SPECIES PROTECTION ABSTRACTS

MONITORING THE URBANIZED DOLPHINS OF UPPER GALVESTON BAY

Kristi Fazioli – Environmental Institute of Houston, University of Houston-Clear Lake, Houston, TX

Vanessa Mintzer – The Galveston Bay Foundation, Webster, TX

George Guillen - Environmental Institute of Houston, University of Houston-Clear Lake, Houston, TX

Critical data gaps exist for all Texas bay, sound and estuary bottlenose dolphin (*Tursiops truncatus*) stocks and managers consider Galveston Bay a high priority for research. Surveys conducted in 2013-2015 suggest that a bottlenose dolphin population regularly utilizes upper Galveston Bay and the Houston Ship Channel. This highly industrialized region of the bay was previously thought to have very little dolphin activity. An increasing trend of dolphin activity in this area could reflect the success of efforts to protect Galveston Bay and improve water quality over the past 30 years, however little is known about habitat use, site fidelity or stock structure in the region. Elevated exposure to contaminants in upper Galveston Bay, combined with additional anthropogenic stressors such as habitat loss, harmful algal blooms, noise pollution and human and fisheries interactions, place dolphins at high risk.

The Galveston Bay Foundation has partnered with the Environmental Institute of Houston at the University of Houston, Clear Lake to conduct research on this understudied population and establish the Galveston Bay Dolphin Research and Conservation Program (GDRCP). Through long-term photo-id monitoring, mark-recapture techniques and remote biopsy darting, this program aims to tackle fundamental questions pertaining to the population's ecology, health and behavior. Additionally, GDRCP is examining historical data and conducting a survey of long term bay users to provide context to current trends.

As of March 2015, we have conducted 16 boat-based surveys, resulting in the observation of 364 dolphins in 56 groups. A total of 196 dolphins have been uniquely identified through photo-identification. Dolphins were sighted year-round and of the marked dolphins, 30% were sighted more than once, suggesting the possibility of a resident population. Observations indicate an increase in abundance during the summer and fall months, which supports previous data suggestive of a seasonal coastal migration between Texas bays. Findings also indicate high levels of association with shrimp trawlers (30% of groups sighted) and vessels traversing the Houston Ship Channel (bow-riding observed in 23% of groups sighted). Considering the exceptionally high levels of human activity in UGB, it is imperative to continue monitoring this population, with focus on understanding residency and habitat use patterns, as well as the impact of anthropogenic threats.

BIRD MONITORING IN THE GALVESTON BAY WATERSHED: CURRENT EFFORTS AND OPPORTUNITIES TO FILL DATA GAPS

Richard E. Gibbons* and Peter Deichmann

Wildlife conservation requires an understanding of the distribution, abundance, and movement of organisms across wide geographic space and over sufficient periods of time. Monitoring wildlife is essential for measuring efficacy of local and regional management actions and estimating population trends. Current bird monitoring efforts in the Galveston Bay Watershed are directed toward targeted assemblages such as waterfowl counts, colonial waterbirds, seabirds, and shorebirds, and single species monitoring such as Wilson's Plover, Piping Plover, and Rusty Blackbird. Additional regional monitoring projects, such as Houston Audubon's Monthly Bird Counts, aim to gather bird community samples using volunteer citizen scientists. Finally, the venerable Christmas Bird Counts and Breeding Bird Surveys are long-term programs that are the classic indices that measure wintering and breeding birds respectively.

Still, gaps remain in our knowledge for important groups of birds, such as secretive marsh birds, non-game waterbirds, many shorebirds, and scores of migratory species that pass through using working farmland and various habitats as stopover habitat. With improving technology and a growing interest in wildlife observation and citizen science, opportunities exist to bring partners and stakeholders together to gather data for these poorly known species. These opportunities will be discussed and proposals made to fill some of the gaps.

1. Richard E. Gibbons, Conservation Director; Houston Audubon, 440 Wilchester Blvd, Houston, TX 77079; rgibbons@houstonaudubon.org; (225) 614-4008
2. Oral presentation, panel session with Houston Audubon bird conservation topics
3. Monitoring and Research

INVASIVE SPECIES MONITORING, MANAGEMENT, AND PREVENTION

Lisa A. Gonzalez, HARC, The Woodlands, Texas

Stephanie M. Glenn, HARC, The Woodlands, Texas

The Galveston Bay Plan (*The Plan*; 1995) and the Galveston Bay Strategic Action Plan (2006) include goals, objectives and actions that relate to reducing or eradicating populations of exotic invasive species and preventing new species invasions. The original objective of *The Plan* was to reduce the abundance of selected exotic invasive species by ten percent by the year 2005. The Strategic Action Plan identified a ten-year approach with objectives relating to invasive species management, research, and public education (for the purpose of prevention).

In 2004, the Galveston Bay Estuary Program, HARC and regional stakeholders conducted a comparative risk assessment of aquatic and terrestrial species that were invasive and potentially invasive to ecosystems in the Lower Galveston Bay Watershed. The exercise yielded a list of invasive species for the Houston-Galveston region never before compiled. 296 invasive aquatic and terrestrial plants and animals were identified as current or future invaders of the Lower Galveston Bay Watershed; especially high risk species were also identified.

Much has changed since the Galveston Bay Invasive Species Risk Assessment was completed in 2004. Some of the species identified by the risk assessment have indeed invaded the Lower Galveston Bay Watershed, while new invaders that were not imagined during that inaugural effort have also been identified in the region. Citizen science and traditional natural resource monitoring programs now contribute information to national databases that track species invasions at county and watershed levels. New risk assessment tools for species entering through the nursery and aquarium trades and other introduction pathways have been developed by HARC and others around the US. New invasion pathways, such as internet sales, have materialized. Some attempts to strengthen local, state and federal rules regulating the flow of exotic and invasive species through trade have succeeded while others have failed. The use of technology, such as social media and smart phones, have become mainstream for outreach and education efforts. Government agencies, universities and nonprofit organizations are using these methods for invasive species education campaigns. At the time the Galveston Bay Plan was written, it was estimated that the public cost of new actions over 5 years would be less than $450,000. We now know the costs to control and prevent species invasions and restore habitats are much higher.

The proposed session will feature speakers that are working on invasive species issues. Presentations will provide information describing the current status of species invasion (plants, animals, and disease organisms) in the Lower Galveston Bay Watershed; programs to monitor species invasions; techniques to manage invasive species in aquatic and terrestrial systems; developments in invasive species regulation in Texas; and public education efforts and risk assessment tools to prevent future species invasions.

1. This abstract is proposed for a panel session. It can be pared down for an oral presentation if desired.

2. Session moderators:

    a. Lisa A. Gonzalez, Vice President, Houston Advanced Research Center, 4800 Research Forest, The Woodlands, Texas 77381, 281-364-6044 (office); 281-364-6070 (assistant); 281-364-6001 (FAX), lgonzalez@harcresearch.org

    b. Stephanie M. Glenn, Hydrology and Watersheds, Houston Advanced Research Center, 4800 Research Forest, The Woodlands, Texas 77381, 281-364-6042 (office); 281-364-6001 (FAX), sglenn@harcresearch.org

3. Proposed panelists (number can vary depending on available time):

    a. Invasive species overview/status of invasion: Ms. Lisa A. Gonzalez, HARC

    b. Invasive species monitoring: Dr. Damon Waitt, University of Texas, Ladybird Johnson Wildflower Center, Texas Invaders Program

    c. Species invasion spotlight on zebra mussels in the Trinity River: Dr. Robert McMahon, University of Texas at Arlington

    d. Techniques to manage invasive species in aquatic and terrestrial systems: Mr. Mark Kramer, Armand Bayou Nature Center

    e. Developments in invasive species regulation in Texas: Ms. Leslie Hartman, Texas Parks and Wildlife Department, Coastal Fisheries Division, and the Gulf South Atlantic Regional Panel (GSARP) on Invasive Species

    f. Public education and tools to prevent future species invasions: Dr. Stephanie M. Glenn, HARC

4. The content of this abstract deals with “Species Protection.”

Low-cost mapping of intertidal reefs using side-scanning sonar and drone systems

George Guillen, Environmental Institute of Houston, University of Houston Clear Lake, Houston, Texas

Mustafa Mokrech, Environmental Institute of Houston, University of Houston Clear Lake, Houston, Texas

James Earl Yokley, Environmental Institute of Houston, University of Houston Clear Lake, Houston, Texas

Oyster reefs provide important environmental services including water filtration and purification, protection of seagrass beds and saltmarshes from wave action, forage for some invertebrates and finfish, and habitat for numerous marine organisms including commercially and recreationally important finfish. Mapping the physical extent and conditions of these reefs provides scientists and managers with data on the current status of oyster populations and hard bottom habitat within an estuary as well as information needed for ongoing oyster conservation and restoration efforts. Although subtidal reefs in relatively deeper water have been mapped using sonar and other traditional technologies, the extent and conditions of intertidal reefs have not been sufficiently inventoried in most states. The geographic extent and conditions of intertidal oyster reefs and shell bottoms, including small patch reefs, are important to document and inventory for assessing the extent of parental adult stock and to determine potential recruitment bottlenecks for oysters within an estuary. Mapping intertidal shallow reefs are usually impeded by navigation and the inability to use traditional side scan sonar and survey methods. This research project applies side-scanning sonar system (where water depth > 3 feet) combined with drone photography (for shallow water where water depth < 3 feet) together with digital image processing techniques to identify and map selected intertidal oyster reefs and shell bottom at two selected sites in West Bay and Christmas Bay.

The low-cost side scanning sonar is mounted on a shallow draft boat to map shallow water habitat not accessible to larger draft vessels that utilize commercial grade side scan sonar instrumentation. The shallow subtidal represents a transition zone along with intertidal area that provides habitat for wading birds and other organisms and contains a potentially large numbers of oysters that provide key ecosystem services and provides habitat for wading birds, juvenile fish and invertebrates that remains unsurveyed. This novel approach for surveying the shallow subtidal zone provides this critically needed information. On the other hand, the low-cost low altitude photography using drones uses high-resolution digital cameras to acquire high-resolution images at the selected sites to evaluate the ability to map intertidal reefs at reasonable costs. The collected images are digitally processed through multiple steps including spatial registration, spectral enhancement and classification. Field verification through diving, walking and shallow boat surveys are considered in the validation process.

This project presents the initial results of the combined use of these technologies and the new information on the distribution of intertidal and shallow subtidal oyster reefs and shell hash with a discussion on potential applications of these technologies.

Primary Presenter:
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Type of presentation: Poster

Potential topical area: Monitoring and Research

TRENDS IN THE ABUNDANCE OF TEXAS DIAMOND-BACKED TERRAPIN, *MALACLEMYS TERRAPIN LITTORALIS* IN GALVESTON BAY

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Jenny Oakley[1]

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Abstract

The Texas Diamondback, *Malaclemys terrapin littoralis*, is the only naturally occurring species of turtle found in estuaries ranging from Sabine Lake to Baffin Bay. Terrapin have been identified as a species of concern by state and federal agencies. The primary objectives of our study were to 1) determine distribution and trends in abundance and 2) determine critical factors affecting terrapin in Galveston Bay and the Texas coast. We conducted a literature review, interviews, and field studies during 2014. Information on location, method captured, habitat, and environmental data were collected to evaluate their possible relationship with terrapin distribution. The first report of terrapin in Texas is 1841. The primary factor causing major declines in terrapin from 1841 to the 1920 was commercial harvest of the species for food. During 1912 through 1975 the shell dredging industry removed large amounts of oyster shell in Texas including shell beaches and small islands. One of the largest known populations of Texas terrapin today are found in the West Galveston Bay near or on isolated islands with shell beaches. The only reported sightings of nesting terrapin have been on shell beaches located in West Bay and nearby Moses Lake. We conclude that the two primary factors causing major declines in terrapin before the 1970's were overharvesting and loss of nesting habitat. Current anthropogenic sources of mortality include bycatch associated with the blue crab fishery and boat collisions. Due to a small home range ($\leq$ 254 hectares), loss of nesting and marsh foraging habitat, terrapin face an increased risk of extirpation.

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THE STATUS OF AMERICAN OYSTERCATCHERS IN GALVESTON BAY

Susan A. Heath
Gulf Coast Bird Observatory
Lake Jackson, TX

The Gulf Coast Bird Observatory has committed the last five years to investigating the status of the American Oystercatcher (*Haematopus palliatus palliatus*) in the western Gulf including Galveston Bay, Texas. The American Oystercatcher is a species of high concern in the U.S. Shorebird Conservation Plan, a National Fish and Wildlife Foundation priority species, and a Texas Wildlife Action Plan priority species. This species is at risk due to its low overall population size, the fact that it is confined to the coastal zone, a low overall reproductive success, and a delayed breeding system. Prior to the initiation of our study, there had been much research conducted on the Atlantic coast concerning this species but no investigation of their status in the western Gulf of Mexico.

The western Gulf population of oystercatcher represents about 5% of the total population in the U.S. with approximately 500 birds located in Texas. The majority of oystercatchers in Texas are located on the Upper and Central coasts with very few pairs nesting south of Corpus Christi. The Galveston Bay area supports approximately 80 pairs of nesting oystercatchers with an unknown number of sub-adults that have not entered the breeding population. Oystercatchers do not breed until they are at least three years of age. Sub-adults appear to congregate in areas of high food abundance including Rollover Pass, San Luis Pass, and reef systems throughout the bays that are not included in adult feeding territories.

In general, the greatest negative factors for nesting oystercatchers are predation, overwash, and human disturbance. On that Atlantic coast, mammalian predation may be the single most negative factor but because western Gulf oystercatchers nest primarily on bay islands mammalian predation is not an issue. Avian predation from Laughing Gulls can have a significant effect on nest success, however. Gulf wind driven tides present a significant overwash threat and therefore weather may the single most negative factor for western Gulf oystercatchers. Human disturbance is also a significant factor because it keeps adults away from eggs and young chicks leaving them vulnerable to predation from hungry Laughing Gulls.

Western Gulf oystercatchers initiate nesting in February with the latest nests found in June. Chicks are fledged by the end of July but remain with their parents for a number of months while they learn to feed efficiently. Oystercatchers with failed nests will attempt to re-nest two or three times until it becomes too late in the season for success. Productivity during our study has ranged from a low of 0.21 to a high of 0.78 meaning that 21% and 78% of pairs, respectively, fledged at least one chick. Overall productivity was 0.49 which is slightly higher than that of Atlantic coast birds.

In the Galveston Bay system, nesting habitat appears to be a limiting factor for this species. American Oystercatchers are not colonial waterbirds, therefore they nest singly within colonial waterbird colonies or on small islands as single pairs. They prefer shell substrate for nesting but must also have access to sub-tidal reefs for feeding. When adult pair member abandons a mate or dies, they are replaced within two weeks indicating a population of unpaired adults waiting for a nesting opportunity. GCBO biologists are working with several organizations on habitat restoration specifically designed for oystercatcher nesting.

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Oral presentation requested within George Guillen's proposed "status and trends" session
This presentation falls within the "species protection" topic

STATUS AND MANAGEMENT OF PUBLIC OYSTER REEFS IN GALVESTON BAY

Christine C. Jensen, Coastal Fisheries Division, Texas Parks and Wildlife Department, Dickinson, Texas

Oysters are an essential component of the Galveston Bay ecosystem on many levels. They serve as refuge and foraging habitat for a variety of fish and invertebrates, improving water quality, stabilizing habitat, and producing large reef complexes in addition to serving as a food source for humans. Prior to the mid-2000s, Galveston Bay produced approximately 80 percent of the oysters commercially harvested in Texas producing 3.5 million pounds of meats worth $12.3 million in today's dollars. Since that time, that number has dropped to around 50 percent with the average harvest reduced to 2.5 million pounds worth only $9.6 million despite increases in demand and price per sack. Catch rates of Texas Parks and Wildlife monitoring data have shown a similar decline in oyster resources. In addition, new mapping data shows that many reefs, particularly in East Bay, are shrinking or disappearing. A combination of factors such as reduced freshwater inflow, increased salinity, drought, predators, disease, Hurricane Ike, and high fishing effort has likely contributed to the reduction in oyster production in recent years. Texas Parks and Wildlife has been working in conjunction with the oyster industry to manage commercial oyster harvest based on the percent of undersized oysters observed in each harvest area, but there has not been an improvement in the resource. New techniques and management tools are being tested to better manage the fishery and achieve the goal of sustainable harvest.

Additional Info Requested:

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Oral presentation desired but poster acceptable

Suggested symposium topic: Species Protection

FORAGING ECOLOGY OF COMMON BOTTLENOSE DOLPHINS (*TURSIOPS TRUNCATUS*) IN GALVESTON BAY

Sherah Loe, School of Science and Computer Engineering, University of Houston-Clear Lake, Houston, Texas

Kristi Fazioli, Environmental Institute of Houston, University of Houston-Clear Lake, Houston, Texas

Dr. George Guillen, Environmental Institute of Houston, University of Houston-Clear Lake, Houston, Texas

Galveston Bay (GB) is the largest estuary in Texas and is located downstream of the fourth most populous city, the second largest port and the largest petrochemical complex in the United States. Galveston Bay is comprised of four sub-bays: Galveston, Trinity, West, and East Bays. The Houston Ship Channel (HSC) divides GB and is an avenue for heavy maritime traffic ending at the Port of Houston (POH) in the northwest. Consequently, GB has suffered degraded water quality due to multiple anthropogenic influences including permitted discharges, non-point source pollution, oil and chemical spills and unauthorized disposal sites. Current concerns include heavy metals, chlorinated organic compounds, which have resulted in multiple seafood advisories, making GB a high priority for biological monitoring. Bottlenose dolphins (*Tursiops truncatus*) are an ecologically important long lived apex predator in GB and are exposed to these anthropogenic stressors. Currently, crucial data gaps exist for bottlenose dolphins in GB and the National Marine Fisheries Service considers GB a high priority area for research. A resident community of dolphins has been previously documented in West Bay. Dolphins are also present in lower GB near Bolivar Roads, whereas previous studies have revealed only limited dolphin activity in East Bay, Trinity Bay, and upper GB. Recent surveys (2013-2015) suggest dolphins regularly utilize upper GB, including the HSC near the POH, year round. One of the most important factors affecting bottlenose dolphin movement patterns is the spatial and temporal distribution of prey resources therefore determining the foraging ecology of these animals is crucial to understanding their life history. Stable isotope analysis (SIA) is a commonly used method to determine the trophic ecology of various species of animals including mammals. Our objectives for this research are to: 1) estimate habitats in the GB system used for foraging by pairing photo-identification population survey data and stable isotope analysis, 2) estimate proportions of different prey consumed by bottlenose dolphins using stable isotope mixing models (SIMM), and 3) delineate year-round residents and seasonal transients. This multidisciplinary approach will provide critical data to better understand habitat use, site fidelity, and foraging ecology of GB dolphins. Information presented on these topics based on preliminary data collected as part of our monitoring program and analysis of historical data.

Poster Presentation (Species Protection)

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THE EFFECT OF FOUR ENVIRONMENTAL PARAMETERS ON THE STRUCTURE OF ESTUARINE COMMUNITIES

R. McFarlane, Houston Advanced Research Center, The Woodlands, TX

A. Leskovskaya, Elite Research, Carrollton, TX

J. Lester, Houston Advanced Research Center, The Woodlands, TX

L. Gonzales, Houston Advanced Research Center, The Woodlands, TX

We modeled 25 years of overdispersed coastal fishery monitoring data with zero-inflated negative binomial regression to determine the effect size of four environmental parameters ¾ temperature, salinity, dissolved oxygen, and turbidity ¾ for 64 species of fishes, shrimps and crabs. Each parameter exhibited both positive and negative effects on the abundance of various species. Surprisingly, there were a number of species with negligible effects. It is these unaffected species that dominate the estuarine macroconsumer shoreline community of the Texas coast.

1. Presenter:

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2. An oral presentation is desired. A poster presentation is unacceptable.

3. Topical area:

Freshwater Inflow and Bay Circulation

Where Them Fish At?

An Overview of the Population and Habitat Characteristics of the Saltmarsh Topminnow (*Fundulus jenkinsi*) in Galveston Bay and Sabine Lake, TX

Josi Robertson[1]

Stephen Curtis[2]

Jenny Oakley[2]

George Guillen[1,2]

[1]University of Houston- Clear Lake, School of Science and Computer Engineering
[2]Environmental Institute of Houston

Fundulus jenkinsi has a preference for low to moderate salinities and is primarily found along the edge of saltmarsh habitat surrounding small intertidal creeks along the Gulf of Mexico. The Saltmarsh Topminnow has been listed as a species of concern within many of the gulf coast states. Not much is known about *F. jenkinsi*'s range or abundance within the state of Texas. *Fundulus jenkinsi* is under consideration for federal listing and given this species' restricted range in Texas and recent projections of land development, land subsidence, and sea level rise it is important to document its habitat requirements and distribution. The objectives of this study were to 1) document the distribution and abundance, 2) habitat use, and 3) assess the population characteristics of *F. jenkinsi* within the Galveston Bay and Sabine Lake watershed. Tidally influenced mesohaline sites were chosen to evaluate the influence of salinity gradients on *F. jenkinsi* occurrence. Fish communities were sampled quarterly in Galveston Bay and Sabine Lake with additional monthly sampling done within the Moses Bayou of Galveston Bay. Water depth, tide stage, water quality, dominant vegetation, and habitat type were recorded during each sampling even. When collected, specimens of *F. jenkinsi* were identified, counted, and measured before being sacrificed and preserved. For each sampling event, fish abundance, species abundance, species richness, species diversity, and evenness were calculated. Fish community assemblages were analyzed using multivariate ordination methods to identify environmental and biological factors relating to spatial and temporal trends in *F. jenkinsi* presence across sites. In addition, gonadal somatic indexes (GSIs) were calculated from the monthly collections.

1.) Contact Information:

Primary Presenter: Josi Robertson, Master's Candidate, University of Houston- Clear Lake

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2.) Presentation section: Oral (poster acceptable if cannot accommodate oral presentation)

3.) Topic Areas: Species Protection, Environmental Science

RESTORING OYSTER HABITATS IN GALVESTON BAY: CURRENT ACHIEVEMENTS AND FUTURE CHALLENGES

William Rodney, TPWD Coastal Fisheries Division

The Galveston Bay Ecosystem has historically been Texas' largest producer of oysters. Even before the devastation brought by Hurricane Ike in 2008, oyster production in Galveston Bay, as measured by Texas Parks and Wildlife Department's (TPWD) fishery independent dredge sampling program, had fallen well below the 30 year average. This decline was likely due to a suite of stressors including hurricanes, drought, hydrologic alterations, disease, predators, commercial fishing impacts and other factors. Hurricane Ike's massive storm surge resulted in large scale sedimentation impacts to the Bay's oyster reefs. About half of Galveston Bay's 16,000 acres of oyster reef habitat were damaged or destroyed with the greatest impacts occurring in East Galveston Bay where more than 70% of the natural oyster reefs were buried. Texas Parks and Wildlife Department began oyster habitat restoration efforts in 2009 and these efforts continue to the present. To date about 440 acres of oyster habitat have been restored using cultch planting methods. Most of these restorations (93%) were designed to benefit the commercial oyster industry. A small percentage (7%) of restoration acreage was designed to enhance oyster reef ecosystem services. Monitoring these projects has provided TPWD with some valuable insights on the ecological and economic benefits of oyster reefs. Oyster populations developed readily on newly restored reefs and, when left undisturbed, oyster densities between 100 and 200 oysters per square meter were easily achieved. On these new reefs, fish abundance and species richness was observed to be greater than nearby unrestored reefs and non-reef control sites. Once opened to commercial oyster harvest, oyster density was rapidly reduced to levels similar to those seen on natural oyster reef control sites. However, on the new reefs, where clean cultch was still abundant, recruitment of oyster spat greatly exceeded what was observed on natural oyster reefs. This insight, combined with results from applying state of the art modelling tools to our restoration monitoring data, suggests that oyster reefs can be managed for sustainable harvest if the level of harvest pressure can be quantified and controlled so as to maintain habitat quality and quantity. As TPWD's oyster restoration project moves forward, new approaches to restoring and managing oyster habitat will be needed in order to attain maximum ecological and economic benefit from these important habitats.

1. Presenter Information:

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2. Presentation Type:

   Oral

3. Topical Area:
   Habitat Protection or Species Protection

DETERMINING FACTORS AFFECTING DERMO DISEASE OF OYSTERS IN GALVESTON BAY, TEXAS

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Francis I. Gelwick**,** Department of Wildlife and Fisheries Sciences, Texas A&M University, College Station, TX 77843

George J. Guillen, Environmental Institute of Houston, University of Houston-Clear Lake Houston, Texas 77058

Abstract: The Gulf Coast has seen a dramatic decline in oyster take in recent years. Lack of fresh water flow and other environmental variables have been suggested to cause an increase Dermo disease of oysters, caused by the parasite, *Perkinsus marinus*, which attacks the tissue of the oyster and is responsible for oyster and reef kills along the Gulf Coast. As such, a disease has its biggest detrimental effect when conditions create an abrupt increase in density for either the disease or host population. Therefore, correlating the Dermo parasites distribution and prevalence in the eastern oyster *(Crassostrea virginica)* to water conditions could be beneficial to the eastern oyster throughout its range. This study addressed the ecologically conditions, parasite distribution and prevalence within the oyster host populations in Galveston Bay, Texas. Specific objectives were to determine in Galveston Bay the: (1) prevalence of Demo in oysters, (2) distribution of Demo infected oysters, (3) concentrations of *Perkinsus marinus* within infected oysters, and effects of salt concentrations (i.e., fresh water flow) on prevalence of Demo in oysters. Oysters were collected at 4 study sites (April Fool Reef, Fishers Reef, Frenchys Reef, and Confederate Reef) bimonthly during 2015. Fishers Reef was a site that was close to the Trinity River and was most affected by fresh water flow. At each site an oyster dredge was pulled behind a boat for 10 minutes in slow circles and repeated 3–8 times if necessary to collect 20 market-sized oysters. Oysters were placed on ice until processed. If a reef was accessible to wading, oysters were collected by hand. At each site, water quality data (turbidity, depth, salinity, temperature, and wave height) were collected. Once collected, oysters were taken to the University of Houston–Clear Lake for processing. Oysters from each site were numbered from 1–20 and kept separated by site. Each numbered oyster shell was measured with calipers to the nearest millimeter. Data recoded included date of culture, bill condition of each oyster (i.e., sharp or dull). Each oyster was shucked using an oyster knife and gloves. The oyster meat was left in the cupped half shell and meat condition was recorded (i.e., shrunken [small, shrunken, dehydrated appearance] or plump [round, lush, creamy]). After shucking, 0.05 ml of the Chloromycetin/Nystatin working mixture was added to each Dermo tube (Thio medium) and was mixed by inverting the tube. For each oyster, a 5 mm^2 piece of anterior mantle was placed into a separate Dermo tube and shaken until the tissue is in the fluid. Tubes were labeled by reef and number of the oyster. Tubes were stored at room temperature for a week and then the tissue was placed on a slide, masticated with a tweezers, and 1–2 drops of Lugols iodine solution was applied and blended in using the tweezers, then placed under a cover slip, and read under a microscope giving it a rating on the Mackin Dermo Intensity Scale. Environmental data collected from the oyster reef surveys were used to correlate Dermo prevalence, distribution of Demo infected oysters, and concentrations of *Perkinsus marinus* within infected oysters with salt concentrations (i.e., fresh water flow). Above normal precipitation during 2015 appears to have decreased Demo prevalence and distribution in oysters from historic levels in Galveston Bay.

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2) Presentation desired, will accept poster

TRENDS IN FINFISH AND INVERTEBRATE ABUNDANCE IN GALVESTON BAY

Glen Robert Sutton
Texas Parks and Wildlife Department
Coastal Fisheries Division

Abstract: Trends on common finfish and invertebrate species are available through Texas Parks and Wildlife's Coastal Fisheries Division's long-term fishery-independent monitoring program. These data have been collected systematically in Texas estuaries using 182.9-m gill nets (since 1975), 18.3-m bag seines (since 1977), 6.1-m bay trawls (since 1982), and 6.1-m Gulf trawls since 1985 to assess trends in abundance and size of marine organisms captured. These provide the baseline data for tracking relative abundance on individual estuarine species. Long-term fluctuations in these trends data can sometimes be difficult to understand given the many interactions between species and environment. These often lead to perplexing end states that are impossible to quantify through simple linear relationships. Part of this is due to the complex nature of marine ecosystems and the multiple influences affecting single populations. While traditional drivers such as fishing pressure play a huge role, others such as high versus low precipitation years should also be considered. Notable changes in abundance of common species are compared to predictions from a previous large-scale ecosystem model from 2007. These predictions were as follows: 1) higher salinities increase the vulnerability of some estuarine species to predation by marine species, which favor higher salinities, 2) reduced shrimp trawling decreases mortality on some finfish bycatch species, but can affect ecosystem structure by increasing mortality on their prey, and 3) the effect of reduced freshwater inflow on the current ecosystem structure has short-term and a long-term consequences. Short-term consequences include a beneficial condition for some species (increased prey availability) and an adverse condition for others (increased predation). These predictions are compared to new data collected to test model performance.

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Panel session: Monitoring and Research

Oral presentation desired but poster acceptable

BEACH-NESTING BIRD MANAGEMENT AT TWO GALVESTON BAY LOCATIONS

Kristen Vale, Stephanie Bilodeau, and Richard Gibbons - Houston Audubon

Kacy Ray - American Bird Conservancy

This is the fourth year that Houston Audubon Society (HAS) and American Bird Conservancy (ABC) have implemented a Beach-nesting Bird Conservation Program on the upper coast of Texas. Through this program, we seek to advance conservation efforts for the Least Tern (*Sternula antillarum*), and Red Status Watch List species Wilson's Plover (*Charadrius wilsonia*) and Snowy Plover (*Charadrius nivosus*) by implementing protective measures (i.e. signs and fencing), public outreach, and nest site stewardship at two sites: Bolivar Flats on the Bolivar Peninsula and East Beach in Galveston. The Bolivar Flats Shorebird Sanctuary is recognized as both a Western Hemisphere Shorebird Reserve Network site of global importance and a Globally Important Bird Area by ABC.

In 2014 and 2015, we trapped, banded, and re-sighted Wilson's and Snowy Plovers. Banding individuals allows us to better estimate in-season reproductive output, track fledging success, document movement of plovers along the Texas coast, estimate second year return rate (in 2015), and later (years 3 and beyond), and calculate regional survival for these species. The goal of the program is to maintain and/or grow these species populations through conservation activities on the ground.

In 2014, we estimated 30 Wilson's Plover and 80 Least Tern breeding pairs at Bolivar Flats, and 15 Wilson's Plover, 63 Least Tern, and 3 Snowy Plover breeding pairs at East Beach. Between the two sites, we documented 18 Wilson's Plover fledges (0.40 fledges/breeding pair), 33 Least Tern fledges (0.23 fledges/breeding pair), and 3 Snowy Plover fledges (1.0 fledges/breeding pair). Overall, the apparent nest success for Wilson's Plovers was 56%, Least Terns were 18%, and Snowy Plovers were 80%. The leading causes of nest failure were coyote and ghost crab depredation and washouts from heavy rains. The 2014 nesting season was the first year monitoring and outreach was conducted at East Beach. Conservation efforts implemented at East Beach, one of the most popular public beaches on Galveston Island, resulted in a relatively successful nesting season (especially for Snowy Plovers), considering these birds share the beach with thousands of tourists and beach-goers during the nesting season. We reached 304 people on the ground via stewardship and public outreach efforts at East Beach on busy weekends and holidays. Through the use of ABC's *Help Gulf Birds* Community Facebook page, we reached over 29,000 more people. We will present the 2015 results at the symposium.

1. Kristen Vale, Shorebird Conservation Technician, Houston Audubon, 440 Wilchester Blvd, Houston, TX 77079; Vale.Kristen@gmail.com; 832.703.767
2. Oral presentation, panel session suggested for Houston Audubon bird projects 90 minutes with panel session after 20-minute talks
3. Species Protection

Colonial Waterbirds in Galveston Bay: Status, Restoration, and Conservation Needs

Jarrett (Woody) Woodrow, Jr., U.S. Fish and Wildlife Service, Houston, Texas

Conservation of colonial waterbirds and their habitat is one of the priorities of the Galveston Bay Estuary Program. The Program and its members have recognized that changes to the bay's environment have led to changes in the distribution, abundance and diversity of colonial waterbirds in Galveston Bay. Several species of colonial waterbirds have shown declines across the Texas coast and within Galveston Bay. Various state and non-governmental partners have invested significant resources in restoring colonial waterbird nesting islands in the Bay including funds from Deepwater Horizon related sources. Despite these investments, there remain opportunities to improve conditions for several species in decline. This presentation will provide an overview of the status of colonial waterbirds, restoration efforts to date, and identify remaining needs for the Galveston Bay Ecosystem.

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Presentation, panel or poster – if poster may modify substantially

Habitat or Species Protection