Habitat Protection Abstracts

MAXIMIZING WETLAND RESTORATION SUCCESS IN GALVESTON BAY: LESSONS ON THE INFLUENCES OF CONSTRUCTION TECHNIQUES AND THE SURROUNDING LANDSCAPE

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Approaches to wetland restoration vary in construction technique, planting strategy, and placement within a larger landscape matrix of wetland habitat. Engineered marshes are often constructed by placing soil in terrace or mound formations; this approach is common in Galveston Bay. In contrast, the relatively less widespread beneficial uses (BU) approach deposits dredge material to fill continuous areas to emergent marsh elevation. Either construction approach can be planted with native species, or colonization can occur naturally. Likewise, either type of wetland can be isolated in a degraded area, or be situated within a network of relict and restored marshes. We investigated how restoration success was influenced by the localized configuration of individual restoration sites and by the placement of that site within a wetland matrix. In October 2014, we surveyed emergent plant characteristics in planted engineered and BU sites along with unplanted BU tidal brackish marshes that varied in size, isolation, and proximity to urban developments near Sabine Lake, TX (USA). Plant biomass, cover, and species richness in BU marshes were similar to reference conditions, regardless of planting technique. In contrast, site-level emergent plant biomass and cover were over 70% lower in engineered marshes than in BU and reference marshes. Restoration failure (defined as emergent plant cover < 10 % and biomass < 0.5 kg/m^2) occurred only in small (< 0.5 km^2) sites, though not all small sites failed. Plant species richness was up to 2x higher in more altered sites that were close (< 1 km) to roads or urban development. Individual restoration sites were highly dissimilar from each other, and some were failures in terms of emergent plant cover. However, when the failed sites were within a relatively large surrounding matrix of successful restored and reference sites, the ecosystem effects of that failure were minimized. Our analysis shows that construction method is less important than the placement of restoration projects within a fairly large wetland matrix in ensuring restoration success. These lessons are directly applicable to the design and implementation of future wetland restoration projects in Galveston Bay.

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Oral presentation requested, poster presentation acceptable.

Topical area: Habitat Protection

WETLAND MITIGATION IN THE HOUSTON-GALVESTON REGION AS RELATED TO REGIONAL TRANSPORTATION PLAN IMPLEMENTATION

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The development of transportation projects sometimes requires unavoidable impacts to wetland resources that normally convey a multitude of ecosystem services. In such circumstances, the US Army Corp of Engineers (USACE) requires transportation authorities to pursue compensatory mitigation to offset adverse impacts associated with a transportation project impacting jurisdictional wetlands. This system allows for communities to sustain the functionality and protection that wetlands provide while allowing prolonged economic development within the same area. Impacts to wetland areas must be avoided and minimized to the greatest degree practicable, but if impacts are ultimately unavoidable, there are various approaches that satisfy compensatory mitigation requirements set by the USACE.

The Houston-Galveston Area Council (H-GAC) has completed a professional white paper outlining the various approaches that satisfy compensatory mitigation requirements for Regional Transportation Plan (RTP) implementation. Also included in the white paper is information about existing and pending wetland mitigation banks in the region. Findings show that the distribution and availability of wetland mitigation credits is disproportionately distributed throughout the region making it clear that future planning should consider expanding the location and credits available to offset future wetland impacts from RTP projects. H-GAC will present an overview of wetland mitigation requirements for RTP implementation in the region as discussed in the white paper as well as provide suggestions for transportation planning and mitigation banking options for the future.

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2. Format Recommendation: Presentation. H-GAC recommends this subject as a presentation.

3. Optional: Suggest presentation would best fit in a Habitat Protection tract for topics such as, wetland impacts, federal requirements, and wetland restoration, protection and mitigation.

SEAGRASS COVERAGE AND AQUATIC HABITAT ASSESSMENT OF GALVESTON BAY

Emma Clarkson, Coastal Fisheries Division: Texas Parks and Wildlife Department, Rockport, TX

Aquatic habitat availability and distribution greatly influence the distribution and abundance of fish and invertebrate species. Therefore, determining the status and condition of aquatic habitats are a key factor in effective fisheries management. Seagrass habitats in particular are economically and ecologically beneficial for estuarine communities. Seagrass beds stabilize sediments, reduce erosion, improve water clarity and quality, and serve as nursery habitat for commercially and recreationally important fish and invertebrate species. Unfortunately, there are several natural and anthropogenic threats to seagrasses, including storm damage, sedimentation, and propeller scarring. Propeller scars occur when the propeller of a boat digs into the bay bottom and uproots seagrass, and the scars typically cause erosion and fragmentation of seagrass habitat.

In an effort to decrease the negative impact of propeller scars in Texas seagrass beds, the Texas Legislature passed a law which took effect September 1, 2013 preventing the uprooting of seagrass with the propeller of a boat. To assess the impact of this legislation, Texas Parks and Wildlife Department (TWPD) has been analyzing aerial imagery in Galveston Bay as well as several other Texas bays to establish the density of propeller scars in seagrass habitats. This imagery has also been used to map the current extent and condition (patchiness, density, etc.) of seagrass beds in these Texas bays.

At the time the Seagrass Conservation Plan for Texas was published (1999), Galveston Bay was predicted to have a severely decreasing trend in seagrass coverage, with only 280 acres of seagrass present in Christmas Bay. The Texas Seagrass Monitoring Workgroup has established a need for updated seagrass distribution estimates for the Texas coast. While intensive field-based seagrass monitoring is occurring on the lower Texas coast from Aransas Bay south to the lower Laguna Madre, no field-based monitoring is currently occurring in Galveston Bay. Therefore, the aerial imagery collected by TPWD in 2015 is the only source for the most current and extensive seagrass coverage mapping for Galveston Bay. In this presentation, the analysis of this aerial imagery will be discussed and updated estimates for seagrass coverage and propeller scar densities in West Galveston Bay and Christmas Bay will be provided.

In addition, current TPWD habitat assessment efforts and projects will also be summarized, with a focus on a newly implemented rapid-assessment habitat monitoring project. This new monitoring project will characterize the aquatic and shoreline habitats associated with TPWD routine resource sampling sites. When this habitat data is assessed at the end of 2016, an aquatic and shoreline habitat map will be interpolated for Galveston Bay from 240 sample sites and may serve to further identify seagrass distribution along the shoreline in Galveston Bay.

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COASTAL HABITAT RESTORATION: LESSONS LEARNED AND A PATH FORWARD TO SUSTAINABLE MANAGEMENT OF CRITICAL MIGRATORY BIRD STOPOVER HABITAT

Peter Deichmann* and Richard E. Gibbons - Houston Audubon

The threat of invasive species is difficult to overestimate. Plants and their microbial environments are the foundation for biological communities and it is this foundation that is being unraveled at key migratory bird stopover habitat on the Upper Texas coast. Invasive species, with no natural predators to keep them in check, outcompete natives for resources replacing highly diverse biotic communities with a drastically simpler community. The result is a reduced prey base in ecosystems (Tallamy 2009). Bird habitat on the Texas coast is at a premium with high demands placed on patchy coastal woodlots from migratory and resident birds. Chinese Privet (*Ligustrum sinense*) is an aggressive in Texas's most storied and visited birding spot. We estimate the extent of invasion to be 75% of the wooded area in the square mile that is High Island. Although volunteers and professionals have worked for years logging thousands of hours to halt the invasion, the number of seeds, runners, and year-round growth of the evergreen plant is outpacing these efforts considerably.

Houston Audubon staff and volunteers are now following a more intensive management regime for invasive species after consulting and working with local and regional invasive plant species experts. This includes a field station with full-time dedicated staff on the coast for habitat management and monitoring. Invasives management is being conducted with several different chemical and mechanical methods. Some methods have proved more effective and feasible given our specific habitat goals. Other methods, while efficient, are not practical for long term invasives control. We present in detail our approach to invasive species management, its successes and the valuable lessons learned.

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2. Oral presentation preferred, panel session suggested for Houston Audubon bird conservation projects 90 minutes with panel session after 20-minute talks. Poster acceptable.
3. Habitat Protection

COMPARING SALT MARSH ECOSYSTEM RESPONSES TO DIFFERENT RESTORATION TECHNIQUES.

Jim Dobberstine; Math, Engineering, and Sciences Division, Lee College

Cindy Howard; School of Science and Computer Engineering, The University of Houston Clear Lake

Abstract

Coastal marsh ecosystems anchored by smooth cordgrass (*Spartina alterniflora*) are some of the most highly productive ecologic communities that provide a number of critical functions and services. In response to substantial loss of these ecosystems in Galveston Bay over the past 50 years, local, state, and federal partners have undertaken active restoration of numerous coastal wetland systems, a priority under the Galveston Bay Plan. Studies indicate that there may be a need to evaluate created and restored marshes to determine ecologic success at the functional level, using the acquired data to tailor restoration strategies accordingly in an effort to maximize success and ensure the persistence and resilience of these marshes into the future. This study focused on the Pierce Marsh complex, a series of restored wetlands within the lower Galveston Bay watershed, and examined whether functional differences are achieved through different marsh restoration techniques. Data collected included *Spartina alterniflora* density and biomass, plant community diversity and importance values, and benthic macroinvertebrate and microbial community diversity, among other metrics. These were collected at five restoration sites of four design types, and an unrestored, natural reference site all within the Pierce marsh complex. Differences were noted among the restored sites, and between the restored sites and the reference site, particularly when examining macronutrient values in the sediments and corresponding shoot densities, plant productivity, and benthic macroinvertebrate and microbial communities. The data suggest that restoration site design can impact ecologic success in restoration projects. Additionally, restoration design may be critical to resilience following disturbances such as tropical storms, further affecting ecologic functional efficacy.

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Presentation Type:
We would like to present as an oral presentation, and as a poster presentation

Topic Area (Optional):
- Habitat Protection
- Shoreline Management

Living Shorelines: Small-Scale Restoration Efforts and Their Ecological Impacts on Local Communities.

Jim Dobberstine; Math, Engineering, and Sciences Division, Lee College

Tia Hall; Math, Engineering, and Sciences Division, Lee College

Lee Anne Wilde: The Galveston Bay Foundation

Abstract

Living Shorelines are shoreline management options that help stop shoreline erosion and enhance aquatic habitat. These efforts are based on the premise that vegetated wetlands form a buffer between high-energy water and adjacent land, limiting or reversing shoreline erosion. Additionally, research suggests that the fringing marsh (wetland edge) is exceptionally important habitat for many important fishery species. Unfortunately, erosion along Galveston Bay's shoreline has exceeded 4 feet per year in many areas. A common response to erosion is to armor the shoreline with a hardened structure such as a bulkhead that offers limited habitat benefits and may increase erosion on adjacent shorelines. As the Galveston Bay system has lost as much as 8% of estuarine emergent wetlands and more than 50% of the freshwater emergent wetlands present in the 1950's through erosion, ground subsidence, and habitat conversion, efforts to restore and protect these important aquatic habitats are a priority under the Galveston Bay Plan.

Anecdotal evidence suggests Living Shoreline projects are an ecologically beneficial option for erosion control and property protection. However, much of the scientific data regarding ecologic function comes from larger scale habitat restoration projects rather than smaller, privately owned sites reflective of many Living Shoreline sites in the Galveston Bay system. For this ongoing study, data was collected at various Living Shorelines sites throughout the Galveston Bay system to attempt to assess the functional aspects of the biologic communities associated with these small-scale restoration projects. This data was compared to unrestored natural marsh reference sites and traditionally armored sites near each project site to ascertain what ecological benefits can be measured. The data suggests that the restored sites are similar to natural sites across a number of the ecologic community characteristics measured, although time may be required before community development achieves ecologic parity with comparable natural sites. Implications for this research suggest that these small-scale shoreline projects can provide viable aquatic habitat benefits while addressing shoreline management concerns of private landowners. As much of the Galveston Bay shoreline is coupled to private lands, the cumulative benefit associated with numerous small-scale projects across the bay system could be substantive.

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Presentation Type:
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Topic Area (Optional):
- Habitat Protection
- Shoreline Management

WETLAND FUNCTIONALITY IN RESPONSE TO ENERGY EXPLORATION AND PRODUCTION OPERATIONS

Stephanie M. Glenn, HARC, The Woodlands, TX

Erin L. Kinney, Coastal Ecology, HARC, The Woodlands, TX

Ryan M. Bare, HARC, The Woodlands, TX

Bradley S. Neish, HARC, The Woodlands TX

Likun Chen, HARC, The Woodlands, TX

Wetlands provide many positive benefits to surrounding coastal ecosystems, both terrestrial and aquatic. Physical benefits of coastal wetlands include wave dampening, flood control and sediment trapping. Chemical processes performed by wetlands include nutrient cycling and contaminant interception. Wetlands also provide ecosystem services that have direct commercial impacts including tourism, birding, hunting, recreational fishing and commercial fisheries. The different functionalities of wetlands are important for long-term resiliency of coastal communities. Wetland loss can contribute to property degradation and disturbance, habitat loss for endangered and commercially important species, disruption of food webs, increases in frequency and scale of flood events, release of land-derived contaminants to fragile coastal ecosystems and release of long-term carbon storage. These environmentally sensitive areas are often found in drilling and exploration properties on the Upper Texas Coast.

We analyzed impacts of oil and gas exploration and production (e.g. infrastructure, pipelines, exploration and drilling site impacts) on wetlands, specifically Upper Texas Coastal Wetlands, prioritizing impacts specific to wetland function (such as coastal flooding mitigation or density of wintering waterfowl). Our objectives were to prioritize wetland functions categorized by wetland type, location and availability of function. Then we cross-referenced these functions with possible energy exploration and production operational impacts on wetlands. This information was then used to develop a decision support tool that will aid managers in determining impact minimization measures (which includes best management practices) and making decisions about where to drill, technical alternatives to mitigate certain impacts and choice of options that will optimize mitigation effect given limited financial resources.

We created a web-based portal with two interactive tools: a Descriptive Tool and a Geospatial Tool. The Descriptive Tool allows the user to select a phase of drilling, wetland impact, or impact minimization measure (IMM) and see how items in each of the three categories are connected. Selecting a specific IMM will reveal the connections between the IMM, the appropriate wetland functionality impacts, and phases of drilling. Users can see the connections and evaluate which IMM might be the most appropriate for their site. In the same portal, we also created a Geospatial Tool that provides basemaps and GIS layers pertaining to wetlands on the Upper Texas Coast. Users will be able to search for an address or zoom to an area of the map. Potential site boundaries can be drawn directly on the map and GIS layers can be selected as hidden or shown. Once a boundary is drawn, a dialog box will appear with a list of potential wetland impacts connected to the GIS layers overlapping the site boundary. The list of potential impacts can then be used in the Descriptive Tool to identify potential IMMs for the selected site. Providing options to decisions makers in terms of technical alternatives or IMMs will enable resources to be developed in an environmentally sound manner.

Abstract Information

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2. Oral presentation desired

3. Suggested Topic Area: Monitoring and Research or Habitat Protection

GIS ANALYSIS AND MODELING OF GALVESTON BAY ROOKERY ISLAND EROSION RISK ALONG THE GIWW

Amanda Hackney, Audubon Texas, Texas City, TX

Luz Lumb, Audubon Texas, Texas City, TX

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The numerous coastal islands of Texas provide critical habitat for colonial waterbird rookeries. Prior to the extensive Gulf Intracoastal Waterway (GIWW) dredging projects of the early 1900s, birds were dependent on natural rookery islands. Few natural islands remain due to changes in hydrology and erosion rates. When the GIWW was completed in the mid-20th century, dredged material heaped along its sides formed new "islands" that became replacement rookeries sites. Today, those that remain are experiencing higher erosion rates due to large ship wakes, altered shorelines, disrupted hydrology, and overall sea level rise. Maintenance dredging for the GIWW provides vital material to slow and reverse this erosion, but this process requires significant funding to save rookery islands. The scope of Texas's rookery islands (Audubon Texas alone owns or leases 178) makes it difficult to catalogue and assess all sites' current conditions and habitats. As a result, islands that are less frequently visited by coastal managers can be overlooked when restoration projects are planned, and new sites may not provide the best type of nesting habitat.

We assembled GIS data and built a spatial, habitat-based model to predict the risk of rookery islands along the GIWW becoming unusable for nesting due to poor habitat or erosion damage. Parameters used to estimate site longevity included sea level rise estimates, erosion rates, elevation, habitat type/ conversion, and ship estimated wake damage. Model was used to predict islands most at-risk over a span of 5, 10, 25, and 50 years. High quality GIS data was assembled on all rookery islands within a 2500m buffer of the GIWW centerline (N= 25). Historical data ranged from 2004 to 2014.

Colonial waterbird breeding population data was then assembled for this time period for the following species: Brown Pelican, Laughing Gull, Royal Tern, Sandwich Tern, Snowy Egret, Roseate Spoonbill, and Forster’s Tern. Survey data was compared with the model results to gain a better understanding of how the island-risk model's predictions will affect different waterbird species and how species have responded to changes in habitat over time. Islands were ranked with "risk categories" of high, medium, and low. With greater funding opportunities coming to the Texas coast for habitat conservation, it is expected that this model will help inform partners on sites most in need of urgent restoration.

This island-risk model will be an assessment tool that can be used by all coastal managers to track habitat changes and needs and inform future coastal management decisions. It will be a science-based compliment to the Rookery Island Conservation Plan (RICP) currently being completed by Audubon Texas that is a statewide catalogue of important coastal sites and bay area issues based on interviews with field professionals.

Amanda Hackney, Audubon Texas Coastal Program

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Prefer oral presentation, can do poster if needed.

Topic: Habitat protection or monitoring and research

Effects of Pierce Marsh Restoration Site Design and Age on Naturally Recruited Plant Diversity.

Cindy Howard; School of Science and Computer Engineering, The University of Houston Clear Lake

Jim Dobberstine; Math, Engineering, and Sciences Division, Lee College

Abstract

In response to the substantial loss of marsh communities in Galveston Bay over the past 50 years, active restoration of numerous coastal wetland systems have been undertaken. The restoration of Pierce Marsh, in the lower Galveston Bay system (1999-2011), employed four different design techniques: grid, sinusoidal and zigzag terraces and levees filled with beneficial uses material (BUM). Each site was planted only with *Spartina alterniflora.* In 2008 and again in 2013, we evaluated the functional success of each restoration design, compared to a natural marsh reference site, focusing on a number of parameters, including changes in plant species diversity afforded by natural recruitment. In 2008, three transects were established randomly at each restoration site and sampling occurred at three stations along each transect. The same stations were sampled in 2013, with the addition of a site restored in 2011. A 1/4m^2 plot was set at each station and all species within the plot were identified and their areal coverage was recorded. Species richness in 2008 was highest at the grid site (oldest restored site); only one species (*Spartina alterniflora*) was present at the BUM leveed site, which had been only recently planted. However, in 2013, there was evidence of extreme erosion of the grid and sinusoidal designs, accompanied by significantly lower species richness at these sites. Maturing of the BUM leveed areas was noted by an increase in species richness.

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Presentation Type:
We would like to present as an oral presentation, and as a poster presentation

Topic Area (Optional):
- Habitat Protection
- Shoreline Management

Of potholes, prairies, forests, and waters:
A significant nexus to a sustainable and resilient future.

John S. Jacob, Ph.D. Texas AgriLife Extension and Texas Sea Grant

The Upper Gulf Coast of Texas is often referred as a flat, featureless plain. But to the knowing eye, it is a rich landscape of intricately connected highs and lows, an unmatched template for floral and faunal biodiversity - an irreplaceable template formed through an eco-geologic medley of flowing rivers, the sculpting of the wind, and the wallowing of mastodons and bison. Incredibly, a few hundred-thousand of acres of prairies and forests can still be found on undisturbed remnants of this landscape.

Houston, however, spreads out, impervious to the significance of this landscape. Most of what remains will be gone in the next 40 years, with only the names of the landscape features to grace new subdivisions. E.g., Seven Meadows, The Forest of Friendswood, etc. An irreplaceable legacy will be lost. But more than a legacy will be gone –the nexus to a sustainable future will also be gone. We are all rentiers living on interest from the ecological capital built up long before our time. We are destroying in decades what accumulated over millennia. With no capital there will be no interest for us to live off of.

All is not lost –there is enough ecological capital to sustain future generations if we take action now. The capital is there; the question is whether or not the political will is there to take action.

Over the past 20 or so years I have engaged in research with a number of partners with the intent of illuminating the status and function of Texas Gulf Coast habitats, particularly wetlands, in the hope of generating some will to take action. I present a summary of that research here.

The Eco-Logic map was developed in conjunction with the Houston-Galveston Area Council and others to delineate significant habitat fragments 100 acres or larger in size. There are many significant small pieces (and very many smaller pieces less than 100 acres in size and thus not included in this project), but the most significant result of this exercise was the revelation that there are many significant large pieces of un-land-leveled landscapes left in our area, with many individual pieces exceeding 30,000 acres each. These fragments do not all have an endowment of pristine vegetation, but the undisturbed template for their restoration is there, and thus an ark to our future.

Wetlands color all of our habitats. But their value is not recognized within the jurisdictional framework of the Clean Water Act in this area. We and others have conducted solid research documenting a “significant nexus” between prairie pothole wetlands and traditional navigable waters in the Houston region. The research is currently informing legal action to bring these wetlands under jurisdiction.

Finally, we have quantified the amount of wetland loss in our region as well as the efficacy of mitigation for that loss. It is becoming increasingly clear that the status quo will not ensure that the legacy we have been given will be passed on to future generations, compromising the sustainability of their future. It is not enough to study these landscapes. It is not enough to preserve small museum pieces, important though these are. It is time for us to take a broader view and make a bigger appeal of our community. Our technical skills will be required, but much more importantly, our imagination.

LOOKING BEYOND ECOLOGICAL FUNCTIONS TO THE VALUE OF ECOSYSTEM SERVICES: INCORPORATING ECOSYSTEM SERVICES INTO INFRASTRUCTURE AND POLICY DECISIONS IN THE GREATER HOUSTON REGION

Deborah January-Bevers, President & CEO, Houston Wilderness, Houston, Texas

Courtney Hale, Intern, Houston Wilderness & Rice University, Houston, Texas

Taylor Britt, Intern, Houston Wilderness & Rice University, Houston, Texas

Lauren Harper, Environmental Policy Specialist, Houston Wilderness, Houston, Texas

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Natural landscapes and organisms serve our wellbeing in a great variety of ways: water purification, flood protection, recreation, recharging of aquifers, protection from damage by hurricanes and tropical storms, pollution reduction, carbon sequestration and more. The Greater Houston region, which encompasses a huge and diverse assemblage of forests, prairies, bottomlands, wetlands and bays receives a tremendous amount of benefits (ecosystem services) from the ecological functions of the natural world. This policy paper explores case studies of how various entities in the Greater Houston Region are working to identify and better understand the services provided by urban riparian, upland and coastal ecosystems that traverse this region. In the paper, we discuss the recent urban riparian and other ecosystem successes in enhancing and/or restoring ecosystem services to solve infrastructural needs, often at a lower cost than traditional solutions. With examples provided, we find that the outcome is often even better than the initial cost saving assessments: solving a problem using ecosystem services by preserving, restoring, or engineering an green infrastructure can produce a whole host of ecosystem services in addition to the single service needed to accomplish the function of the infrastructure. We look closely at a defining aspect of the urban core of Houston and the extended Houston Region – its myriad of connecting bayou and creek systems and how they affect Galveston Bay. Creeks and bayous play an integral role in flood protection, air and water quality and wildlife habitat for the region and are prime examples of ways that ecosystem services can be added or enhanced and more effectively benefit the health of the bay system.

Without the ecosystem services provided by these 10 ecoregions, the Greater Houston Region and Galveston Bay would economically and environmentally suffer in trying to provide equivalent services to its residents, industries, and wildlife. Incorporating the value and benefits of ecosystem services into infrastructure and policy decisions in the Greater Houston Region is still evolving but a few best management practices now exist. For an expanding urban core such as the Houston Area, there is a critical need to: (1) Provide more opportunities for regional recognition and support of the 10 unique ecoregions in the Greater Houston Region; (2) Engage in more region-based research on ecosystem services to better understand natural benefits and the cost-effective infrastructure solutions that this understanding will enable; (3) Compare the economic value of ecosystem services to other alternative approaches when making public policy decisions regarding land-use and infrastructure; and (4) Incorporate ecosystem services into infrastructure and water-based decisions.

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2. Oral presentation is desired. A poster presentation would be accepted if we are not selected for an oral presentation.

3. This abstract falls under multiple topical areas: Economic Valuation and Impact of Estuarine Resources, Habitat Protection, Monitoring and Research, and Public Participation and Education.

Coastal habitat restoration and conservation in the Galveston area following Hurricane-Ike

Nathan Johnson, Non-Profit, Artist Boat, Galveston, TX

Karla Klay, Non-Profit, Artist Boat, Galveston, TX

It is estimated that Hurricane Ike flooded 100,000 Texas homes, dropped between 10-20 inches of rain on the Houston/Galveston region over a period of two days, and caused 19 feet of storm surge within areas of Galveston Bay. In addition to the economic devastation, Ike brought about enormous ecological destruction within Southeast Texas. Regions containing valuable coastal upland prairie, coastal dune, and wetland habitat were flooded and the associated ecosystems drastically changed. Communities such as Galveston and Bolivar rely heavily on income from ecotourism and outdoor recreation, making habitat loss in these areas incredibly damaging to their local economies. Artist Boat, an environmental nonprofit in Galveston dedicated to promoting awareness and preservation of coastal ecosystems through science and art, has developed numerous habitat restoration programs to address this issue. Since 2005, Artist Boat has restored and conserved approximately 419 acres of coastal habitat throughout Galveston Island, Follet's Island, and Bolivar Peninsula. Not only has this increased available habitat in these regions, it has helped foster a culture of environmental stewardship throughout the Galveston area.

Artist Boat's habitat restoration programs offer volunteer opportunities for a wide variety of under-targeted audiences. From 2009-2011, the organization partnered with Texas Parks and Wildlife Department to restore 10 acres of coastal prairie and dune habitat at the Galveston Island State Park. Participants in these events were students from the Galveston Independent School District, the Clear Creek Independent School District, and Texas A&M University at Galveston. GISD and CCISD, along with Houston Independent School District and Pasadena Independent School District, came out again to help Artist Boat restore 26.95 acres of coastal dunes on Galveston Island and Follet's Island from 2011-2013. Through partnerships with U.S. Fish and Wildlife, TPWD, the Galveston Island Park Board of Trustees, and the National Fish and Wildlife Foundation, Artist Boat has taught over 8,000 volunteers the importance of environmental stewardship.

In 2014, Artist Boat received funding from the Houston Advanced Research Center to launch its Stewardship Training program. This unique program provides opportunities for members of the oil and gas industry and their families to participate in free habitat restoration events. Approximately 100 volunteers from eight different companies have taken part as of May 2015, and in doing so have planted 10,000 plants in dune and prairie habitats throughout the Galveston/Bolivar area.

Though it continues its habitat restoration program, Artist Boat recently turned its focus towards land conservation and stewardship. The organization is currently securing the final 154 acres of its 367-acre Coastal Heritage Preserve. The Preserve, located on the west end of Galveston Island, contains a suite of estuarine wetland, upland coastal prairie, tidal flat, and open bay habitats. Because wetlands and coastal prairies are rapidly disappearing throughout the U.S., securing this land is vital to long-term habitat conservation activities. By purchasing the Coastal Heritage Preserve and stewarding it for conservation and educational purposes, Artist Boat has ensured that this area will provide crucial habitat for wildlife while offering ecological and economic benefits to the surrounding community for years to come.

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Oral presentation is preferred, but presenter will accept a poster presentation if not selected for an oral presentation

Symposium topic best suited for talk: Habitat Protection

ARMAND BAYOU NATURE CENTER - PRAIRIE RISING
A MODEL FOR COLLABORATIVE SERVICE LEARNING

Mark Kramer

Coastal tallgrass prairie habitats are critically imperiled with an estimated one percent still remaining. These landscapes once dominated the greater Houston area but today are almost completely gone. Armand Bayou Nature Center (ABNC) is located in southeastern Harris County and manages one of the largest remnant prairies along the western shore of Galveston Bay. Sadly, these beautiful areas are poorly understood by local residents and are generally not included in local curricula. The ecology of these grasslands was historically maintained by fire and large herds of grazing animals, particularly the American bison. Remnant prairies quickly degrade in the absence of these key ecological influences. Today prairies have become people dependant habitats which require active management in order to survive. These management strategies include invasive species control, prescribed fire, prescribed mowing, vegetation monitoring and native plant introduction.

Through a collaborative effort of ABNC volunteerism, community based events and service learning projects, ABNC is bringing back the natives and restoring these grasslands to their former grandeur and teaching local grassland ecology to area residents and students. ABNC volunteers cultivate large amounts of locally rare plant materials which are used for restoration projects and local high school and college students assist with installing these locally rare grasses and wildflowers into degraded prairie landscapes. After the work day is completed students retire to a brownbag lunch lecture for a deeper discussion of prairies as the Houston areas ecological heritage. A handout booklet captures the prairie lecture content and serves as a "take home" for further reflection and classroom discussion. The Prairie Ecology booklet will be distributed to State of the Bay participants which are present for the Prairie Rising lecture. This model blurs the line between restoration and education and has proven successful at effecting change at the landscape level and providing meaningful local ecological curriculum for area teachers.

RESILIENCEY TO ENVIRONMENTAL CHANGE IN THE GALVESTON BAY ESTUARY

Joshua Owens
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On November 20, 2007, Houston-Galveston Area Council's Board of Directors established an expert panel to develop recommendations for local governments to adapt to potential changes in the region's climate and associated environmental effects. Foresight Panel on Environmental Effects ("the Panel") was comprised of experts in climate change and local infrastructure planning. The purpose of the Panel was not to address the validity of climate change models or the potential contributions of human activity to climate change. Rather, its charge was to recommend sound strategies for local governments to adapt to the potential effects of climate change should it occur. The Panel produced a report primarily focused on adaptation strategies local governments can employ to offset the potential impacts on these systems produced by the environmental effects of climate change.

The Houston-Galveston Area Council (H-GAC) would like to convene the experts from the Panel for a discussion nearly ten years after its initiation. The Panel will discuss the state of Galveston Bay's resiliency in 2016; including responding to updated information regarding forecast population growth and land cover change in the estuary's watershed. The panel will also discuss what local governments have done to implement the panel's recommendations to mitigate the impacts of climate related change and what needs to be done moving forward to ensure the area remains resilient to the changing environment. The Panel will also respond to questions, so that participants may gain further understanding into the local and regional policies impacting the resiliency of the Galveston Bay estuary. Panel participants may include the following experts: Dr. Philip Bedient (Professor, Rice University), Dr. Peter Bishop (Associate Professor, University of Houston), Alan C. Clark, (Manager, Transportation and Air Quality, Houston-Galveston Area Council), Dr. Robert Harris (President and CEO, Houston Advanced Research Center), Dr. Neal Lane (Professor, Rice University), Dr. Barry Lefer (Assistant Professor, University of Houston), Dr. Eugene Leong, (environmental scientist and engineer) Michael D. Talbott (Director, Harris County Flood Control District), Dr. Arnold Vedlitz, (Chair, Texas A&M University).

1. Joshua Owens, Senior Regional Planner, Community and Environmental Planning Department, Houston Galveston Area Council, 3555 Timmons Lane, Houston, TX 77027, 832.681.2613, Fax: 713.993.4503, and Joshua.Owens@h-gac.com.

2. Format Recommendation: Panel Discussion. H-GAC recommends this subject as a Panel Discussion.

3. Optional: Suggest presentation would best fit in a Habitat Protection tract for topics such as wetland protection and coastal resiliency.

THE TEXAS COAST: A BLUEPRINT FOR THE FUTURE

By: Linda R. Shead, P.E., Texas Coastal Partners

The Texas Coast needs a blueprint for its future, a comprehensive master plan to guide future decisions on growth, development, erosion response, habitat protection and restoration. The *Houston Chronicle* called for such a master plan in March 2014. The Texas General Land Office issued a Request for Information in 2014 for guidance on how to pull together all the various ideas, proposals, and projects that have been put forth by different entities, but not funded. The recognition is there, but as yet there is no agreement on the elements of such a plan and how the plan can be funded. Let's talk about approaches, elements and funding ideas.

RESTORATION OF FRESHWATER EMERGENT WETLANDS ON THE SOUTHEAST TEXAS COASTAL PLAIN

Marissa G. Sipocz (Texas AgriLife Extension Service, Houston, Texas, USA)

Andrew V. Sipocz (Texas Parks and Wildlife Department, Houston, Texas, USA)

Freshwater palustrine emergent wetlands occupied 25% of the southeast Texas coastal plain prior to settlement. They occur within wind-deflated basins, on flats and within broad sumps. Most have been severely altered or destroyed by land leveling, drainage and fill associated with agriculture, pasturage and urban development.

Traditionally, freshwater palustrine emergent wetland restoration within an upland prairie matrix has mostly consisted of holding water within existing rice fields or similar agricultural areas for an extended period of time, or the excavation of relatively small basins into uplands without consideration of historic wetland location or basin morphology. This has led to mixed results or failures, created wetlands with soils, hydroperiods and plant communities unlike that of the reference coastal freshwater emergent wetlands.

The Texas Parks and Wildlife Department (TPWD) developed a restoration template at Sheldon Lake State Park (SLSP) which rebuilds actual historic emergent wetlands sites. Using historic and current aerial photographs, topographic maps and soil pit surveys, TPWD precisely located actual historic emergent wetlands and, with the assistance of many partners, excavated the sites down to the original basin elevation. Locally collected native plants were then transplanted into the excavated basins, by effort of volunteers working on the Wetland Restoration Team-a joint effort between Texas Master Naturalist and Texas A&M AgriLife Extension Service.

Fourteen years following the successful implementation of Phases 1 to 4 of the wetland restoration, the SLSP restored wetlands show remarkable establishment. The return of local wetland fauna, specifically wading birds and migratory waterfowl, demonstrates the success of this habitat restoration while also providing water quality improvements (e.g. load reduction) for Carpenter’s Bayou watershed.

Living Shorelines: Small-Scale Restoration Efforts and Their Ecological Impacts on Local Communities.

Lee Anne Wilde; The Galveston Bay Foundation

Abstract

Living Shorelines are attractive shoreline management options that provide erosion control benefits while working with nature to enhance the existing natural shoreline habitat and protect valuable natural resources. As opposed to bulkheads or armoring, Living Shorelines are designed to allow natural coastal processes to take place. They allow for the movement of organics in and out of the marsh, they absorb wave energy from wind, boats and storm events and they filter pollutants from runoff. Perhaps more importantly, they can create critical habitat for economically important finfish and shellfish, and provide nesting and foraging areas for birds. Additionally, modified living shorelines can be built in front of existing bulkheads or armoring to provide additional protection and increase the ecological value of an area by converting open water to fringing marsh. Emerging research is showing positive ecological benefits from both small and large scale living shoreline installatios.

Because much of the Texas coastline is privately owned, the Galveston Bay Foundation has worked with individual landowners to install living shorelines as erosion management tools. Additionally, GBF has utillzed living shorelines as part of their large scale environmental restoration practices. This presentation will review current projects that fit the living shoreline definition in the Galveston Bay watershed and place them in a national context highlighting the areas in which the Galveston Bay restoration community can set national standards as well as particular areas where we can benefit from other practices around the country.

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Presentation Type:
Oral presentation

Topic Area (Optional):

- Habitat Protection
- Shoreline Management
- Living Shorelines