical North American rivers, one entirely urbanized and the other almost undeveloped. Our goal is to evaluate the role of subtropical rivers as a CO_2 source to the atmosphere and the potential impact of urbanization on the amount and sources of evaded CO_2, both of which are poorly known. Both the urbanized and undeveloped rivers studied are highly supersaturated in CO_2 with respect to the atmosphere. Mean CO_2 emission flux for the two rivers is 7.3 Mg C ha^{-1} y^{-1}, close to the Amazon. The undeveloped river is simply putting carbon fixed a few years ago back to the atmosphere, while the urbanized river is releasing hundreds-of-year old carbon to the atmosphere.

Poster Abstracts

Human footprint index of the Texas coast. Jorge Brenner, Ali McKenzie, David Yoskowitz, Harte Research Institute for Gulf of Mexico Studies, Texas A&M University-Corpus Christi.

Many changes of the coastal environment are the result of interactions between humans and ecosystems. Therefore, there is a need to understand this influence and its extent in a practical way for resource managers and policy makers. The human footprint index (HFI) is a spatial measurement of the relative human influence in land use/land covers (Sanderson *et al.* 2002). The HFI represents the sum of human activities and infrastructure. It expresses it as a continuum of the influence across a specific area, revealing major patterns. The HFI was used in this study to map the human influence on the Texas coastal zone. It was assessed using spatial indicators of human population and infrastructure that have the most immediate impact on wildlife and habitats and their capacity to benefit humans. We used four types of data as proxies for human influence in the Texas coast: population density, land transformation, accessibility, and infrastructure. Sub-indicators (spatial layers) of these four groups were analyzed using a raster model in ArcGIS. They were coded into standardized scores that reflected their influence using existing scientific information. The HFI was compiled by adding the individual scores and reclassifying the index by linearly stretching its values to zero (minimum influence) and 100 (maximum influence) in each ecoregion. The HFI map represents the percentage of relative human influence by ecoregions in coastal counties in Texas. This map constitutes a relevant tool in the assessment of the capacity of ecoregions to provide a healthy stream of benefits to humans.

Production and properties of alginate from *S. sinicola* (Setchell y Gardner) and its use in cellular immobilization. Gustavo Hernández Carmona[1], Ricardo Yabur Pacheco[1] & Yoav Bashan[2]. [1]CICIMAR, [2]CIBNOR. La Paz, Baja California Sur, México.

Alginate from *Sargassum sinicola* was produced as raw material to immobilize the microalga *Chlorella sorokiniana* and the microalga growth promoting bacteria *Azospirillum brasilense*, for wastewater treatment and tomato plants growth promotion. During the extraction of the alginate, different steps on the production method were analyzed. The yield, production costs, viscosity, color, and phenolic compounds concentration were evaluated. Alginate composition and structure was analyzed by ^{1}H NMR. Results were compared with commercially alginate from *Macrocystis pyrifera*. Using the optimized process the alginate yield was 15%, costing 7.8 USD kg^{-1}. Alginate from *S. sinicola* contains more guluronic acid (FG = 0.64) than mannuronic acid (FM = 0.38), and a viscosity of 100 mPa s (2 %). It had dark brownish color with more phenolic compounds than *M. pyrifera*. Despite these characteristics, the growth of *C. sorokiniana* and *A. brasilense* in *S. sinicola* alginate beads was not significantly different than growth in *M. pyrifera* alginate beads. The growth of *C. sorokiniana* was uniform inside the beads in both alginates, and the nutriments removal (phosphates and ammonium) from wastewater was similar. The growth of tomato plants inoculated with *S. sinicola* alginate microbeads was enhanced as good as with the *M. pyrifera* alginate.

Map representing changes in scarring between 2007-2008 for Redfish Bay, TX.
Faye Grubbs and Ashley Summers –Texas Parks and Wildlife Department, Rockport, Texas

Redfish Bay area adjacent to Port Aransas, TX hosts a variety of habitats including mangroves, oyster reef, and seagrasses. Seagrasses fill important ecological roles as bio-filters, sediment stabilizers, oxygen producers, as well as forage and protection for organisms at all trophic levels. As the demand for sunlight restricts growth of these marine plants to shallow water, they are susceptible to damage caused by boat propellers. In order to sustain the resource, Texas Parks and Wildlife Department (TPWD) implemented a law prohibiting the up-rooting of seagrass within Redfish Bay State Scientific Area (RBSSA) in 2006. To asses the regulation, aerial imagery was acquired for north Redfish Bay (7,800 acres) in March of 2007 and 2008 at 1:4,800 resolution (0.10 meter) to determine total scarred area. The first step involved using automated software to pull out scars from the 2007 imagery. The automated product was split into three groups according to the level of scarring present: low, medium, and high to make the estimates more accurate. The entire study area was gridded and a stratified random sample was selected, based on the scarring-intensity groups. This resulted in 300 grids in which a GIS analyst digitized "linear disturbances." After the linear disturbances for 2007 and 2008 were digitized, the difference was found between them for each grid. ArcGIS interpolation tools were used to estimate all the unknown areas. From 2007 to 2008 we saw increased scarring in the northern areas and decreased scarring around the Terminal Causeway area.

A preliminary microsatellite linkage map of the red drum (Sciaenops ocellatus). Christopher M Hollenbeck, David S Portnoy, Mark A Renshaw and John R Gold, Center for Biosystematics and Biodiversity, Texas A&M University-College Station

A genetic linkage map was generated for the red drum (*Sciaenops ocellatus*), a marine fish species of considerable economic importance in the southeastern United States. Two single-pair mating families of 104 progeny were genotyped at 60 nuclear-encoded microsatellites and analysis of the data enabled identification of 13 linkage groups. The linear arrangement of the microsatellites within each linkage group was determined and map distances between adjacent markers were estimated. Significant family- and sex-specific differences in recombination rates between adjacent loci were found. This project represents the beginning of a microsatellite-based linkage map for red drum.

Integration of hypoxia into reef restoration: Impacts on oyster growth and settlement.
Matthew W. Johnson[1], Sean P. Powers[2], Joseph Senne[2], Keyong Park[2]; [1]Harte Research Institute, TAMU-CC, Corpus Christi, TX, [2]University of South Alabama, Mobile, AL

Reef restoration is an increasingly common technique to restore oyster populations. However, often sites are identified based on historical reef locations rather than an in depth examination of the ecological parameters (i.e. hypoxia) that affect that site. The result is many restored reefs fail to become productive habitats. Here, we develop a technique to evaluate the *in situ* effects of environmental parameters at reef restoration sites prior to reef creation. We deployed replicated oyster covered panels at three historically productive sites that experience different patterns of hypoxia (severe, moderate, and minimal). Panels were placed at different depths (bottom, 1 m, and surface) and were monitored for survival and growth. Instantaneous oyster population growth was significantly different based on location but not depth. Population growth was the least at the severely hypoxic site, moderate at the moderately hypoxic site, and greatest at the minimally hypoxic site. At the least hypoxic site, oyster populations were 3-4 times greater per panel than the other sites. Shell growth was also significantly different among the sites. The greatest growth occurred at the most hypoxic, followed by the least hypoxic site, then the moderately hypoxic site. These results may be due to reduced oyster growth at the least hypoxic site due to overcrowding. Our results suggest that extended periods of moderate hypoxia can be as detrimental as short periods of severe hypoxia. Any reef restoration at the moderately or severely hypoxic sites should result in the creation of reefs greater than 1.5 m to facilitate success.

Climate change and global warming: temperature and salinity testing on the sponge *Cliona celata* from the Port Aransas jetties, Texas.
Amber Miller, Kevin Strychar, Texas A&M University-Corpus Christi, TX; Thomas Shirley, Harte Research Institute, Corpus Christi, TX; Klaus Rützler, National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Temperatures in the Gulf of Mexico will increase approximately 2ºC by 2050 and an additional 2 - 4ºC over the next 100 years and may cause either a complete loss or partial bleaching of organisms that contain photosynthetic bacteria or algae as symbionts. The overall health and status of our coastal waters can be evaluated by monitoring responses to heat stress by organisms. Poriferans (sponges) are common filter-feeding invertebrates on hard substrate in the Gulf of Mexico and are used by numerous aquatic organisms for food, habitat, and chemical defense against predators. The biochemical constituents of sponges are partly contributed by unique symbionts contained within or harvested by different poriferan species. The encrusting sponge, *Cliona celata* (Gray 1826), is a prevalent species on the Port Aransas jetties and contains pigments which may be monitored to document the effects of climate change. In this study, high performance liquid chromatography (HPLC) and ultraviolet spectrophotometry were used to determine whether changes in temperature and salinity cause pigment degradation and similar symptoms of stress as has been reported for various coral species. Over time, sponge samples exposed to 30.6 and 33ºC visually showed a loss of pigmentation.

Characterization of Dissolved Organic Matter in the Mission River at Fennessey Ranch. Samantha Myers, University of Texas- Austin

Determining the composition and origin of dissolved organic matter (DOM) in aquatic systems is essential to understanding ecosystem dynamics. Under normal conditions, there is an expected decrease in DOM concentration as rivers flow toward ocean waters. However, if primary productivity increases, there may also be an increase in overall DOM levels. DOM in river systems is greatly affected by vegetation in surrounding freshwater and saltwater wetlands, as well as by rain and runoff. Freshwater wetlands are a prominent feature at Fennessey Ranch and surround most of the Mission River. In these wetlands, DOM originates from detritus of terrestrial plants through leaching and microbial breakdown of decaying leaf structure. Bacteria recycle DOM into particulate organic matter for use in the microbial loop and higher trophic levels. To understand and characterize DOM in the Mission River, water samples were taken weekly along transects and analyzed for fluorescence, absorbance, dissolved organic carbon (DOC), and total dissolved nitrogen (TDN). Results suggest that DOC concentrations in the Mission River do not follow the normal negative correlation with salinity as the river flows downstream and instead show an increase in DOC concentrations. High concentrations of DOC at a mid-river site may be the result of a point source caused by increased runoff within the watershed that may or may not be associated with Fennessey Ranch.

Methyl halide flux variability from a South Texas salt marsh. Dong-Ha Min, The University of Texas at Austin, Marine Science Institute, Port Aransas, TX 78373; Robert C. Rhew, University of California, Berkeley, Department of Geography, Berkeley, CA 94720

Coastal salt marshes are highly productive environments where climate-related trace gases are actively being exchanged with the atmosphere. Three sets of measurements have now been conducted on subtropical salt marshes in South Texas near Port Aransas to determine emission rates of methyl halides. In the first outing (2006), we found that *Batis maritima* emits methyl chloride (MeCl) and methyl bromide (MeBr) at rates that are orders of magnitude greater than other predominant species, so additional studies focused on this plant species. In the second outing (2008), we observed some of the largest fluxes ever recorded for natural methyl halide emissions on a per area basis, with larger fluxes in the afternoon than in the morning. In the third outing (2009), we conducted studies over a 24 hour period to demonstrate the diurnal variability of fluxes at *Batis* sites. These show that fluxes have a strong diurnal variability, with lowest fluxes prior to sunrise and the highest fluxes midday. Thus far, emission rates follow the expected seasonality of the growing season. These fluxes from subtropical salt marshes are much higher than fluxes measured at temperate salt marshes at similar times of the year, supporting the suggestion that salt marshes are globally significant sources of MeCl and MeBr.

Fecundity and fertility of the species that forms the *Sargassum* beds in the South-Western coast of the Gulf of California. Miriam Morales-Murillo[1], Juan Manuel López-Vivas[1], Rafael Riosmena-Rodríguez[1]. [1]UABCS. La Paz, B.C.S., México.

Intertidal and subtidal zones of the Gulf of California are dominated by *Sargassum* beds. For the northeast zone it has been proposed that it exist a marked zonation in the composition of species, that forms these forests and that's the effect of a differential recruitment. In the southwestern region it has been suggested that only two species compose it: *S. horridum* and *S. lapazeanum*. Different aspects from the population are known, but its reproductive biology is unknown. The aim of the present study is to know the reproductive biology of the two species in La Paz Bay, B.C.S., through indicators such as density of reproductive thalli, biomass in wet and dry weight (vegetative and reproductive) as well as fecundity and fertility. They present the maximum biomass and size season during spring-summer and a minimum in autumn-winter. The reproductive phase starts in april, showing the highest amount of reproductive thalli in may (94%). *S. horridum* showed more reproductive biomass with bigger reproductive structures, receptacles and caulines, than *S. lapazeanum,* because the mantle where it was collected it's larger and predominantly composed of *S. horridum* meanwhile the other collect site is smaller and *S. lapazeanum* is mainly located there. There weren't significant differences between the thallus sizes on each species.

Biodiversity of marine mollusks in the Gulf of Mexico. Fabio Moretzsohn and John W. Tunnell, Jr., Texas A&M University-Corpus Christi

An all-species biotic inventory of the Gulf of Mexico (GMx) has recently been completed; here we report on the mollusks. Eighteen authors from 15 institutions in five countries compiled a well-documented yet conservative checklist of 2455 marine mollusk species, including updated taxonomy, habitat, depth, and distribution within the boundaries of the GMx as defined in this project. This is the most comprehensive effort to date in documenting GMx mollusks. Nine apparently introduced species were recorded and 259 species are currently considered endemic (10% endemism). The southeast quadrant (including the Florida Keys, NW Cuba and NE Yucatan Peninsula) showed the highest diversity and SW the lowest, but most sampling effort has been highest in the SE and least in the SW. Discovery of new species is still common, with about 9% having been described in the last 20 years. Sampling of micromollusks and nudibranchs, as well as deepwater species is still poor in many areas, therefore continuing discovery of new species and GMx occurrences of species from neighboring waters are expected [supported under the Harte Research Institute for GMx Studies].

Characterization of Dissolved Organic Matter in the Mission River at Fennessey Ranch.
Samantha Myers, University of Texas- Austin

Determining the composition and origin of dissolved organic matter (DOM) in aquatic systems is essential to understanding ecosystem dynamics. Under normal conditions, there is an expected decrease in DOM concentration as rivers flow toward ocean waters. However, if primary productivity increases, there may also be an increase in overall DOM levels. DOM in river systems is greatly affected by vegetation in surrounding freshwater and saltwater wetlands, as well as by rain and runoff. Freshwater wetlands are a prominent feature at Fennessey Ranch and surround most of the Mission River. In these wetlands, DOM originates from detritus of terrestrial plants through leaching and microbial breakdown of decaying leaf structure. Bacteria recycle DOM into particulate organic matter for use in the microbial loop and higher trophic levels. To understand and characterize DOM in the Mission River, water samples were taken weekly along transects and analyzed for fluorescence, absorbance, dissolved organic carbon (DOC), and total dissolved nitrogen (TDN). Results suggest that DOC concentrations in the Mission River do not follow the normal negative correlation with salinity as the river flows downstream and instead show an increase in DOC concentrations. High concentrations of DOC at a mid-river site may be the result of a point source caused by increased runoff within the watershed that may or may not be associated with Fennessey Ranch.

Extracting surface features of the Nueces River Delta using lidar points
Lihong Su and James Gibeaut, Harte Research Institute for Gulf of Mexico Studies, Texas A&M University - Corpus Christi

Lidar has become one of the major techniques to collect topographic data. During February 2007, the Bureau of Economic Geology at The University of Texas at Austin acquired research-quality lidar data of the Nueces River Delta. The lidar points include reflections from the substrate, vegetation cover, water surface, buildings, and infrastructure. Further data processing of the lidar point cloud is required to generate a bare-earth DEM and to extract features from the landscape.

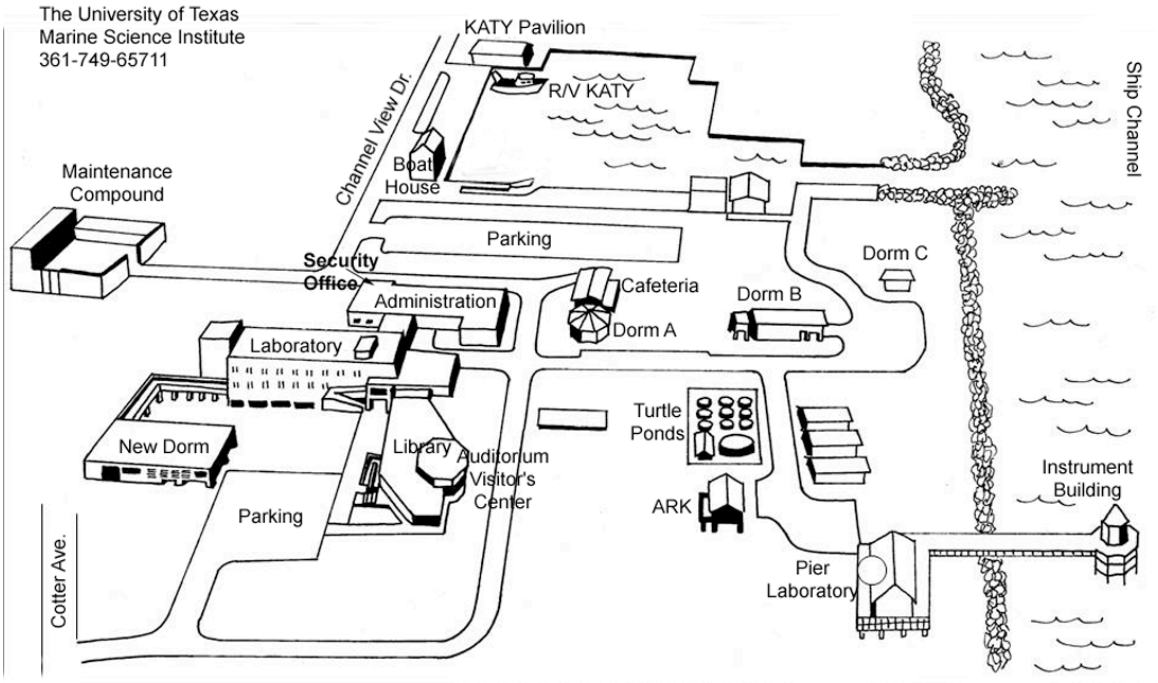
The Nueces river delta is a low-lying landform with natural topographic relief of less than 3 m. The delta consists of morphological features including ponds, man-made and natural tidal and river channels with levees, natural marsh and marsh restoration areas, barren flats, and upland areas. Vegetation cover ranges from barren areas to marsh and upland grasses typically up to 1-m high with varying cover density and scrub/shrub areas 1- to 3-m high. A novel filter based on re-sampling and interpolation was designed to remove shrubs, trees, and buildings while keeping levees and channels. In addition, physical characteristics of laser shot interactions with water and land surfaces were considered in developing a new method, based on neighbor properties of lidar point clouds, for classifying lidar points as reflections from water or land. Preliminary results from the two methods are promising. It is a challenging task to separate grass points from ground points due to low heights and varying densities of cover. Methods based on roughness to classify grasses are also being explored.

Fauna associated to *Sargassum* beds in the subtidal rocky shore at El Sauzoso, Baja California Sur, México. Alvin N. Suárez[1], Rafael Riosmena[1], Gustavo Hernández[2], José de la Cruz[1] & Ismael Mascareñas[1], [1]UABCS, [2]CICIMAR-IPN, La Paz, Baja California Sur, México.

In this work, we examined whether the presence of large fucalean *Sargassum* influenced in the community structure of macrofauna in the subtidal rocky shores at El Sauzoso, Bahía de La Paz. The composition and abundance of epibenthic invertebrates was estimated during February to August 2008 in twenty fixed quadrants of 1 m^2 with and without presence of *Sargassum* inside the bed, and fish composition during August 2007 to August 2008 in presence and absence of natural bed in the locality. We found a total of 54 taxa of epibenthic invertebrates and 47 species of fishes. The community structure of epibenthic invertebrate in quadrants with *Sargassum* didn´t show a significant variation compared with quadrants without *Sargassum*. However, during the study we found high values of mean richness, abundance and diversity of epibenthic invertebrate in quadrants with *Sargassum*. The mean richness of fishes in presence of the *Sargassum* bed show a significant variation compared in absence of the bed in the locality. The results showed that the presence of alga adds complexity to rocky shores and increases the number of ecological niches, becoming a critical habitat for maintaining the biodiversity.

Historical macroalgal biodiversity shifts associated with *Sargassum* forest. Cynthia G.Valdez-Navarrete[1], Rafael Riosmena-Rodríguez[1], Javier Orduña-Rojas[2], Juan M. Lopez-Vivas[1], Jazmín Hernández-Kantún[1] & Alvin N. Suarez-Castillo[1]. **[1]UABCS-[2]CIIDIR-IPN.** La Paz B.C.S.,México.

Macroalgal communities trends in space-time scales ranging from years to decades, as reflected in organization and biogeographic affinities. Due to the complexity of the environment on communities of *Sargassum* forests, in this study the goal was to analyzed the relationships between associated macroalgae species richness at various scales of space and time to find answers to short and long term shift within the system. It was realized a compilation of four historical localities. During a year, three localities were sampled every month and were evaluated to compare changes on spatial and temporal richness. A total of 308 species were found of which 256 were collected in historic samples and 41 species in modern sampling. In proportion, the Rhodophyta division had the greater number of species associated to this community. Nevertheless, the community is based on 4 or 5 dominant species throughout the year, and some of these are annual species that promote temporal changes. Finally, using an index of taxonomic distinctness, relations between historical and modern samples were analyzed and results suggest that independent changes owe to possibly by geographic isolation and climatic or geologic factors that affect the ecosystem.



The Marine Science Institute is dedicated to the three primary functions of a major university (education, research, and service) as they apply to the Texas coastal zone. It is an organized research unit of the University of Texas at Austin and emphasizes both basic and applied research aimed at understanding the biological, chemical, and physical processes governing the coastal zone ecosystem.