



**Proceedings of the Ninth Biennial State of the Bay Symposium**  
***What is Needed to Sustain Our Estuary?***

**January 12-14, 2009**  
**Galveston, Texas**

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## Introduction

### *About the Estuary Program*

The Galveston Bay Estuary Program, a non-regulatory program administered by the Texas Commission on Environmental Quality, and its partners work together to implement The Galveston Bay Plan (The Plan), a 20-year, science-based plan designed to protect and restore the bay. The Estuary Program hosts the biennial symposium to provide an opportunity for stakeholders to interact and share environmental policy and management successes, report the latest monitoring and research findings, and to illuminate the challenges facing Galveston Bay.

### *About the State of the Bay Symposium*

In addition to coordinating implementation of resource management actions in *The Galveston Bay Plan*, the Estuary Program serves as a clearinghouse for Galveston Bay related activities and information. The State of the Bay Symposium is an important component of that.

Every two years, the State of the Bay Symposium provides resource managers, scientists, industry representatives, regulators, policymakers, and other interested members of the public an opportunity to interact and share successes, challenges and new findings. Over 100 businesses, government agencies, universities, and non-profits are represented at the event.

As the only regional event about the Galveston Bay watershed, the symposium is convened to advance knowledge and understanding of Galveston Bay and associated habitats, their importance and value to coastal living, and the role citizens, business and industry, and resource managers play in creating an economically and environmentally sustainable region.

### *About the Ninth Biennial State of the Bay Symposium*

The Galveston Bay Estuary Program was pleased to return to Galveston Island to support the City of Galveston and surrounding communities as they continued Hurricane Ike recovery efforts.

More than 350 people representing businesses, government agencies, universities, and non-profits, and citizen groups attended the event. Program staff collaborated with regional partners in assembling a diverse group of 82 expert speakers to explore elements of sustaining Galveston Bay in the midst of the Houston-Galveston region's rapid population growth and emerging challenges.

With sustainability in mind, the symposium provided the latest on the impacts of and recovery from Hurricane Ike, the health of Galveston Bay, creating a culture of awareness for the bay, as well as the restoration and protection of valuable habitat, water quality, and fisheries, and research on building resilient coastal communities—a major theme that resonated throughout the event as the region recovers from recent hurricanes.

Galveston Mayor Lyda Ann Thomas kicked off the event with a promise to do everything possible to bring the city back to full recovery. Galveston County Judge James Yarbrough emphasized the county's long-term economic health and vitality depends on the health of Galveston Bay.

Estuary Program partners and speakers highlighted the progress made in protecting the bay's ecological and economic health, and attributed the success to science, collaborative partnerships, public education, and hard work. Texas Commission on Environmental Quality Chief Engineer David Schanbacher praised the Galveston Bay Estuary Program for leveraging \$3 million in program funding to secure \$29 million from private and public-partner contributions and state and federal grants. Dollars leveraged were used for wetland restoration and coastal habitat conservation--areas coastal resource managers have identified as most important elements of ensuring the long-term health and viability of Galveston Bay. Schanbacher said such on-the-ground, measurable environmental improvements are a top priority with TCEQ. Sustaining the estuary in the future, said Schanbacher, will be even more dependent on working with our existing partnerships as well as building new partnerships.

Participants gathered information about our region's evolving threats and most challenging problems—from balancing growth and development, habitat and water quality protection to balancing freshwater needs of a growing population with the freshwater needs of a productive estuary that supports an economically important fishery.

Experts wrapped up the symposium on with a discussion about the future of Galveston Bay. The panelists noted that establishing economic and social incentives that facilitate broad-based environmental stewardship will be an important element to addressing the challenges ahead, and will significantly contribute to sustainable management of the ecosystem.

## **Workshops**

### **Best Management Practices workshop.**

Best Management Practices (BMPs) are tools that help your organization address the regulatory requirements for water quality set forth by the U.S. Environmental Protection Agency and the Texas Commission on Environmental Quality. Participants learned the latest strategies for funding BMPs — including outreach and education — and obtain hands-on instruction for identifying and prioritizing impaired areas, determining placement of BMPs, and selecting the right BMP to meet their water quality needs.

### **Creating a Stewardship Campaign.**

Participants learned how their program can play a key role in fostering sustainable behaviors within specific communities. Dr. William Smith, Executive Director of the Academy for Educational Development, led the workshop and provided information on the skills in designing, developing and implementing effective environmental stewardship campaigns.

## Plenary Sessions

*\* For more on the presentations and the presenters, please visit the abstracts and bios portion of the proceedings. For a copy of the presentation, please contact the presenter for permission.*

### Plenary Session I. The Current State of Galveston Bay

Carl Masterson, Houston-Galveston Area Council, moderated the plenary. Honorable Lyda Ann Thomas gave the welcome, and TCEQ Chief Engineer David Schanbacher provided the opening remarks. Dr. Jim Lester, Ph.D., Houston Advanced Research Center, gave the State of the Bay report. Panelists discussed the impacts of Hurricane Ike.

Chuck Wemple, Houston-Galveston Area Council, facilitated the panel session. Panelists included: Lance Robinson and William Schubert (Texas Parks and Wildlife Department), George Guillen, Ph.D., (Environmental Institute of Houston), Jim Indest (Texas Commission on Environmental Quality), and Doug Jacobson (U.S. Environmental Protection Agency)

### Plenary II. After Ike: Rebuilding Coastal Communities

Dr. Jim Lester, Ph.D., Houston Advanced Research Center, moderated the session and provided opening remarks. The following presentations were given:

- Impacts of Hurricane Ike - A State Perspective. Eddie Fisher, Texas General Land Office
- Coastal Resilience National Perspective. Ben Blount, Ph.D., SocioEcological Informatics
- Developing a Coastal Communities Planning Atlas as an Educational Tool for Decision Makers and Local Residents. Himanshu Grover, Texas A&M University

A panel discussion on coastal resilience planning followed. Panelists included: Honorable Galveston County Judge James Yarbrough, Honorable Chambers County Judge Jimmy Sylvia, Himanshu Grover, Ben Blount, Ph.D., Eddie Fisher, and Bill Merrell, Ph.D., (Texas A&M University at Galveston).

### Plenary III. How Can Habitat Conservation Improve Water Quality?

Dr. John Jacob, Ph.D., Texas Sea Grant, moderated the session. The following presentations were given:

- Conservation. Andy Sansom, Texas State University
- Conservation and Water Quality: Growing Greener and Cleaner. Jeff Taebel, FAICP, Houston-Galveston Area Council
- Finding Common Ground for Water Quality and Habitat Priorities. Kelley Hart, Trust for Public Land

A panel discussion on how habitat conservation improves water quality followed. Panelists included: Andy Samson, Jeff Taebel, FAICP, Mike Talbott, P.E., (Harris County Flood Control District), Linda Shead, P.E. and Kelley Hart (The Trust for Public Land).

### Plenary Session IV. Moving Toward Sustainability: Strategies and Approaches

Helen Drummond, REM, Galveston Bay Estuary Program, moderated the session and provided opening remarks. The following presentations were given:

- Human, Economic and Market Value of Estuaries. Bob Stokes, J.D., Galveston Bay Foundation
- Greening a Concrete Jungle: Multi-Benefit Solutions in an Urban Environment. Shelley Luce, Santa Monica Bay Restoration Commission
- Habitat and Water Conservation Strategies. Rebecca Hensley, Texas Parks & Wildlife Department
- Lessons Learned: Managing Sediment for Regional Benefits. Jeffrey P. Waters, U.S. Army Corps of Engineers

Panel discussion on strategies and approaches followed. Panelists included: Bob Stokes, J.D., Rebecca Hensley, Jeffrey Waters, Shelley Luce, Greg Biddinger, Ph.D., (Exxon Mobil), William Smith, Ph.D., (Academy for Educational Development), and Ron Sandberg (U.S. Business Council on Sustainable Development).

### Plenary Session V. The Future of Galveston Bay

Carl Masterson, Houston-Galveston Area Council, moderated the session. A Panel Discussion Summarizing the Highlights of the Symposium and Reflections Upon Galveston Bay's Future. A question and answer session followed. Panelists included: Jeff Taebel, FAICP, (Houston-Galveston Area Council), Jim Lester, Ph.D., (Houston Advanced Research Center), John Jacob, Ph.D., (Texas Sea Grant), Lance Robinson (Texas Parks and Wildlife Department), Linda Shead, P.E., (The Trust or Public Land), Kirk Wiles (Texas Department of State Health Services), Helen Drummond, REM, (Galveston Bay Estuary Program), John Huffman (U.S. Fish and Wildlife Service), and William H. Espey, Jr., Ph.D., P.E., D.WRE. (Espey Consultants).

## Concurrent Sessions

*\* For more on the presentations and the presenters, please visit the abstracts and bios portion of the proceedings. For a copy of the presentation, please contact the presenter for permission.*

### Tuesday Luncheon

Rex Ward, Clear Creek Environmental Foundation, provided a presentation on the following: Building Community Outreach for Largest River Clean Up in Texas.

### Concurrent Session A: Sustainable Conservation Practices

John Huffman for Jarrett “Woody” Woodrow, Jr., U.S. Fish & Wildlife Services, moderated the session and provided a presentation on the overview of Galveston Bay habitat conservation successes. Other presentations included:

- Greenprinting and Habitat Preservation Successes. Linda Shead, P.E., The Trust for Public Land
- Purchase of Development Rights as a Conservation Tool. Scott Campbell, Texas General Land Office
- Armand Bayou Nature Center: A Case Study in Preservation and Ecological Restoration. Mark Kramer, Armand Bayou Nature Center
- Processed Waste Water: Potential Tool for Promoting Oyster Reefs in High-salinity Waters. Sammy Ray, Ph. D., Texas A&M University at Galveston

A question and answer session followed.

### Concurrent Session B: Managing Water Quality in the New Century

Chuck Wemple, Houston-Galveston Area Council, moderated the session. The following presentations were given:

- Developing a Plan to Reduce Bacteria in Waterways of the Houston-Galveston Region. Rachel Powers, Houston-Galveston Area Council
- Dickinson Watershed Protection Plan Implementation. Charriss York, Texas Sea Grant
- Texas Pollution Discharge Eliminating System Phase II City. Jack Murphy, P.E., City of League City
- Harris County’s Bacteria Reduction Plan. Alisa Max, P.E., Harris County Watershed Protection Group

A question and answer session followed.

### Concurrent Session C: Bridging the Generation Gap — Educating Stewards Across All Ages

Dr. William Smith, Ph.D., Academy for Educational Development, moderated the session. Presentations were provided by the panelists and a panel discussion highlighting the efforts to measure and build sustainable behavior changes among Galveston Bay watershed citizens followed. Panelists included: Della Barbato (Galveston Bay Foundation), Amy Turner, (Waterbourne Education Center), Lisa Reznicek (Artist Boat), Tiffany Garcia (Clear Creek Independent School District), Mary Jean Haden (Camp Wild and Junior Master Naturalists), Lawrence Spence (Crockett Elementary School), Chris LaChance, (Habitat Highways, Texas Sea Grant and Texas AgriLife Extension), and Ed Gerhardt (Junior Anglers & Hunter’s Association). A question and answer session followed.

### Concurrent Session D: How Human Behaviors Impact Galveston Bay – A Socio-Ecological Approach

Dr. Pris Weeks, Ph.D., Houston Advanced Research Center, moderated the session. The following presentations were given:

- Development of Social Indicators for Fishing Communities. Pris Weeks, Ph.D., Houston Advanced Research Center and Ben Blount, Ph.D., SocioEcological Informatics
- A Historical Perspective of the Dickinson Bayou Watershed. Alecia Gallaway, University of Houston-Clear Lake
- Freshwater Aquarium Hobbyists and Invasive Species in the Houston-Galveston Region. Lovette Miller, Ph.D., Houston Advanced Research Center
- Modeling Values and Perception of Release Intention for Invasive Species. Michael Monticino, Ph.D., University of North Texas
- Connecting People to the Bay. Laura Sykes, The Trust for Public Land

A question and answer session followed.

### Symposium Reception with Ralph Rayburn Commemorative Poster Session

*Opening remarks were provided by Robert Stickney, Ph.D.*

### Texas Sea Grant Request for Proposal Session

The Texas Sea Grant Administration was on hand at the symposium to discuss the Texas Sea Grant Request for Proposal 2010-2012 funding cycle. Texas Sea Grant is a GBEP partner supporting coastal applied research, outreach and educational programs in support of sustainable use and conservation.

### **Concurrent Session I: Environmental Flows: How Much is Enough?**

Glenda Callaway, Ekistics Corporation, moderated the session. The following presentations were given:

- Establishing Environmental Flows: Where are We in the Process? Glenda Callaway, Ekistics Corporation
- Water Supply Needs and Freshwater Inflows for Galveston Bay: A Region H Water Planning Perspective. Michael Reedy, P.E., AECOM
- Freshwater Inflows in Galveston Bay: Primary Productivity as an Indicator of Ecosystem Function. Antoinetta Quigg, Ph.D., Texas A&M-Galveston
- An Alternative Approach to Addressing Freshwater Inflow Needs. Jim Lester, Ph.D., Houston Advanced Research Center

### **Concurrent Session J: Bacteria in Our Waterways: New Research and Solutions**

Lori Gernhardt, Gulf Coast Waste Disposal Authority, moderated the session. The following presentations were given:

- Association of Virulent Vibrio SPP. Bacteria with Hard Head and Gafftop Catfish. Leslie D Gilbert, Texas A&M University
- Total Maximum Daily Load for Indicator Bacteria in Oyster Waters in Galveston Bay. Ron Stein, TCEQ
- Constructed Waste Water Treatment Plant Wetland. Allen Sims, P.E., Carroll & Blackman
- Innovative Wetland on Brays Bayou Effectively Removes Bacteria from Polluted Stormwater Runoff. Marissa Sipocz, Texas Sea Grant

A question and answer session followed.

### **Concurrent Session K: Reducing Boater Waste**

Dr. Nancy Parra, Ph.D., League of Women Voters, moderated the session. The following presentations were given:

- Pump It-Don't Dump It-A Boater Education Campaign. Bob Stokes, J.D., Galveston Bay Foundation
- State Environmental Laws for Coastal Boaters Hard to Enforce. Dewayne Hollins, Texas Sea Grant
- Marine Effluent Reduction: A Working Model. Autie McVicker, Maritime Sanitation, Inc.

A question and answer session followed.

### **Concurrent Session L: Ecological Services of Freshwater Wetlands**

Dr. George Guillen, Ph.D., University of Houston-Clear Lake, moderated the session. The following presentations were given:

- Evaluating Water Quality and Water Storage Functions of Coastal Prairie-Freshwater Wetlands. Maggie Forbes, Ph.D., and Nicholas Enwright, Baylor University
- Quantifying Water Budgets for Coastal Prairie Freshwater Wetlands. Adam Clapp, Baylor University
- Created Wetlands and Water Quality Enhancement. Carolyn White, Harris County Flood Control District
- Evaluation of Surface Hydrological Connectivity between a Forested Coastal Wetland and Regulated Waters of the United States. Dex Dean and Brad Wilcox, Ph.D., Texas A&M University

A question and answer session followed.

### **Wednesday Luncheon**

William H. Espey, Jr., Ph.D., P.E., D.WRE, Espey Consultants, facilitated the luncheon.

### **Concurrent Session M: The Science of Estuarine Wetlands**

Jim Dobberstine, Lee College, moderated the session. The following presentations were given:

- Influence of Ecotypic and Environmental Factors on Stress Biomarkers in *Spartina alterniflora*. Cindy Howard, Ph.D., University of Houston-Clear Lake
- How Do Common Salt Marsh Plants Deal With Nutrient Additions. Leslie Rulon, Texas A&M-Galveston
- Patterns of Plant Diversity in Texas and Georgia Salt Marshes. Steven Pennings, Ph.D., and Amy Kunza, University of Houston
- Assessing the Ecological Efficacy of Select Wetland Restoration Approaches in the Northwestern Gulf of Mexico. Antonietta Quigg, Ph.D., Texas A&M-Galveston

A question and answer session followed.

### **Concurrent Session N: Addressing Long-Lasting Contaminants**

Scott Jones, Galveston Bay Foundation, moderated the session. The following presentations were given:

- Review of Historical Galveston Bay Contaminants. Lisa Gonzalez, Houston Advanced Research Center
- Dioxin and PCB in the Houston Ship Channel and Galveston Bay. Hanadi Rifai, Ph.D., University of Houston

- Factors Regulating Microbial Degradation of Dioxins in Estuarine Sediments: Houston Ship Channel and Galveston Bay, Texas. Robin Brinkmeyer, Ph.D., Texas A&M-Galveston
- Ecological Implications of Recent Dioxin Advisories: Potential Food Web Interactions and Ecotoxicity. George Guillen, Ph.D., University of Houston-Clear Lake

A question and answer session followed.

### ***Concurrent Session O: Invasion of the Aliens – Can We Control Them?***

Nicole Hausler, Port of Houston Authority, moderated the session. The following presentations were given:

- Statewide Invasive Species Management. Earl Chilton, Ph.D., Texas Parks & Wildlife
- Integrated Management of Invasive Plants in Coastal Prairies of Texas. Warren Conway, Ph.D., Stephen F. Austin State University
- Unseen Stowaways: Bacterial Diversity in the Ballast Tank,. Elizabeth Neyland, Texas A&M-Galveston
- Transportation of Exotic Phytoplankton into Texas Ports via Ballast Water. Jamie Steichen, Texas A&M-Galveston

A question and answer session followed.

### ***Concurrent Session P: Modeling the Physical Processes of Galveston Bay***

Dr. Geoffrey Matthews, Ph.D., National Oceanic & Atmospheric Administration, moderated the session. The following presentations were given:

- Parameterization of Hurricane Surge. Rajat Katyal, Ph.D., Texas A&M University
- Vulnerability of the Galveston Bay Estuary Complex to Accelerated Sea-Level Rise and Reduced Sediment Supply. John Anderson, Ph.D., Rice University
- Projecting Impacts of Relative Sea-Level Rise, Erosion, and Storms on Galveston Bay Barrier Islands, Jim Gibeaut, Ph.D., HART Research Institute for Gulf of Mexico Studies, Texas A&M-Corpus Christi
- Seabed Changes in Bolivar Roads Inlet and Offshore Bolivar Peninsula from Hurricane Ike: Implications for the Barrier System Sand Budget, John Goff, Ph.D., The University of Texas

A question and answer session followed.



## Abstracts and Bios

### Plenary Session I. The Current State of Galveston Bay

#### **Moderator: Carl Masterson, Houston-Galveston Area Council**

##### *Moderator Bio*

Carl Masterson has worked in the environmental field for nearly 40 years. He currently serves as the Environmental Resources Program Manager for H-GAC's Community and Environmental Planning Department where he manages planning activities in water quality, habitat, and flood management. Mr. Masterson holds several key positions with regional environmental and conservation organizations. He is the current chair of the Galveston Bay Council for the Galveston Bay Estuary Program, the director of the Sam Houston Resource Conservation and Development Council, and a member of the Environmental Institute of Houston Advisory Board. He also maintains an advisory/resource role with the Galveston Bay Foundation, the Bayou Preservation Association and the Harris County Flood Control Task Force.

Mr. Masterson began his career in the environment as a biologist for the Texas Water Quality Board in 1970. In 1976, he joined the Houston-Galveston Area Council to work on the Greater Houston Area Waste Treatment Management Plan (208 Plan)—a responsibility that launched him into environmental planning. Over the years, Carl has been an active member in the local section of the Water Environment Association of Texas (President, 1982-83); Texas Association of Environmental Professionals (President, 1994-95); Greater Houston Partnership - Water Resource Committee; Texas Commission on Environmental Quality - Water Quality and Nonpoint Source Management Program Advisory Groups; Texas Water Conservation Association; and American Water Resources Association.

Carl graduated from Texas A&M University in 1969 with a Bachelor of Science in zoology.

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#### **Carlos Rubinstein, Deputy Executive Director for TCEQ, Opening Remarks**

##### *Presenter Bio*

Carlos Rubinstein was appointed deputy executive director June 17, 2008. The deputy executive director serves as the chief operating officer, assisting the executive director in the administration of the agency. Rubinstein previously served as the director for the border and South-Central Texas area, which includes the Austin, San Antonio, El Paso, Laredo, and Harlingen regions. In this capacity, Rubinstein provided oversight and direction and coordinated strategic planning, budget, purchasing, and human resource issues for the five regional offices. Rubinstein also served as the Rio Grande Watermaster, responsible for allocating, monitoring, and controlling the use of surface water in the Rio Grande basin from Fort Quitman to the mouth of the Rio Grande River. Previously, Rubinstein began his career at the agency as a waste program manager and moved up to serve as the regional director for the Harlingen and Laredo offices. He also worked for the city of Brownsville as the health and EMS director, health and permitting director, operations manager, and rose to the rank of city manager. Rubinstein has a Bachelor of Science in Biology and Chemistry from The University of Texas - Pan American. He and his wife Judy have three daughters and one granddaughter.

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#### **The State of the Bay: An Update on the State of the Ecosystem, Successes and Challenges Ahead**

Jim Lester, Ph.D., Houston Advanced Research Center, The Woodlands, TX (Presenter)

Lisa Gonzales, Houston Advanced Research Center, The Woodlands, TX

The Galveston Bay Estuary Program sponsors the Galveston Bay Status and Trends project to collect and analyze data describing the health of the Galveston Bay Estuary. Indicators initially developed in 2004-05 to assess Galveston Bay ecological resources and human uses of those resources are updated annually. Indicators describe water and sediment quality, seafood safety, quantity and quality of coastal habitats, abundance of fish and wildlife populations, and human uses of coastal resources. The framework of indicators provides a summary view of the State of the Bay, the progress to date, the challenges that lie ahead, and the knowledge gaps that must be overcome to ensure a healthy and sustainable Galveston Bay Estuary.

The status of those indicators showing trends will be reviewed. While several indicators continue to show improvements over time (e.g. abundance of some species of colonial nesting waterbirds and predatory finfish), many indicators call attention to problems that persist (e.g. bacterial contamination of urban bayous and seafood consumption advisories). The available data allow for a number of indicators of ecosystem-level change to be tracked though time. However, some indicators, e.g. those for habitat fragmentation and shoreline development, provide baselines for future trend analysis as data become available. Progress in adding data to baseline indicators and filling data gaps will be discussed. Perhaps the largest challenge of all is represented by our ability to model and predict the bay's complex ecosystem processes and determine the way in which factors such as human land use, air quality, emerging contaminants, and other factors will shape the future of Galveston Bay Estuary.

*Presenter Bio* Dr. Jim Lester holds a Ph.D. in zoology from The University of Texas at Austin and is currently the Vice President of the Houston Advanced Research Center. As Vice President, he is responsible for development and implementation of projects to make more sustainable our management of water, air and biological resources and our use of energy. He was a faculty member and administrator in the University of Houston System from 1975 to 2002. Dr. Lester held administrative positions at UH Clear Lake as a dean, associate vice president, and director of the Environmental Institute of Houston.

Dr. Lester serves in an advisory capacity to a variety of organizations. He is past president of the Texas Environmental Education Partnership. He serves as the chair of the Monitoring and Research Committee of the Galveston Bay Estuary Program, serves on advisory committees for the Texas Sea Grant Program and was recently elected vice chair of the Bay and Basin Expert Science Team for Galveston Bay. His scientific work is grounded in ecological and population genetics, which he has applied to projects dealing with biodiversity and development of new species for sustainable aquaculture. Dr. Lester has worked in Asia and Latin America on aquaculture and fishery development projects. He is currently engaged in projects that analyze compilations of data from multiple sources to obtain new insights for ecosystem management or environmental policy.

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### **Impacts of Hurricane Ike (Panel Discussion)**

Chuck Wemple (Facilitator)

The massive storm surge and winds associated with Hurricane Ike destroyed thousands of homes, closed scores of businesses, triggered numerous environmental spills, and left millions of people without power for days. While substantial efforts are underway to repair and restore the housing, infrastructure and economies of impacted communities - addressing the damage and long term impacts to the natural resources of Galveston Bay, coastal bayous, and other natural resources have not received the same amount of attention. This panel will present preliminary assessments of community and natural resource damages that resulted from Hurricane Ike – and offer ideas on developing a recovery strategy that includes restoration and mitigation of impacted natural resources and stabilizing the economies which rely upon them.

*Facilitator Bio* Chuck Wemple is the economic development coordinator for the Houston-Galveston Area Council. With over 20 years of experience working in the private, non-profit and government sectors, Mr. Wemple has been directly involved in the design and implementation of regional environmental studies, pollutant source tracking, state and federal permitting, natural resource damage assessment, habitat restoration, and most recently community and economic development associated with disaster recovery. Specific industrial experience includes oil and gas refining and transportation, mining, and electrical power generation.

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### **Panelist**

#### **George Guillen, Ph.D., Environmental Institute of Houston, University of Houston-Clear Lake**

Dr. George Guillen received his B.S. in marine biology from Texas A&M University (TAMUG) (Galveston, Texas) in 1979. He received his Masters Degree in wildlife and fisheries sciences in 1983 from TAMU (College Station, TX). In 1996, Dr. Guillen received his Ph.D. in community health science (environmental science option) from The University of Texas - School of Public Health in Houston, TX. Dr. Guillen is a long time resident of the Houston-Galveston area having lived in the area for over 40 years. He has over 25 years experience in the field of fisheries, marine biology and water quality assessment. From 1984 to 1998, Dr. Guillen worked for various state conservation and environmental agencies including the Texas Parks and Wildlife Department and Texas Commission on Environmental Quality (formally TNRCC and TWC) in Houston, Texas. He was responsible for management and direction of various environmental research, monitoring and enforcement programs. In 1998, Dr. Guillen took a position section manager with the Minerals Management Service (MMS) in New Orleans, Louisiana. During 2000 through 2004, Dr. Guillen served as the Fisheries and Contaminants Program leader for the US Fish and Wildlife Service (FWS) in the Arcata, California. During his tenure at FWS he managed the fisheries program and administered a research program dealing with instream flows on the Klamath and Trinity Rivers. This involved extensive collaboration with various federal, state, local and tribal agencies and organizations.

Dr. Guillen currently serves as the executive director of the Environmental Institute of Houston, part of the University of Houston system. He also serves as an associate professor in biology and environmental science at the University of Houston - Clear Lake. His current research interests include evaluation of the influence of fisheries, water and sediment quality and habitat loss on aquatic resources.

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**Jim Indest, Texas Commission on Environmental Quality**

Stanley “Jim” Indest is a registered Texas professional geologist. Jim worked in oil and gas exploration for 15 years before being hired by the Texas Water Commission in 1992. He worked in the PST Group for 2 years before becoming involved in Emergency Response in 1994. Jim currently manages the Emergency Response Team and the Surface Water Quality Monitoring Group, TCEQ, Region 12. Jim received his M.S. in geology from the University of Houston in 1978, and B.S. geology, from the University of New Orleans in 1975.

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**Doug Jacobson, U.S. Environmental Protection Agency**

Since coming to EPA Region 6 in 1992, Mr. Douglas Jacobson has worked on various coastal issues and projects. Originally slated to coordinate Gulf of Mexico Program activities, Mr. Jacobson's responsibilities expanded to include overseeing EPA's investments in the Galveston Bay Estuary Program and Barataria-Terrebonne National Estuary Program. As the regional program manager, Mr. Jacobson advises the regional administrator and senior staff; oversees strategic planning, budget, and workplan development; and serves as the Region's single point-of-contact for the public, other agencies, and program partners. Currently, Mr. Jacobson is spearheading EPA's involvement in the development of a Long Term Recovery Plan in Texas for Hurricane Ike. He chairs the Wetlands and Coastal Development workgroup under FEMA's Emergency Support Function 14 (ESF-14). Mr. Jacobson was named Louisiana Team Leader for the Water Quality Protection Division, coordinating all of the division's activities in the State of Louisiana. Mr. Jacobson also worked with the Coastal Bend Bays National Estuary Program and as the Coastal Zone Management Program Coordinator. Prior to joining EPA, Mr. Jacobson was assistant director of the Public Lands Council, representing the 31,000 ranchers who use federal lands in their operations; a legislative assistant to U.S. Senator Phil Gramm; and an intern to U.S. Representative Bill Thomas. Mr. Jacobson earned a Bachelor of Arts from The University of Texas and a Juris Doctor from St. Mary's University. In addition to his work with the EPA, Mr. Jacobson has been active in commercial and residential real estate and ranching.

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**Jim Lester, Ph.D., Houston Advanced Research Center**

(See above)

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**Lance Robinson, Texas Parks and Wildlife Department**

Lance Robinson has worked for Texas Parks & Wildlife Division's Coastal Fisheries Division for over seventeen years—first as the Galveston Bay ecosystem leader, and currently as the regional director. Mr. Robinson and his staff have been involved with fisheries-independent and fisheries-dependent monitoring programs, marine invasive species issues, and the commercial oyster fishery. At present, he is responsible for managing the monitoring programs in Texas' coastal waters—from Sabine Lake on the Texas-Louisiana border to Galveston, Matagorda and San Antonio Bays—as well as the commercial oyster lease fishery and the Oyster Habitat Mapping and Restoration Program. Prior to his employment with Texas Parks & Wildlife, Lance worked as research faculty at Auburn University's Marine Research and Extension Center in Mobile, Alabama. He was involved in several research efforts including pond and open-bay production of oysters, shrimp habitat assessment, and artificial reef monitoring. Lance Robinson holds a Bachelor of Science from Auburn University and a Master of Science from Fairleigh Dickinson University/West Indies Laboratory, St. Croix, USVI.

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**Carlos Rubinstein, Deputy Executive Director for TCEQ**

(See above)

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**William Schubert, Texas Parks and Wildlife Department**

Jamie Schubert is the upper Texas coast team leader for Texas Parks and Wildlife Department's Ecosystem Assessment Program. He has been with TPWD for 8 years and has worked in Texas wetlands for over 18 years. He earned a B.S. in marine biology from Texas A&M University at Galveston and a M.S. in rangeland ecology and management from Texas A&M University.

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**Plenary Session II. After Ike: Rebuilding Coastal Communities****Moderator AND Introductory Remarks: Jim Lester, Ph.D., Houston Advanced Research Center**

*Moderator Bio* Dr. Jim Lester holds a Ph.D. in zoology from The University of Texas at Austin and is currently the Vice President of the Houston Advanced Research Center. As Vice President, he is responsible for development and implementation of projects to make more sustainable our management of water, air and biological resources and our use

of energy. He was a faculty member and administrator in the University of Houston System from 1975 to 2002. Dr. Lester held administrative positions at UH Clear Lake as a dean, associate vice president, and director of the Environmental Institute of Houston. Dr. Lester serves in an advisory capacity to a variety of organizations. He is past president of the Texas Environmental Education Partnership. He serves as the chair of the Monitoring and Research Committee of the Galveston Bay Estuary Program, serves on advisory committees for the Texas Sea Grant Program and was recently elected vice chair of the Bay and Basin Expert Science Team for Galveston Bay. His scientific work is grounded in ecological and population genetics, which he has applied to projects dealing with biodiversity and development of new species for sustainable aquaculture. Dr. Lester has worked in Asia and Latin America on aquaculture and fishery development projects. He is currently engaged in projects that analyze compilations of data from multiple sources to obtain new insights for ecosystem management or environmental policy.

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### **Texas General Land Office: Hurricane Ike Response and Recovery**

Eddie Fisher, Coastal Protection Division, Texas General Land Office, Austin, Texas (Presenter)

The Texas General Land Office (Land Office) is responsible for managing Texas' public land, including beaches, bays, and other "submerged lands" out to 10.3 miles into the Gulf of Mexico. This authority is partly derived from the Open Beaches Act and the Dune Protection Act, which direct the Land Office to protect critical dunes and ensure that the public has free and unrestricted access to and use of the public beach. In addition, the Land Office is responsible for ensuring public health and safety from hazards on state-owned land and is the lead state agency for preventing and responding to oil spills in the marine environment. When Hurricane Ike made landfall on September 13, 2008, it brought with it tremendous economic and environmental damage extending from the Gulf of Mexico well into the mainland coastal counties. While only a Category two storm, Ike's large size and sustained winds generated waves and storm surge that were more representative of a Category four or five storm. Entire beachfront communities were completely destroyed and many lives and livelihoods were lost. Debris from thousands of residential and commercial structures was scattered across the upper coast and significant erosion occurred along both the Gulf and bay shorelines. Critical habitats, such as dunes and wetlands, were heavily impacted, robbing coastal populations of the valuable ecosystem services they provide. The Land Office is helping to restore the economies and natural resources along the upper Texas coast, and is actively involved in numerous short and long-term recovery efforts. Immediately after landfall, the Land Office issued emergency rules to allow local governments to expedite permits to stabilize and repair damaged homes to make them habitable and to undertake dune restoration projects to protect their property from further damage. Additionally, the Land Office has been aggressively working to remove debris from the public beach and state-owned submerged lands, including bay and nearshore Gulf waters. Land Commissioner Jerry Patterson was recently appointed to the Governor's Commission for Disaster Recovery and Renewal, where he will assist in planning to expedite recovery, encourage economic renewal, and reduce vulnerability to future disasters. He will continue to work to strengthen the Land Office's ability to mitigate and plan for coastal erosion and advocate for increased funding from the Texas Legislature for this purpose. Furthermore, he will work with state and federal partners to leverage large-scale beach nourishment and habitat restoration projects.

#### *Presenter Bio*

Eddie R. Fisher is the director of the Coastal Protection Division for the Texas General Land Office. The Coastal Protection Division oversees the Coastal Coordination Council functions of the Texas Coastal Management Program, the Coastal Erosion Planning & Response Act, the Beach/Dune Program, and the Natural Resource Damage Assessment program. Mr. Fisher has been with the Land Office for six years in this capacity. Prior to working for the Land Office, he worked in private industry for 25 years with marine construction and coastal engineering firms throughout the Gulf of Mexico region. He has a degree in Communications from the University of Texas at Austin. He is a fourth generation native of the Texas coast, born in Port Lavaca, Texas.

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### **Coastal Resilience National Perspective**

Ben Blount, Ph.D., SocioEcological Informatics (Presenter)

An overview will be presented of current activities by US Gulf states, especially Louisiana and Florida, to enhance disaster preparedness. The overview will draw heavily from recent work within the Gulf of Mexico Alliance (GOMA). The issues will be viewed from a demographic and ecological perspective, noting (1) the major characteristics of rapidly expanding coastal zone populations, economic development, gentrification, and patterns of land use changes; (2) the major threats posed by global warming and related more frequent and extreme weather events, including hurricanes and sea level rise; and (3) coordinated efforts to take steps to increase resilience and reduce vulnerability. An effort will also be made to identify particularly acute needs in effecting those changes.

#### *Presenter Bio*

Benjamin Blount, Ph.D., is currently a consultant with SocioEcological Informatics and a board member of Anthropology & Environment. He retired from The University of Texas at Antonio in 2008 as a research professor. He has held academic

positions with several universities including The University of Texas at San Antonio, the University of Georgia and The University of Texas at Austin. Blount has garnered over half a million dollars in grants and awards for research, developed the coastal anthropology program at the University of Georgia, and developed a procedural refinement for the use of cultural models in environmental and ecological research, linking anthropology and linguistics through 'key-word' analysis. Blount currently serves as the editor for the *MAST* Maritime Anthropology Studies. He previously served as editor-in-chief for *American Anthropologist* from 2005-2007 in addition to authoring and co-authoring several articles in academic journals over a ten-year period. Blount also contributed to a handbook for the National Coastal and Oceanic Service on human dimensions of research on harmful algal blooms, and has participated on several committees including the Science and Statistics Committees for fishery management councils, the South Atlantic Fishery Management Council (including 2 years as chair of the Socioeconomics Sub-Committee), and the Gulf of Mexico Fishery Management Council, and president of Culture & Agriculture (Section of AAA) from 2007 to 2008. Blount received a Ph.D. in anthropology from the University of California, Berkeley in 1969 following a B.A. in anthropology from The University of Texas in 1963.

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### **Developing a Coastal Communities Planning Atlas as an Educational Tool for Decision Makers and Local Residents**

Samuel D. Brody, Texas A&M University, College Station, TX

Walter Peacock, Hazard Reduction & Recovery Center, Texas A&M University, College Station, TX

Himanshu Grover, Texas A&M University, College Station, TX (Presenter)

Darmawan Prasodjo, Texas A&M University, College Station, TX

William Merrell, Texas A&M University at Galveston, Galveston, TX

Rapid growth and development along the Texas coast is increasingly putting communities at risk from the adverse impacts of floods, hurricanes, climate change, and other natural hazards. Among government officials, there is increasing awareness that key decision makers and local residents must have access to technical tools with which to make future plans before undesirable impacts from rapid growth take place.

In response to this need for proactive planning tools, our project develops a coastal communities planning atlas to help local jurisdictions in Texas understand the implications of development decisions and plan appropriately for the future. It provides an easily accessible, graphically represented, interactive database on environmental, hazard, and land use related issues for local communities. Specifically, the project creates an Internet-based spatial decision support system that allows users to identify and visualize critical hotspots related to environmental degradation, natural hazard risks, and significant changes in land use patterns. In addition, users in Galveston, TX will be able to query data and create custom maps based on multiple development scenarios. Communities can use this educational tool to guide future decisions on growth in a sustainable manner such that the need for economic development is balanced with priorities associated with environmental protection and human health, safety, and welfare. The system also helps address important research questions related to where future growth will occur in the Texas coastal zone, the impacts of this growth, and the usefulness of WebGIS in facilitating sustainable planning. The Atlas can be accessed at: [coastalatlas.tamug.edu](http://coastalatlas.tamug.edu).

#### ***Presenter Bio***

Himanshu Grover is a doctoral student and a graduate research assistant with environmental planning and sustainability research unit. His research interests include community planning, social vulnerability and local sustainability issues. He has research experience in coastal hazards management, post-tsunami community recovery and climate change public policy. His doctoral research particularly looks at determinants of local capacities in the context of global environmental change management. He has been the principal research associate on the coastal communities planning atlas since the last three years. The planning atlas is a web based spatial decision making tool for communities along the Texas Coast. New tools and utilities are developed and added by the research team regularly to enhance the utility of the atlas.

Prior to coming to Texas A&M University, he worked as an urban and environmental planner for six years with Indian National Trust of Art & Cultural Heritage (INTACH), India. His professional experience includes projects related to watershed development, regional development, sustainable tourism, post-disaster recovery and rain water harvesting systems. He is professionally accredited as an urban and environmental planner both in India (ITPI) and the United States (AICP). He is presently pursuing his doctoral studies in URBAN AND REGIONAL SCIENCES at Texas A&M University, College Station, Texas. He completed his master's degree in urban planning from Texas A&M University (2006) and Bachelor of Physical Planning degree (1998) from School of Planning and Architecture, New Delhi, India.

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#### ***Panelists***

**Ben Blount, Ph.D., SocioEcological Informatics**

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**Eddie Fisher, Texas General Land Office**

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**Himanshu Grover**

(See above)

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**Bill Merrell, Ph.D.**

Bill Merrell is the George P. Mitchell '40 chair in marine sciences and director of the Center for Texas Beaches and Shores at Texas A&M University at Galveston, chairman and principal scientist of The Institute for Oceans and Coasts, president of Merrell Historic Properties, Inc.; and serves on the management committees of NIOXX LLC (USA) and NIOXX Beijing Biotechnology, Inc. He has served as president of the H. John Heinz III Center for Science, Economics, and the Environment, vice chancellor for Strategic Programs of The Texas A&M University System, vice president for Research Policy of Texas A&M University, president of Texas A&M University at Galveston, and Assistant Director of the National Science Foundation. Merrell received the Distinguished Member Award for Research Achievement from the Texas A&M University Chapter of Sigma XI, the Distinguished Achievement Award from the Geosciences and Earth Resources Council, and the Distinguished Service Award of the National Science Foundation for "his lasting impact on the course of American science." He holds a BS and a MA, physics, Sam Houston State University; and a PhD, oceanography, Texas A&M University.

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**Speeding Up the Path to Recovery: A Local Perspective**

**Honorable Chambers County Judge Jimmy Sylvia**

When faced with the aftermath of a disaster, some of the first questions local jurisdictions begin to ask are: "Why is it taking so long to get help?" and "How are we going to pay for this?" There are some very simple reasons why these questions keep getting asked, over and over again, by numerous jurisdictions suffering through the recovery process. A local jurisdiction does not have to get very far into a disaster to realize FEMA's decision making process is less than expedient. It seems apparent that most, if not all, decisions have to be made at a higher level - a level that ironically is not at ground zero. It is this chain of decision-making that tends to slow down effective disaster response and the path to recovery. With what seems to be a simple, straight-forward decision, days turn to weeks, and weeks turn to months. It is then that one begins to wonder, "Does the 'E' in FEMA stand for 'Emergency' or 'Eventually'?" Without a doubt, the power to make decisions -- even funding decisions - has to somehow be placed into the hands of local FEMA representatives. According to Sec. 418.016 of the Texas Government Code, "The governor may suspend the provisions of any regulatory statute prescribing the procedures for conduct of state business or the orders or rules of a state agency if strict compliance with the provisions, orders, or rules would in any way prevent, hinder, or delay necessary action in coping with a disaster." No doubt, the reason this was written in this manner is because our legislators had the foresight to understand that "business as usual" is far removed during a disaster. However, it is this very constraint, procedural rules and regulations, that hinder and delay coping with disaster and recovery. This issue needs not only to be addressed on a state level, but on a national level as well. The fact that adhering to "normal day" rules and regulations, such as State Historical Preservation Office approvals, must also be done during a disaster situation is an all too painful reality that many of us have had to deal with during the recovery process.

When disasters somehow transform into money-making opportunities, the utmost goal of helping those in need tends to take a back seat. Also, when about 90% of the phone calls coming into your EOC and tying up your phone lines are from vendors and contractors soliciting business during a disaster, something is spiraling out of control. Pre-disaster contracts are a must, but equally important is determining reasonable costs, so that the local jurisdiction is not left holding the bag when the dust settles at the conclusion of FEMA reimbursement decisions. To remedy this on a broad scale, state and federal pre-approval of disaster contractors, as well as preapproval of associated costs and services, must take place. It is unacceptable that a jurisdiction is forced to make disaster-related decisions under duress, only to find out later that they were overcharged and FEMA will not cover the entire cost.

There is something that all three of these suggestions have in common. They are simple, straightforward, will speed up the path to recovery, and most of all they are possible.

*Presenter Bio*

Honorable Chambers County Judge Jimmy Sylvia was born October 5, 1955 in Madigan Army Hospital, Seattle, Washington. His family moved back to Old River, Texas in 1955 where he still resides. He is married to Laura Lou Thompson Sylvia, and they have two children: Jimbo, 25 and Kalli, 20. Judge Sylvia was elected County Commissioner of Precinct 3 in 1993, and appointed County Judge in 1997. He is a member of several organizations including the following: Conference of Urban Counties, Texas Association of Counties, National Association of Counties,

ARCIT (Association of Rural Communities in Texas), Countywide Chambers of Commerce, board member of Baytown/West Chambers County Economic Development Foundation, and the Old River Baptist Church Judge Sylvia graduated from Barbers Hill High School in 1974, and Sam Houston State University in 1979 where he received a degree in business administration and was a four-year letterman in football.

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#### **Honorable Galveston County Judge James Yarbrough**

Honorable James Yarbrough has served as county judge of Galveston County since January 1, 1995. A native of Galveston County, Judge Yarbrough attended The University of Texas at Austin on an athletic scholarship and captained the Longhorn Southwest Conference Football Championship team. He was named to the All-Southwest Conference football team, and was the first player in the NCAA to play as a graduate student. Judge Yarbrough has fifteen years of successful business experience in Galveston County: 10 years as a banker, and five years as a consultant to businesses throughout Galveston County through James D. Yarbrough & Company. He served two year term (1992/93) on the Galveston Central Appraisal District Board of Directors He was also elected to the Board of Trustees for the Galveston Independent School District in 1991 and served as finance committee chair; term expired October 1994.

Judge Yarbrough is the recipient of several awards including the following: the *Galveston County Daily News* Citizen of the Year; Boy Scouts of America - Bay Area Council Distinguished Citizen; College of the Mainland Outstanding Service to Education Award; Bay Area Houston Economic Partnership's QUASAR Award; Communities in Schools Starlight Award; State Friend of Extension Services; Prevent Blindness - Person of Vision; Charles A. Jacobson Award - Bay Area Transportation Partnership. Judge Yarbrough received a B.B.A. from The University of Texas at Austin with majors in finance, accounting and real estate. He is married to the former Carol Urbani for 30 years. They have two children, a daughter, Ashley, a graduate of Baylor University, and a son, Beau, a student at The University of Texas at Austin.

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### **Plenary Session III. How Can Habitat Conservation Improve Water Quality?**

#### **Moderator: John Jacob, Ph.D., Texas Sea Grant**

##### *Moderator Bio*

John Jacob, Ph.D. is the director of the Texas Coastal Watershed Program, and holds a joint appointment with the Texas A&M Sea Grant Program and with Texas AgriLife Extension Service through the department of Recreation, Parks, and Tourism Science. He has coast-wide responsibility for inland environmental problems that have a direct impact on the quality of Texas' bays, estuaries, and coastal waters. Preeminent among these issues are the mitigation and abatement of runoff pollution from both rural and urban sources, and the preservation and restoration of valuable natural habitats such as wetlands. His current project, Coastal CHARM (Community Health and Resource Management), focuses on enabling coastal communities in Texas to improve quality of life in cities and towns while preserving and enhancing the natural coastal environment.

Jacob holds B.S. and M.S. degrees from Texas Tech University, and a Ph.D. from Texas A&M University—all in soils and natural resources. He is registered as a professional geoscientist with the State of Texas and is a professional wetland scientist.

Jacob is a recognized expert on Texas wetlands, having been active in consulting and research aspects of wetlands for more than 20 years. Jacob is coauthor of the Texas Coastal Wetlands Guidebook.

The Texas Coastal Watershed Program provides education and outreach to local governments and citizens about the impact of land use on watershed health and water quality. The TCWP currently has 7 staff members with programs in sustainable urban planning, watershed management, habitat restoration, sustainable landscapes, and water quality issues.

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#### **Conservation**

Andy Sansom, Texas State University (Presenter)

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#### **Conservation and Water Quality: Growing Greener and Cleaner**

Jeff Taebel, FAICP, Houston-Galveston Area Council (Presenter)

The Houston-Galveston region is expected to add 3.5 million people by the year 2035. Maintaining, let alone enhancing, water quality while accommodating this population growth will be a daunting task. Conserving the region's remaining "green infrastructure" may be best the best remaining tool we have. This presentation will include the results of a "what if"

scenario, comparing the impacts of status quo growth patterns with those of conservation oriented designs and the implications for our future policy choices.

*Presenter Bio* Jeff Taebel is director of Community and Environmental Planning at the H-GAC, where he oversees the agency's community and environmental planning, socioeconomic modeling, economic development and community enhancement initiatives. He has 25 years of experience in urban and regional planning, including 21 in his current position. Actively involved in community service, professional development and planning education, Jeff is a former president of the Texas Chapter of the American Planning Association and in 2008 was inducted as a fellow of the American Institute of Certified Planners. Jeff received a Master of Urban Planning from Texas A&M University and a Bachelor of Science in life sciences from the University of Nebraska.

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### **Finding Common Ground for Water Quality and Habitat Priorities**

Kelly Hart, Trust for Public Land (Presenter)

When is land conservation an appropriate tool to address water quality threats and habitat protection goals? The presenter begins by answering this question. She then outlines an approach to land conservation that focuses on the water quality context and weaves in habitat goals. TPL's Greenprinting work around the country has revealed the following: lands that are important for habitat purposes are often the same lands that are valuable for water quality purposes -- e.g. riparian areas, wetlands, and lands around headwaters. This presentation includes best practices for developing maps with community input that identify lands that meet these objectives (and others) simultaneously. An emphasis is placed on GIS tools and effective partnerships, and examples are provided from other parts of the country.

#### *Presenter Bio*

As program manager for TPL's Conservation Services, Kelley designs and manages strategic park and conservation planning processes and research projects for local governments, TPL staff and other partners. This includes conducting targeted interviews; researching related initiatives and opportunities; facilitating community consensus-building that generates tangible results; and developing outreach materials.

Kelley worked previously as a staff attorney at UCLA Law School's Environmental Law Center, where she supervised various student projects, including an assessment of Los Angeles County's stormwater permit and municipality compliance. She has conducted extensive research on using green infrastructure solutions to mitigate flooding and water pollution, and she co-authored *Path to Protection: Ten Strategies for Successful Source Water Protection*. In 2003 she published the "The Mojave Desert as Grounds for Change: Clarifying Property Rights in California's Groundwater to Make Extraction Sustainable Statewide," in *Hastings West-Northwest Journal of Environmental Law and Policy*. Kelley has also had previous environmental planning and policy experience working in the private sector and for the federal government. Kelley has a B.A. in government from Dartmouth College, and she earned a JD (2002) and a Masters in urban planning (2004) from the University of California, Los Angeles.

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#### **Panelists**

**Andy Sansom, Texas State University**

(See above)

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#### **Linda Shead, P.E., The Trust for Public Land**

Linda Shead is the program director of the Coastal & Southeast Texas Office of the Trust for Public Land, where she has been since 2002. Ms Shead provides strategic direction and oversees conservation visioning, conservation transactions, conservation finance, and conservation outreach for TPL in the Houston-Galveston area and throughout the Texas coast. She is implementing the Saving Our Coastal Heritage Program and the Southeast Texas Program to assist local governments in increasing public access to Galveston Bay, its tributaries, and other conservation lands, for public enjoyment, water quality protection, and wildlife. From 1989 to 2002, she was executive director of the Galveston Bay Foundation, a locally, regionally, state, and nationally recognized organization working for the Bay. Ms. Shead has been invited to serve on a variety of local, state, and federal committees, including the Galveston Bay Council, Natural Resources Advisory Committee of the Houston-Galveston Area Council, Galveston Bay Freshwater Inflows Group, Outer Continental Shelf Policy Committee of the Minerals Management Service, the Citizens Advisory Committee of the Gulf of Mexico Program, and the Federal Advisory Committee on Total Maximum Daily Loads. A registered professional engineer in the State of Texas, Ms. Shead holds engineering and zoology degrees from The University of Texas at Austin. She has planned and designed water and wastewater systems with a consulting engineering firm, taught high school science, and assisted with university biology research.

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**Jeff Taebel, FAICP, Houston-Galveston Area Council**  
(See above)

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**Mike Talbott, P.E., Harris County Flood Control District**

Mike Talbott has been with the Harris County Flood Control District for over 20 years, and is currently the organization's director. Under his direction, the district carries out its mission to devise the countywide flood damage reduction plan, implement that plan, and maintain the infrastructure. That mission is executed in the third largest county in the United States, with a population in excess of three million, which includes the City of Houston, the nation's fourth largest city. The district has jurisdiction over the primary stormwater facilities in the county, which consist of about 1,500 channels, totaling nearly 2,500 miles in length, as well as 40 regional detention basins and a 2.5 square mile wetlands mitigation bank. Mr. Talbott is active in a number of associations, local committees and task force groups relating to storm water planning and environmental management. Mr. Talbott is a licensed professional engineer with a Bachelor of Science in civil engineering from Texas A&M University and a Master of Business Administration from the University of Houston.

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**Plenary Session IV. Moving Toward Sustainability: Strategies and Approaches**

**Moderator: Helen Drummond, REM, Galveston Bay Estuary Program**

*Moderator Bio*

Helen E. Drummond, director for the Galveston Bay Estuary Program, is responsible for overseeing cooperative conservation efforts implemented under the federally and state approved *Galveston Bay Plan*. Building partnerships and coordinating implementation activities to conserve bay habitats, water quality and fish and wildlife are integral to the program's mission to sustain the bay ecosystem for future generations. Ms. Drummond has 20 years experience in environmental and natural resource management, including 2 years in estuarine research, 5 years in environmental compliance in the private and public sector, and 13 years in natural resource management with the estuary program. She applies her experience and involvement in ecosystem/watershed based planning and management, organizational development and regional coordination to foster collaboration that transcends socioeconomic and political boundaries to enrich the quality of life of citizens living in the Galveston Bay region and beyond. She has also served on several federal, state and local committees working on natural resource management related issues.

Ms. Drummond is a member of the American Society of Limnology and Oceanography and is registered with the National Registry of Environmental Professionals as a registered environmental manager (since 1994). She has a B.S. in marine and environmental science from Hampton University in Hampton, Virginia and a M.S. in environmental management from the University of Houston-Clear Lake.

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**Human, Economic and Market Value of Estuaries**

Bob Stokes, J.D., Galveston Bay Foundation (Presenter)

In the fall of 2006, Restore America's Estuaries convened a panel of internationally renowned experts to help us understand the economic value of coastal and estuary resources. These authors were asked to summarize the state of the art in our knowledge of coastal economic value. Their findings were astonishing – far beyond commercial fishing and tourism, healthy coasts and estuaries are essential for protecting more than \$800 billion of trade each year, tens of billions of dollars in recreational opportunities annually, and more than 45 percent of the nation's petroleum refining capacity. Coasts and estuary regions support a disproportionately large share of the nation's economic output and population. The growing body of research shows that environmental damage places these values at risk, yet promoting environmental protection and expanding habitat restoration efforts are likely to increase these values substantially. This presentation will highlight some of the key findings of the Restore America's Estuaries panel.

*Presenter Bio*

Bob Stokes is a 1990 graduate of Yale University and a 1994 graduate of The University of Texas School of Law. He began his legal career with the firm of Blackburn & Carter, an environmental law firm in Houston. At Blackburn & Carter his practice consisted of both civil and administrative matters, mainly on behalf of community groups. In February of 1997, Bob moved to the Harris County Attorney's Office where he began practicing in the Environmental Division. His practice consisted primarily of civil enforcement matters, but he also had an active administrative practice, both in opposition to and in pursuit of, state environmental permits in front of the Texas Commission on Environmental Quality.

In June 2004, Bob left the County Attorney's Office to become president of the Galveston Bay Foundation. The Galveston Bay Foundation's mission is to preserve, protect, and enhance the natural resources of Galveston Bay and its tributaries. It has programs in advocacy, conservation, education, and research. Bob had served on the board of the Foundation for

five years prior to taking over as president and had served as the board's chair for the previous two years. Bob has also served on the Houston Wilderness Board of Directors since 2004 and on the Governing Board of Earth Share of Texas since 2007.

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### **Greening a Concrete Jungle: Multi-Benefit Solutions in an Urban Environment**

Shelley Luce, Santa Monica Bay Restoration Commission (Presenter)

Everyone wants to see “green solutions” to our water quality and other environmental problems. Low-impact development (LID) techniques will go a long way toward protecting streams and other waterbodies when new construction occurs. In existing, densely-built cities where concrete and other hard infrastructure are already in place, implementing LID techniques may be difficult due to cost, land ownership, public perception and other issues. We defined “green solutions” for Los Angeles County watersheds as projects that would increase pervious surfaces in order to filter urban runoff and at the same time provide badly-needed park, habitat and recreational opportunities. We then analyzed topography, land use and land ownership throughout the County to determine where such projects could be readily implemented and produced maps showing the most suitable locations for LID retrofitting. In Phase 2 of the project, we will refine our parcel mapping to examine soils and other features relevant to infiltration, and will add rights-of-way and other opportunity lands to the analysis.

#### *Presenter Bio*

Dr. Luce is the executive director of the Santa Monica Bay Restoration Commission, a National Estuary Program of the EPA. Dr. Luce and her staff facilitate and direct the restoration and protection of a large urban water body (Santa Monica Bay). Along with National Estuary Program partners, Dr. Luce directs technical research, makes funding decisions, and implements strategic plans and new initiatives to accomplish measurable environmental results. She is responsible for tens of millions of dollars in grants awarded and works with state and federal elected officials to improve funding and build support for environmental initiatives.

Dr. Luce has been a key spokesperson for major political campaigns supporting open space preservation and alternative energy in California. Her environmental policy expertise includes developing innovative policies on water supply and conservation, urban development, stream protection, and environmental justice. She also advises numerous scientific panels and groups in California and provides presentations and expert testimony on environmental issues to expert and lay audiences alike.

Dr. Luce has a doctorate degree in environmental science and engineering from UCLA (2003) and previous degrees in biology from McGill University in Montreal, Canada. She was the science and policy director for Heal the Bay, a nonprofit environmental group in Santa Monica, California before joining the Santa Monica Bay Restoration Commission.

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### **Habitat and Water Conservation Strategies**

Rebecca Hensley, Texas Parks & Wildlife Department (Presenter)

(Abstract Placeholder)

#### *Presenter Bio*

Rebecca Hensley received a B.S. and M.S. degree in biological sciences from The University of Texas- Pan American. Rebecca has worked for Texas Parks & Wildlife Division's Coastal Fisheries Division for thirteen years in several positions: as a conservation scientist, Galveston Bay ecosystem leader and currently as regional director. During this time, Rebecca and her previous staff have been involved with fisheries independent and fisheries dependent monitoring programs and a variety of fisheries related research projects covering topics such as Ecopath modeling, spotted seatrout and flounder management, and exotic species.

Presently, as regional director in the Science and Policy Branch, Rebecca and her Ecosystem Resources Program staff are responsible for managing a multitude of coastal fisheries ecosystem issues (e.g., habitat conservation and mitigation, freshwater inflow analyses, fish kill response and assessment, wetland and stormwater permit response, Coastal Expo events). This program has three offices and covers the entire Texas coastal area.

Prior to Rebecca's employment with Texas Parks & Wildlife, she worked as a fisheries biologist/manager in Guam and North Carolina and then as a Research Administrator in Florida. During this time she worked with habitat and fisheries community assessments and water quality monitoring/resource allocations. While in Florida, Rebecca was involved in several committees in the Charlotte Harbor National Estuary Program. Rebecca has participated with the Galveston Bay Estuary NEP as representative with various subcommittees (Research Coordination Board, Monitoring and Research) and currently represents Texas Parks and Wildlife on the Galveston Bay Council.

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## **Lessons Learned: Managing Sediment for Regional Benefits**

Jeffrey P. Waters, Ph.D., U.S. Army Corps of Engineers (Presenter)

Regional Sediment Management (RSM) is a systems-based approach for collaboratively addressing sediment related issues within a regional context. Historically, dredged sediment was placed in the most economical locations, which were often on the banks of rivers, or alongside the channel in rivers, bays and estuaries resulting in submerged features and island formations. More recently, environmental concerns over the effects of open water or unconfined placement resulted in sediment being placed in confined areas either upland or in the water. Along coastal inlets, sediment was disposed of in deeper offshore waters. These practices, new and old, do not necessarily consider the regional sediment transport processes and dynamics.

Regional sediment management is the practice of making the best local project decision within the context of a regional plan. Under the RSM concept, sediment is considered a natural resource that provides environmental and economic benefits when it is managed effectively on a regional basis. It recognizes that the geomorphic region and its embedded ecosystems respond beyond the space and time scales of individual projects and that a proactive regional planning and engineering approach will produce significant national benefits and environmentally sustainable projects.

The development of strategic regional partnerships with stakeholders is a key to the success of RSM. This is because RSM activities and solutions extend beyond the scope of a traditional Corps' projects and the Corps' current authorities and resources. Thus the Corps will be one of a number of stakeholder participants in developing solutions and allocating resources to implement RSM measures and actions.

Traditional project management practices that focused solely on local sediment management actions have often produced adverse impacts because they may not have considered the regional sediment transport dynamics. Multiple, single-purpose sediment management actions undertaken in a region may dramatically alter the regional sediment transport dynamics. However, RSM strategies which recognize that sediment is a resource and employ a systems-based approach can be implemented to effectively manage sediment for multiple objectives and long-term system sustainability. RSM promotes management of littoral, estuarine and riverine sediment within the boundaries of a physical system where sediment exchange occurs naturally. Therefore, the successful implementation of RSM strategies requires knowledge of regional sediment transport dynamics.

### *Presenter Bio*

Dr. Jeff Waters is a research physical scientist with the Coastal Engineering Branch at the Coastal and Hydraulics Laboratory of the USACE Engineering Research and Development Center. He is the program manager for the Regional Sediment Management Demonstration Program and the National Shoreline Erosion Control Demonstration and Development Program. He also serves as the co-chair for the Shore Processes Workgroup of the National Shoreline Management Study. Jeff received his BS degree in geology from the University of Maine, his Masters degree in geology from Northern Arizona University and his Ph.D. in geology from the University of New Orleans (UNO). While at UNO, his research interests included sediment transport in coastal systems and the geochemistry of estuarine sediments.

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### **Panelists**

#### **Greg Biddinger, Ph.D., ExxonMobil**

Dr. Biddinger is currently the natural land management program coordinator at ExxonMobil Biomedical Sciences, Inc. (EMBSI) where he is responsible for strategic development of methods and application of sustainable approaches to managing Exxon Mobil's current and former operating properties. To this effort he is exploring technical (e.g. natural approaches to remedial design, ecosystem service assessment), legal (e.g. wildlife property tax assessments, and conservation easements) and policy (e.g. conservation and wetlands banking and ecological re-use of surplus properties) mechanisms to bring fresh perspective to the management of Exxon Mobil's properties.

Dr. Biddinger has practiced professionally as an environmental scientist for over 25 years. He has been an active leader in the Society of Environmental Toxicology and Chemistry (SETAC) where he was the founding chair of the SETAC's Ecological Risk Assessment Advisory Group (1992-2002) and is a founding editor of the SETAC journal *Integrated Environmental Assessment and Management*. As well, he is currently a member of the U.S. Environmental Protection Agency's (USEPA) *Chartered Science Advisory Board (SAB)* and its *Committee on Valuing the Protection of Ecosystems and Ecological Services*. His other professional activities have included chairmanships with the American Society for Testing and Materials, American Chemistry Council and International Standards Organization technical committees. Dr. Biddinger has also participated in editing a number of scientific books on ecotoxicology, ecological risk assessment, risk management and landscape ecology.

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**Rebecca Hensley, Texas Parks & Wildlife Department**  
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**Shelley Luce, Santa Monica Bay Restoration Commission**  
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**Ron Sandberg, U.S. Business Council on Sustainable Development**

Ron Sandberg works on sustainability issues in two capacities, with a non-profit organization and with a for-profit company. He works closely with the staff of the U.S. Business Council for Sustainable Development (US BCSD). The US BCSD is a non-profit association of businesses whose purpose is to deliver highly focused, collaborative projects that help its members and partners demonstrate leadership in the United States on sustainable development and realize business value. The US BCSD is a partner organization of the World Business Council for Sustainable Development.

Ron is a member of the US BCSD's Project Team for the Green Brownfields Initiative, which has created an inventory and prioritization of brownfields for possible conversion to productive green space in the 8-county Houston-Galveston region. He is also active in the US BCSD's By-Product Synergy Project, which is organizing a waste-to-product network in the Houston-Galveston region. These synergies reduce waste, save energy, reduce material costs and address social and environmental impacts of industrial activity.

As a partner at Conservation Capital, LLC, Ron is also involved in sustainability issues. Conservation Capital focuses on land-related projects that lead to environmentally desirable outcomes in a for-profit context.

Ron was an in-house attorney for over thirty years in three major corporations – Gulf Oil, Conoco, and Cooper Industries. During the last twenty of those years, his legal practice was entirely devoted to environmental matters. Prior to joining Conservation Capital, Ron was the brownfields redevelopment program manager for the City of Houston in the Mayor's Office of Health and Environmental Policy.

Ron is a native Texan. He earned a B.A., *Cum Laude*, from Southwestern University (Georgetown, Texas) in 1969, a Master of Religion degree from The Claremont School of Theology (Claremont, California) in 1971, and a Doctor of Jurisprudence from The University of Texas School of Law in 1974. Ron and his family have lived in Houston since 1978.

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**William Smith, Ph.D., Academy for Educational Development**

William Smith, Ph.D., is the executive vice president of the Academy for Educational Development, one of America's largest non-profits. Smith began his work in public health on infant diarrhea, immunization campaigns, and acute respiratory infections in rural communities throughout Africa, Asia and Latin America. In the mid-80's he became heavily involved in AIDS prevention around the world and in the United States. Today Bill supervises health programs ranging from elder care to teen drug prevention – from policy advocacy to communication campaigns.

Bill is co-author of the recent IOM (Institute of Medicine) report *Health Literacy: A Prescription to End Confusion Report*. He has authored major chapters in health text books and recent publications on health communication. He has co-authored two books: *Radio and Community-Based Social Marketing*.

He serves on the Scientific Advisory Board to the Center for Health Marketing of the Centers for Disease Control and Prevention; on the Boards of the Center for Plain Language, the editorial Board of the *Journal of Environmental Communication*, the *International Journal of Health Communication* and the American Dental Association Advisory Board on Health Literacy.

Smith has an Ed.D. in non-formal education with an emphasis on gaming theory from the University of Massachusetts. He received an honorary Doctor of Science from the University of South Florida in recognition of his work in social marketing and social change. He is co-founder of the Social Marketing Institute, columnist for the *Social Marketing Quarterly* and publishes widely on health, human behavior and social marketing.

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**Bob Stokes, J.D., Galveston Bay Foundation**  
(See above)

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**Jeffrey P. Waters, Ph.D., U.S. Army Corps of Engineers**  
(See above)

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## Plenary Session V. The Future of Galveston Bay

### Panelist Discussion

Galveston Bay is a dynamic and important coastal resource to Texas; and is an estuary of national significance. It is intricately entwined in the ecological, social and economic fabric of the Houston-Galveston region; yet, the bay and those working to conserve it face unprecedented challenges as the region grows to nearly 8 million people over the next 20-30 years. Other emerging threats such as coastal hazards resulting from hurricanes also present new management challenges.

After two and one half days of timely, rewarding, and deliberative discussion of issues critical to the future of our coast and the people that depend on them, leading resource management professionals will offer insight to what policy and management strategies are important to sustaining a productive, healthy Galveston Bay.

Panelist with diverse expertise in areas important to the bay ecosystem - from growth and development and habitat conservation/ restoration to water quality, fisheries, seafood, and environmental flows - will also take questions from the audience during this interactive session.

### **Moderator: Carl Masterson, Houston-Galveston Area Council**

#### *Moderator Bio*

Carl Masterson has worked in the environmental field for nearly 40 years. He currently serves as the Environmental Resources Program Manager for H-GAC's Community and Environmental Planning Department where he manages planning activities in water quality, habitat, and flood management. Mr. Masterson holds several key positions with regional environmental and conservation organizations. He is the current chair of the Galveston Bay Council for the Galveston Bay Estuary Program, the director of the Sam Houston Resource Conservation and Development Council, and a member of the Environmental Institute of Houston Advisory Board. He also maintains an advisory/resource role with the Galveston Bay Foundation, the Bayou Preservation Association and the Harris County Flood Control Task Force.

Mr. Masterson began his career in the environment as a biologist for the Texas Water Quality Board in 1970. In 1976, he joined the Houston-Galveston Area Council to work on the Greater Houston Area Waste Treatment Management Plan (208 Plan)—a responsibility that launched him into environmental planning. Over the years, Carl has been an active member in the local section of the Water Environment Association of Texas (President, 1982-83); Texas Association of Environmental Professionals (President, 1994-95); Greater Houston Partnership-Water Resource Committee; Texas Commission on Environmental Quality-Water Quality and Nonpoint Source Management Program Advisory Groups; Texas Water Conservation Association; and American Water Resources Association.

Carl graduated from Texas A&M University in 1969 with a Bachelors of Science in zoology.

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### **Panelists**

#### **William H. Espey, Jr., Ph.D., P.E., D.WRE., Espey Consultants**

Dr. William H. Espey came to The University of Texas at Austin in 1955, on a football scholarship and completed his B.S. in 1960, M.S. in 1963, and Ph.D. in 1965 in civil engineering. In 1986, Dr. Espey was honored as a Distinguished Graduate of the College of Engineering, at The University of Texas. As an outgrowth of Dr. Espey's Ph.D. dissertation, his Urban Unit Hydrograph methodology has found application in both state and city drainage design manuals and is published in several textbooks, including the "Civil Engineering Reference Manual" for the PE exam as a visiting professor. Dr. Espey, as a visiting professor, has taught several courses and participate in seminars at The University of Texas.

Dr. Espey started his career with the U.S. Geological Survey Water Resources Division and later joined TRACOR in 1965. In 1972 he co-founded Espey Huston & Associates Inc. (EH&A) and served as president and chairman of the board until 1993. EH&A provided engineering and environmental consulting services employing over one thousand people in several offices in the U.S., as well as England and Mexico. EH&A was ranked No. 53 of the top 500 engineering firms in the United States by *Engineering News Record* in 1986.

Dr. Espey has served as the chairman, since 1980, of the Lake Michigan Diversion committee that was mandated by the modified Supreme Court Decree of 1980. The committee is convened approximately every five years.

In 1993 he founded Espey Consultants, Inc which now has offices in Austin and Houston, providing engineering and environmental services.

Dr. Espey has been involved since the early 1960's in numerous projects concerning Galveston Bay. In the early '60's he was involved in a Galveston Bay shell dredging project for – for Texas Parks and Wildlife. Numerous projects for the

Galveston District USACE, the proposed superport at Pelican Island, water quality management study for the Texas Water Quality Board, P.H. Robinson and Cedar Bayou, HL&P Plant studies, Waste allocation and water quality modeling of the Houston Ship Channel for the Texas Water Quality Board, and recently the WAM studies (TCEQ) for the Trinity and San Jacinto rivers.

Dr. Espey has been married to his high school sweetheart for 49 years and has 3 children and 8 grandchildren. He was raised in Dallas / Oak Cliff and graduated from South Oak Cliff High School.

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#### **Helen Drummond, R.E.M., Galveston Bay Estuary Program**

Helen E. Drummond is director of the Galveston Bay Estuary Program. She is responsible for overseeing cooperative conservation efforts implemented under the federally and state approved *Galveston Bay Plan*. Building partnerships and coordinating implementation activities to conserve bay habitats, water quality and fish and wildlife are integral to the program's mission to sustain the bay ecosystem for future generations. Ms. Drummond has 20 years experience in environmental and natural resource management, including 2 years in estuarine research, 5 years in environmental compliance in the private and public sector, and 13 years in natural resource management with the estuary program. She applies her experience and involvement in ecosystem/watershed based planning and management, organizational development and regional coordination to foster collaboration that transcends socioeconomic and political boundaries. She's served on several federal, state and local committees working on natural resource management related issues.

Ms. Drummond is a member of the American Society of Limnology and Oceanography and is registered with the National Registry of Environmental Professionals as a registered environmental manager. She has a B.S. in marine and environmental science from Hampton University in Hampton, Virginia and a M.S. in environmental management from the University of Houston-Clear Lake.

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#### **John Huffman, U.S. Fish and Wildlife Service, Texas Coastal Program**

John Huffman is the regional coordinator for the U.S. Fish and Wildlife Service's Coastal Program in Texas. Through the Service's Coastal Program, John has been facilitating habitat restoration projects along the entire Texas Gulf Coast since 1999. His duties also include participating on the Service's National Coastal Wetland Grants ranking committee. John has worked for the Service for nine years and has over 14 years experience working on habitat conservation issues and projects on the Texas Coast. Prior to the Service, experiences include working for a Houston consulting firm, the Texas General Land Office and the Galveston Bay Foundation. He earned his Bachelor's and Master of Science degrees from the University of Houston - Clear Lake. His research interests include Texas Diamondback terrapins, piping plovers, colonial waterbirds and seagrass restoration. John is a current member of the Galveston Bay Council and the vice-chairman of the Natural Resources Uses Subcommittee. He also serves as an advisor to the Environmental Institute of Houston, the Texas Corporate Wetlands Restoration Partnership and the Service's Ocean and Coastal Team.

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#### **John Jacob, Ph.D., Texas Sea Grant**

John Jacob, Ph.D. is the director of the Texas Coastal Watershed Program, and holds a joint appointment with the Texas A&M Sea Grant Program and with Texas AgriLife Extension Service through the department of Recreation, Parks, and Tourism Science. He has coast-wide responsibility for inland environmental problems that have a direct impact on the quality of Texas' bays, estuaries, and coastal waters. Preeminent among these issues are the mitigation and abatement of runoff pollution from both rural and urban sources, and the preservation and restoration of valuable natural habitats such as wetlands. His current project, Coastal CHARM (Community Health and Resource Management), focuses on enabling coastal communities in Texas to improve quality of life in cities and towns while preserving and enhancing the natural coastal environment.

Jacob holds B.S. and M.S. degrees from Texas Tech University, and a Ph.D. from Texas A&M University—all in soils and natural resources. He is registered as a professional geoscientist with the State of Texas and is a professional wetland scientist.

Jacob is a recognized expert on Texas wetlands, having been active in consulting and research aspects of wetlands for more than 20 years. Jacob is coauthor of the Texas Coastal Wetlands Guidebook.

The Texas Coastal Watershed Program provides education and outreach to local governments and citizens about the impact of land use on watershed health and water quality. The TCWP currently has 7 staff members with programs in sustainable urban planning, watershed management, habitat restoration, sustainable landscapes, and water quality issues.

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#### **Jim Lester, Ph.D., Houston Advanced Research Center**

Dr. Jim Lester holds a Ph.D. in zoology from The University of Texas at Austin and is currently the Vice President of the Houston Advanced Research Center. As Vice President, he is responsible for development and implementation of projects to make more sustainable our management of water, air and biological resources and our use of energy. He was a faculty member and administrator in the University of Houston System from 1975 to 2002. Dr. Lester held administrative positions at UH Clear Lake as a dean, associate vice president, and director of the Environmental Institute of Houston.

Dr. Lester serves in an advisory capacity to a variety of organizations. He is past president of the Texas Environmental Education Partnership. He serves as the chair of the Monitoring and Research Committee of the Galveston Bay Estuary Program, serves on advisory committees for the Texas Sea Grant Program and was recently elected vice chair of the Bay and Basin Expert Science Team for Galveston Bay.

His scientific work is grounded in ecological and population genetics, which he has applied to projects dealing with biodiversity and development of new species for sustainable aquaculture. Dr. Lester has worked in Asia and Latin America on aquaculture and fishery development projects. He is currently engaged in projects that analyze compilations of data from multiple sources to obtain new insights for ecosystem management or environmental policy.

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#### **Lance Robinson, Texas Parks and Wildlife Department**

Lance Robinson has worked for Texas Parks & Wildlife Division's Coastal Fisheries Division for over seventeen years—first as the Galveston Bay ecosystem leader, and currently as the regional director. Mr. Robinson and his staff have been involved with fisheries-independent and fisheries-dependent monitoring programs, marine invasive species issues, and the commercial oyster fishery. At present, he is responsible for managing the monitoring programs in Texas' coastal waters—from Sabine Lake on the Texas-Louisiana border to Galveston, Matagorda and San Antonio Bays—as well as the commercial oyster lease fishery and the Oyster Habitat Mapping and Restoration Program.

Prior to his employment with Texas Parks & Wildlife, Lance worked as research faculty at Auburn University's Marine Research and Extension Center in Mobile, Alabama. He was involved in several research efforts including pond and open-bay production of oysters, shrimp habitat assessment, and artificial reef monitoring.

Lance Robinson holds a Bachelor of Science from Auburn University and a Master of Science from Fairleigh Dickinson University/West Indies Laboratory, St. Croix, USVI.

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#### **Linda Shead, P.E., Trust for Public Lands**

Linda Shead is the program director of the Coastal & Southeast Texas Office of the Trust for Public Land, where she has been since 2002. Ms Shead provides strategic direction and oversees conservation visioning, conservation transactions, conservation finance, and conservation outreach for TPL in the Houston-Galveston area and throughout the Texas coast. She is implementing the Saving Our Coastal Heritage Program and the Southeast Texas Program to assist local governments in increasing public access to Galveston Bay, its tributaries, and other conservation lands, for public enjoyment, water quality protection, and wildlife. From 1989 to 2002, she was executive director of the Galveston Bay Foundation, a locally, regionally, state, and nationally recognized organization working for the Bay.

Ms. Shead has been invited to serve on a variety of local, state, and federal committees, including the Galveston Bay Council, Natural Resources Advisory Committee of the Houston-Galveston Area Council, Galveston Bay Freshwater Inflows Group, Outer Continental Shelf Policy Committee of the Minerals Management Service, the Citizens Advisory Committee of the Gulf of Mexico Program, and the Federal Advisory Committee on Total Maximum Daily Loads.

A registered professional engineer in the State of Texas, Ms. Shead holds engineering and zoology degrees from The University of Texas at Austin. She has planned and designed water and wastewater systems with a consulting engineering firm, taught high school science, and assisted with university biology research.

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#### **Jeff Taebel, FAICP, Houston-Galveston Area Council**

Jeff Taebel is director of Community and Environmental Planning at the H-GAC, where he oversees the agency's community and environmental planning, socioeconomic modeling, economic development and community enhancement initiatives. He has 25 years of experience in urban and regional planning, including 21 in his current position. Actively involved in community service, professional development and planning education, Jeff is a former president of the Texas Chapter of the American Planning Association and in 2008 was inducted as a fellow of the American Institute of Certified Planners.

Jeff received a Master of Urban Planning from Texas A&M University and a Bachelor of Science. in life sciences from the University of Nebraska.

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**Kirk Wiles, Texas Department of State Health Services**

Kirk Wiles joined the Texas Department of Health in 1975 in La Marque monitoring Galveston Bay seafood for bacterial and chemical contaminants. His major responsibility was classification of oyster growing waters. Wiles later transferred to Corpus Christi and managed the program in the middle and lower coast areas. He transferred to Austin in 1988 and assumed assistant directorship of the seafood program in 1997. Wiles currently serves as manager of the Seafood and Aquatic Life Group. Some of his major responsibilities include regulation of the shellfish industry and make recommendations for fish consumption advisories and bans.

Kirk Wiles received his B.S. from Texas A & M University at College Station in wildlife fisheries science. He went to high school in Texas City.

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## Concurrent Session A. Sustainable Conservation Practices

### **Moderator: Jarrett (Woody) Woodrow**

#### *Moderator Bio*

Jarrett (Woody) Woodrow, Jr. is a fish and wildlife biologist with the U.S. Fish and Wildlife Service -Texas Coastal Program. Mr. Woodrow currently focuses on voluntary projects with conservation partners as well as water and climate change issues. He also serves on several regional and local committees, and is the chair of the Natural Resource Uses Committee for the Galveston Bay Council. Prior to USFWS, Woody served as the director of the Coastal Conservation Program for the Texas Parks and Wildlife Department. At TPWD, he worked on environmental and conservation issues and served on the Region H Planning Group and the Galveston Bay Freshwater Inflow Group.

Mr. Woodrow has also worked in the environmental consulting field for 15 years on a variety of topic areas including human and ecological risk assessment, Superfund, RCRA, NRDA, wetlands permitting, and habitat assessment and restoration.

Jarrett (Woody) Woodrow, Jr. graduated from the University of Houston with a Bachelor of Science in biology. He also completed post-graduate coursework at The University of Texas Health Science Center in environmental science.

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### **TPL Partnerships for Conservation Success State of the Bay, 2009**

Linda R. Shead, Program Director, The Trust for Public Land (Presenter)

Combining vision with pragmatism has been a hallmark of conservation projects in the Galveston Bay region since around the early 1990s. The creation of both the Galveston Bay Estuary Program and the Galveston Bay Foundation formed templates for successful partnerships that could move beyond conflict to solutions – ones that bring visions of a healthy bay system closer to reality. The Trust for Public Land's programs in southeast Texas have continued in this vein: "Greenprinting for Growth" helps communities identify their conservation priorities and simultaneously mobilizes support for land conservation projects that meet multiple goals and attract a wide variety of participants and supporters.

#### *Presenter Bio*

Linda Shead is the program director of the Coastal & Southeast Texas Office of the Trust for Public Land, where she has been since 2002. Ms Shead provides strategic direction and oversees conservation visioning, conservation transactions, conservation finance, and conservation outreach for TPL in the Houston-Galveston area and throughout the Texas coast. She is implementing the Saving Our Coastal Heritage Program and the Southeast Texas Program to assist local governments in increasing public access to Galveston Bay, its tributaries, and other conservation lands, for public enjoyment, water quality protection, and wildlife. From 1989 to 2002, she was executive director of the Galveston Bay Foundation, a locally, regionally, state, and nationally recognized organization working for the Bay.

Ms. Shead has been invited to serve on a variety of local, state, and federal committees, including the Galveston Bay Council, Natural Resources Advisory Committee of the Houston-Galveston Area Council, Galveston Bay Freshwater Inflows Group, Outer Continental Shelf Policy Committee of the Minerals Management Service, the Citizens Advisory Committee of the Gulf of Mexico Program, and the Federal Advisory Committee on Total Maximum Daily Loads.

A registered professional engineer in the State of Texas, Ms. Shead holds engineering and zoology degrees from The University of Texas at Austin. She has planned and designed water and wastewater systems with a consulting engineering firm, taught high school science, and assisted with university biology research.

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### **Purchase of Development Rights as a Conservation Tool**

Scott Campbell, Texas General Land Office, Austin, TX (Presenter)

In recent years, agricultural conservation easements or purchase of development rights, have become popular tools for preserving open space land for protection of wildlife habitat, water runoff areas and other natural resources, while assisting agricultural landowners in their struggle to stay in production.

In 2005 the Texas Legislature created the Texas Farm & Ranch Lands Conservation Program, which is intended to provide funding to assist in purchasing development rights in critical natural resource areas of the state.

A primary benefit of the program in coming years will be protection of critical water recharge areas, protection of natural wildlife habitat and assistance to the struggling agricultural industry.

#### *Presenter Bio*

Scott Campbell is native of Paint Rock, Texas. He grew up on the family ranch just north of Paint Rock. The ranch has been in his family since 1877 and is the site of the largest Indian pictograph site in Texas. His parents, Kay and Fred Campbell still operate the ranch, raising sheep, goats, two buffalo, some llamas and other assorted animals. Scott graduated from Angelo State University in 1977 with a degree in journalism and was self-employed as owner of an agricultural publishing company in San Angelo – Ranch Publishing – from 1982 until he sold the business in 2006. Prior to moving to Austin in 2007, Scott was a state representative in the Texas Legislature serving House District 72, which stretches from San Angelo northward to Snyder. He served on the natural resources committee and as vice chairman of the Defense Affairs and State-Federal Relations committee. Scott is currently coordinator of the Texas Farm and Ranch Lands Conservation Program at the Texas General Land Office in Austin.

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#### **Armand Bayou Nature Center: A Case Study in Preservation & Ecological Restoration**

Mark Kramer-Armand Bayou Nature Center-Pasadena Texas (Presenter)

The Armand Bayou Nature Center (ABNC) is a 2500 acre wildlife preserve located in southeastern Harris County. The center opened in 1976 as a not-for-profit corporation to serve the community by offering environmental education opportunities and managing the land as a nature preserve for current and future generations. For over 15 years ABNC has actively implemented a number of restoration strategies designed to enhance the diversity of its historic plant and animal communities. The present discussion will focus on restoration tools and techniques as well as the partnerships that support the effort.

A discussion of marsh restoration techniques included: 1) early efforts with smooth cordgrass (*Spartina alterniflora*) and hay bales; 2) aquatic invasive species control; 3) beneficial use of dredge

material; 4) Marsh Mania – A Ten Year Partnership; 5) seagrass restoration using widgeongrass (*Ruppia maritima*); and 6) California bulrush (*Schoenoplectus californicus*) – seed propagation and the use of bulrush baskets.

A discussion of prairie restoration techniques included: 1) Chinese tallow (*Triadica sebiferum*) control using aerial application of herbicide and chipping equipment; 2) prescribed fire; 3) mowing; 4) native plant introduction; and 5) vegetation monitoring.

#### *Presenter Bio*

Mark Kramer is the stewardship coordinator at Armand Bayou Nature Center. His job covers all aspects land management, wildlife management, habitat restoration and environmental education. Mark is a Pasadena native and began exploring Armand Bayou in his youth. He currently participates as a board member and steering committee member of several organizations including the Environmental Institute of Houston, Galveston Bay Estuary Program's Invasive Species Work Group, Trash Bash and Marsh Mania. He enjoys speaking about topics including habitat restoration, the use of prescribed fire and wilderness preservation.

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### **Processed Waste Water: Potential Tool for Promoting Oyster Reefs in High-Salinity Waters.**

Sammy Ray, Texas A&M University at Galveston, Galveston, TX (Presenter)

Ayal Anis, Texas A&M University at Galveston, Galveston, TX

Antonietta Quigg, Texas A&M University at Galveston, Galveston, TX

Lalise Mason, Scenic Galveston, Galveston, TX

A pilot study is underway to determine the feasibility of using the daily production of 10 to 12 million gallons of processed industrial waste water to manage (reduce) the ambient salinity in a small embayment (Swan Lake) in lower Galveston Bay, Texas. The oyster population in Swan Lake is heavily impacted by Dermo disease (*Perkinsus marinus*) and the Southern Oyster Drill (*Stramonita (Thais) haemastoma*). This two year study will include hydrographic measurements, oyster recruitment, oyster meat index, Dermo disease level and assessments of phytoplankton population at several sites in and adjacent to Swan Lake (surface area: 630 acres/259 hectares).

#### *Presenter Bio*

Sammy Ray, Ph.D., was born in Mulberry, Kansas in 1919. He is currently the professor emeritus and associate director of Continuing Education at Texas A&M University at Galveston. Prior to joining the Texas A&M faculty in 1957, Sammy served with the U.S. Fish & Wildlife Service in Galveston and as a Pharmacist's Mate 1/C in the U.S. Navy. Mr. Ray has several distinguished academic honors including an Honorary Doctorate of Science from Doane College, induction into the Texas Science Hall of Fame, the American Institute of Fishery Research Biologists' Distinguished Service Award, the Texas Academy of Science's Distinguished Texas Scientist award, the William Paul Ricker Award for Distinguished Faculty-Staff Achievement, TAMUG, the Distinguished Alumnus Award, Mississippi Delta Junior College, the designation as a Piper Professor, and Faculty Distinguished Achievement Award in Research from TAMUG.

Sammy received his Bachelor of Science in zoology from Louisiana State University in 1942. He received his doctorate in Biology from Rice University in 1954.

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### **Concurrent Session B. Managing Water Quality in the New Century**

#### **Moderator: Chuck Wemple, Houston-Galveston Area Council**

*Moderator Bio* Chuck Wemple is the economic development coordinator for the Houston-Galveston Area Council. With over 20 years of experience working in the private, non-profit and government sectors, Mr. Wemple has been directly involved in the design and implementation of regional environmental studies, pollutant source tracking, state and federal permitting, natural resource damage assessment, habitat restoration, and most recently community and economic development associated with disaster recovery. Specific industrial experience includes oil and gas refining and transportation, mining, and electrical power generation.

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#### **The Big: Developing a Plan to Reduce Bacteria in Waterways of the Houston-Galveston Region**

Carl Masterson, Community & Environmental Planning, H-GAC, Houston, TX

Rachel Powers, Community & Environmental Planning, H-GAC, Houston, TX (Presenter)

Erin Anderson, Community & Environmental Planning, H-GAC, Houston, TX

Ron Stein, TMDL Program, TCEQ, Austin, TX

In 1996, the Texas Commission on Environmental Quality first identified waterways in the Houston region as having bacteria levels high enough to raise concerns about whether the identified waterways are safe for swimming and wading. These waterways were listed in the state's "303(d) List," which identifies waterways that do not meet state standards for various uses. Since then, TCEQ has studied these and other waterways more thoroughly to discover the extent of the high levels of bacteria. As a result, additional waterways have been listed as impaired. All of these waterways eventually drain into Galveston Bay.

The state is developing Total Maximum Daily Loads, or TMDLs, for these waterways. TMDLs quantify how much of a pollutant a waterway can absorb and still meet state standards and they identify how much of a reduction is required to meet state standards. The twelve watersheds with impaired waterways have been grouped into four TMDL projects: Buffalo and White Oak Bayous, Clear Creek, Lake Houston, and Houston Metro. After a TMDL is completed, an implementation plan, or I-Plan, must be developed to identify how to reduce bacteria levels.

Because the people, resources, and solutions for the I-Plans for these TMDLs will have so many similarities, stakeholders from the TMDL projects agreed that a combined group to address the development of the I-Plan would be appropriate. Through a broad-based, consensus process facilitated by the Houston-Galveston Area Council (H-GAC) a committee to address implementation was formed. The thirty-member committee known as the Bacteria Implementation Group, or the BIG, is responsible for receiving input, establishing working groups, facilitating communications, developing and adopting recommendations, and providing oversight.

The proposed oral presentation will discuss the extent of the bacteria impairments in the region using maps, graphs, and illustrations. It will discuss the TMDL process, with emphasis on the development of an implementation plan. It will discuss the process for identifying and engaging stakeholders. Finally, it will discuss anticipated outcomes of the implementation planning process.

*Presenter Bio* Rachel Powers joined H-GAC as a senior environmental planner in March of 2008. She is responsible for coordinating the activities of the Bacteria Implementation Group in its endeavor to develop a plan for addressing high levels of bacteria in the region's waterways. She also works with H-GAC's Regional Flood Management Council and the Parks & Natural Areas Subcommittee of H-GAC's Natural Resources Advisory Council.

Prior to joining H-GAC, Rachel worked for the Harris County Flood Control District for six years, coordinating volunteer tree planting activities, wildflower planting, planning, and outreach related to maintenance activities. She also has extensive experience working as an environmental educator and program manager in the Houston area, Austin, Possum Kingdom (Texas), and Massachusetts.

A native of Newton, MA, Rachel has lived in Texas since she matriculated at Rice University, from which she graduated with a bachelor's degree. She is currently enrolled at the University of Phoenix—Online, working towards an MBA. Rachel volunteers with organizations such as the Citizens Environmental Coalition, the Environmental Educators Exchange, Trees for Houston, and Texas Master Naturalists.

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### **Dickinson Bayou Watershed: A Plan for the Future**

Charriss York, Texas Sea Grant/Texas AgriLife Extension Service, Houston, TX (Presenter)

Dickinson Bayou is one of the many Houston Area bayous listed as impaired by the Texas Commission on Environmental Quality. It is impaired for both low levels of dissolved oxygen and high levels of bacteria. In 2005, the Texas Coastal Watershed Program began working with the citizens of the Dickinson Bayou Watershed to write a comprehensive watershed protection plan. This stakeholder process took three years to produce a document that protects both the needs of the community and the health of Dickinson Bayou.

Key components of the Watershed Protection Plan include: installation of stormwater best management practices (BMPs), a consistent stormwater ordinance for communities in the watershed, habitat and open space protection and better planning for community development.

#### *Presenter Bio*

Charriss York is the stormwater projects coordinator for the Texas Coastal Watershed Program (TCWP), a joint program between Texas Sea Grant and the Texas AgriLife Extension Service, where she works to promote stormwater best management practices and implement the Dickinson Bayou Watershed Protection Plan.

Charriss received her Bachelor of Science in biology from Truman State University in 2000 and her Master of Science in botany from Oklahoma State University in 2003. Prior to her work at TCWP Charriss was a conservation biologist at Buffalo Bayou Partnership (Houston, TX) and a biology instructor at San Jacinto College North.

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## **Texas Pollution Discharge Eliminating System Phase II City**

Jack Murphy, P.E., City of League City (Presenter)

(Placeholder)

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## **Harris County's Bacteria Reduction Plan**

Alisa Max, P.E., Harris County Watershed Protection Group (Presenter)

Bacteria has been identified as the number one impairment of waterways in Harris County. In advance of the current Bacteria Implementation Group efforts, Harris County developed a bacteria reduction plan adopted by Harris County Commissioners Court. This presentation will speak to the process used to develop the plan, including consideration of stakeholder input. The presentation will also address how the plan illustrates that improvements can, and will, be made to improve water quality in our regional waterways, including Galveston Bay.

*Presenter Bio* Alisa Max, a registered professional engineer in the State of Texas, has worked on environmental issues in the Houston area for seventeen years, both in private and public sectors. She serves as the manager of Harris County's Watershed Protection Group, a group of 22 employees who are solely dedicated to keeping our waterways clean. Ms. Max is a civil engineering graduate of Rice University, a member of the Chi Epsilon Honor Society, and the recipient of the American Society of Civil Engineers Houston Branch's 1998 Edmund Friedman Young Engineer of the Year award.

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## **Concurrent Session C. Sustainable Conservation Practices**

### **Moderator: William Smith, Ph.D., Academy for Educational Development**

#### *Moderator Bio*

William Smith, Ph.D., is the executive vice president of the Academy for Educational Development, one of America's largest non-profits. Smith began his work in public health on infant diarrhea, immunization campaigns, and acute respiratory infections in rural communities throughout Africa, Asia and Latin America. In the mid-80's he became heavily involved in AIDS prevention around the world and in the United States. Today Bill supervises health programs ranging from elder care to teen drug prevention – from policy advocacy to communication campaigns.

Bill is co-author of the recent IOM (Institute of Medicine) report *Health Literacy: A Prescription to End Confusion Report*. He has authored major chapters in health text books and recent publications on health communication. He has co-authored two books: *Radio and Community-Based Social Marketing*.

He serves on the Scientific Advisory Board to the Center for Health Marketing of the Centers for Disease Control and Prevention; on the Boards of the Center for Plain Language, the editorial Board of the *Journal of Environmental Communication*, the *International Journal of Health Communication* and the American Dental Association Advisory Board on Health Literacy.

Smith has an Ed.D. in non-formal education with an emphasis on gaming theory from the University of Massachusetts. He received an honorary Doctor of Science from the University of South Florida in recognition of his work in social marketing and social change. He is co-founder of the Social Marketing Institute, columnist for the *Social Marketing Quarterly* and publishes widely on health, human behavior and social marketing.

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### **Panelist**

#### **From Education to Conservation: The First Step Toward Awareness of Galveston Bay**

Della Barbato, Manager of Education Programs, Galveston Bay Foundation, Webster, Texas (Presenter)

Amy Turner, Director, Waterborne Education Center, Anahuac, Texas (Presenter)

Tiffany Garcia, Clear Creek Independent School District, Friendswood, TX (Presenter)

Mary Jean Haden, Camp Wild and Junior Master Naturalists

Lisa Reznicek, Artist Boat, Galveston, TX

Before a person can develop a passion strong enough to merit a call to action, he/she has to have knowledge of the topic. Following this logic, it only makes sense that before you can cultivate a life-long conservationist, you have to first educate about the beauty and benefits of Galveston Bay and her coastal resources. Hands-on activities that are actually in the bay area the most affective way to educate about the bay, as well as develop a stewardship in our area youth and the general public. Programs that begin with classroom lessons to establish baselines of knowledge, and culminate with in-the-field lessons develop long-lasting concerns for the "who, what, when, where, why and who cares" of Galveston Bay. And not

only do they apply a more effective learning technique, they often result in immediate conservation activities for tangible results.

If you cannot bring the students to the habitat, bring the habitat to the students. There are, unfortunately, still many school districts that do not have the capability to conduct in-the-field activities. Until this condition is solved, there are still creative ways to accommodate field activities to the classroom, and to develop mini-habitats on campus. The Galveston Bay area is rich with programs, groups, individuals and educators who are experienced and enthusiastic about camps, workshops, field activities and classroom residencies. And these are the individuals and activities that cultivate the kind of stewards Texas needs.

#### *Presenters Bio*

**Della Barbato** received her Bachelor and Master of Science degrees in plant biology from Texas A&M University. She comes from a science educator background, serving as the middle school science teacher and developer of curricula of all sciences at an accredited Montessori school for five years. Since March of 2007 she has served as manager of education programs for the Galveston Bay Foundation. She coordinates and runs six different education programs for the youth in the Galveston Bay area, half of which allow the students to get hands on and muddy in the Bay.

**Amy Turner** is a graduate of Texas A&M University with a degree in journalism and another in recreation, parks and tourism sciences. After graduating, she was hired as the Waterborne Education Center's Outreach Director in June 2004. In this position, she managed all press and advertising for the organization, as well as other various duties that go along with working for a very small non-profit. In June 2008, she was promoted to Executive Director.

Amy is lifelong resident of the Galveston Bay area. She was raised in Anahuac, and now resides in Double Bayou with her husband, Rhett.

**Tiffany Garcia** is a teacher at Westbrook Intermediate. She is currently teaching two environmental education courses and three gifted and talented science classes. Westbrook Intermediate houses the WAVE magnet program and these students are offered specialized courses every nine weeks. Mrs. Garcia teaches some of these specialized classes about Galveston Bay, marine biology, birding, recycling, habitat construction and local reptiles and amphibians. All mini-courses take field trips which usually involve some sort of hands-on community service such as marsh grass plantings, dune plantings and habitat construction. Mrs. Garcia has a Bachelors degree in special education with a minor in biology. She is certified to teach middle school science, early childhood, special education, G/T, ESL and elementary school. Her professional experience includes preschool teacher (four years), mothers day out director (three years), kindergarten teacher (three years), WAVE science teacher (four years), and an environmental education teacher (one year).

**Mary Jean Hayden** has always been an outdoors woman and community volunteer. Becoming a Texas Master Naturalist following retirement was a natural progression along her career path as secretary, mom, school volunteer, Campfire Girls leader, backpacker and Occupational Therapist. She currently serves as president and education team leader of Galveston Bay Area Chapter - Texas Master Naturalists. A founding member of Friends of Galveston Island State Park and Galveston Island Nature Tourism Council, Mary Jean has worked on numerous committees and projects, but her passion is teaching children about local ecosystems and her gift is recruiting others to the effort. She developed and coordinates Camp Wild, Bay & Island Adventures and the Jr. Master Naturalist Program. Mary Jean attended Bryant and Otterbein colleges and graduated from Ohio State University. She worked as an occupational therapist, specializing in spinal cord injury and ADA accommodations, at TIRR, Baylor and UTMB before retiring in 1999.

**The *EcoTeacho* Program: Sustaining Our Estuary through Inner-City Environmental Education Programs**  
Lawrence Spence, Crockett Elementary, Houston ISD, Houston, TX

As the populations living within the Galveston Bay watershed increase, we are left wondering how we can sustain the health of the Galveston Bay estuary, indeed the very health of all adjacent ecosystems. Hope for sustainability of the estuary remains in education of its inhabitants. The youth of this region, the inheritors of the Estuary, benefit from intensive environmental education programs that expose them to the basic concepts of coastal estuaries, watersheds, non-point source pollution prevention as well as the awareness and appreciation of the economic and intrinsic value of the native local flora and fauna. To accomplish such, these young people need to be literally immersed into these concepts with hands-on, feet-on activities through field classes, restoration events and community-action projects which will engage them as stewards of their neighborhood and local environment, stake-holders in their community, both civil and ecological, as well as inspire them to take steps towards positive, progressive action in the areas of the world around them where they have influence.

The *EcoTeacho* program at Crockett Elementary in Houston ISD continues to provide such environmental education programs. Beginning as the Kids on the Bayou program of the Bayou Preservation Association in 2001, *EcoTeacho* provides students, teachers and parents opportunities year-around, from year to year through after-school programs, family science events, campus-wide science festivals, field classes, habitat restoration events and community-action projects. Participants in the program learn the basic concepts of the function of freshwater wetlands and coastal estuaries as well as how these systems interact with the ecosystems around them. Field classes take participants out of the classroom to environmental education venues including nature-learning centers, parks, preserves and other natural places to interact with the natural environment. Habitat restoration events teach the importance in conserving natural areas, issues with invasive species, value of native species as well as techniques for enhancing areas to attract wildlife as well as clean air, water and soil. Participants in community-action events de-litter urban areas, learn of the causes non-point source pollution, NPSP prevention strategies and how to encourage others to prevent NPSP. The program coordinates activities to interrelate to one another thereby creating continuity in the curriculum throughout the year.

*EcoTeacho* primarily serves the at-risk, underserved, inner-city and minority student populations, their parents and teachers in Houston ISD from grades Pre-Kindergarten (3 years of age) to 12th graders. College students from the University of Houston-Downtown also participate regularly in programs and activities. Houston ISD is the largest urban school district in Texas with over 220,000 students. Since 2001, the *EcoTeacho* program, and its predecessor, the Kids on the Bayou program, has served thousands of students, parents and teachers in Houston ISD through environmental education programs thanks to the support of many public and private sponsorships including the Galveston Bay Estuary Program.

*Presenter Bio*

Lawrence Spence is a classroom educator and coordinator for *EcoTeacho*, an environmental education and stewardship program at Crockett Elementary, Houston ISD, located in the First Ward, northwest of Downtown Houston. During his seven-year tenure at Crockett, he designed, coordinated the installation and now manages the sustainability education center including a school-yard habitat, native wetland pond, composting, rain water harvesting, vegetable gardening and recycling programs. He also serves as the campus design team coordinator for the school's current LEED expansion and renovation project.

Since 2003, Lawrence has served as president of the Environmental Educators' Exchange (EEE) of Greater Houston, an organization that has served formal and informal educators as well as local education venues through networking, collaboration and resource sharing since the early 1980's.

Lawrence also serves on the Houston ISD Green Committee, the Houston ISD Children's Nature Collaborative Initiative, the Green Schools Committee of the Greater Houston Area Chapter of the U.S. Green Building Council as well as an advisor to the University of Houston-Downtown Environmental Club.

Lawrence holds a Bachelor of Science in environmental education from the University of Houston-Downtown and is certified by the Texas State Board for Educator Certification to teach early childhood through 8th grade.

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**Habitat Highways: Connecting Wildlife Habitats in Urban Settings**

Chris LaChance, Texas Sea Grant and Texas AgriLife Extension Service, Houston, TX

The Galveston Bay Plan ranks habitat loss first in order of compelling issues threatening Galveston Bay and the Upper TX Gulf Coast. Increased pressure from urbanization has also created habitat fragmentation leaving disconnected, widely spaced “islands” of habitat that make it difficult or even impossible for wildlife to migrate to find essential food, shelter or water.

It is estimated that forty million acres of land are in human-designed landscapes in America (Tallamy, 2007). This also translates to more chemical fertilizers and pesticides entering waterways at alarming rates making estuaries, rivers, lakes, bays and bayous hostile environments for marine life and humans. These often thirsty landscapes consume 50-60% of the supply of potable water. With too little space left for wildlife, degrading water quality and increased pressure on water supplies, it will be important to make yards, neighborhoods, schools and urban communities healthy havens for the creatures with which we share the planet.

The Habitat Highways (HH) initiative was conceived as a way to mitigate habitat loss and fragmentation while galvanizing public awareness and support for creating wildlife habitats, protecting water quality and conserving water. As a program focused on education and action, HH is building the infrastructure to train volunteer advocates for wildlife habitats, create public awareness of habitat potentials, influence the changing of landscape ordinances and deed restrictions to be more wildlife habitat-friendly and support local schools in their effort to establish school habitats as a way to not only re-connect children but help to foster the next generation of environmental stewards.

#### *Presenter Bio*

Christina LaChance is the watersmart program coordinator for the Texas Coastal Watershed Program (TCWP) a program of the Texas AgriLife Extension Service and Texas Sea Grant, part of the TX A&M University System. Her background includes eighteen years of teaching experience and certification as a Texas Master Gardener and Master Naturalist. For the past 9 years she has worked to facilitate outreach and education on the issues of runoff pollution, water conservation, and landscaping for wildlife as these issues relate to residential and non-residential landscaping. She has coordinated annual WaterSmart Landscaping workshops and seminars, as well as coordinated the installation of eight demonstration gardens in the Houston-Galveston Bay area, one of which includes a healing garden at MD Anderson Cancer Center. Currently, she is continuing the WaterSmart Program with a grant from Houston Endowment that added a new feature: Habitat Highways: Restoring and Creating Habitats for Wildlife in Urban Spaces.

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#### **Houston's Mainstream Inner City Citizen's Public Education & Participation**

Ed Gerhardt, Junior Anglers & Hunters of America, Houston, TX

“What is needed to sustain our estuary?” is the key question. The immediate answer is the public must support the case for sustaining the estuary. The public we refer to is made up of individuals, taxpayers, employees & owners of businesses, members of community organizations, and citizens & taxpayers of towns, cities, counties and the state. Citizens need scientific support to assist their case. Then economic support can be sought from various sources responsible to the citizenry.

The question is seemingly fairly simple and straightforward, but it cannot be answered with either a “yes” or “no”. The answer has to explain how the public needs to be educated and how they can participate most effectively.

JrAHA has in its mission statement the commitment to teach environmental responsibility and conservation practices. Our target constituents are mainstream inner city youths and families that have had traditionally “little to no” connections to nature that form the foundation for environmental responsibility and conservation practices.

JrAHA's strategy is to focus on lifelong outdoors recreational activities, the two most traditionally popular nationally, fishing and hunting. Through creating a connection to nature that is a lifetime one versus a single event, those citizens are being educated to protecting their self-interest, which is one and the same as sustaining our estuary.

The single largest target opportunity is the youth and then their parents. Houston ISD is the seventh largest school district in the nation and by far the largest in Texas with well over 200,000 students. JrAHA has successfully entered into a partnership with HISD and particularly the inner city schools to teach for PE credits fishing, archery, boating and hunting. Other major strategic plans include providing access to continued outdoors experiences and increasing the time these young people and their parents spend outdoors together, routinely.

#### *Presenter Bio*

Mr. Gerhardt is a graduate of The University of Texas in Austin and served as an officer in the U.S. Navy with multiple tours in Vietnam.

In 2002, Ed retired from the hospital management sector of health care after 30 years. He spent his early business career with Johnson & Johnson and later was a corporate officer with Lifemark Hospitals, and then Healthcare International.



All his life Gerhardt has been an avid angler and hunter who was taught those skills by his father while growing up in Breckenridge, Texas.

Ed currently serves as a volunteer area chief for Texas Parks and Wildlife Department. In this capacity, he instructs and qualifies volunteer TPWD angler instructors. He is also qualified as a master angler, a hunter education instructor, a boating safety certification instructor, and a National Archery In Schools Program instructor trainer.

In January 2006 Ed founded Junior Anglers & Hunters of America along with some long time “field & stream” friends. It qualified for a 501(c)(3) public charity for education exemption in March 2006. In February 2007 he completed Rice University’s, Susan Glascock School’s Certificate Program for Charity Fund Raising Professionals—a 3-year program. Junior Anglers & Hunters is the managing project partner in a joint venture to connect inner city youth to nature with Texas Parks & Wildlife and Houston ISD. This project has just completed its first year with over 5,000 inner city youth attending classes for PE credit in angling & archery. JrAHA has also conducted for 106 families with young hunters the required Hunter Safety Certification Course during 2008.

Noteworthy, in 2007 The Conservation Fund launched the National Forum on Children and Nature. Over the past year, the Forum received 560 proposals from projects seeking endorsement and Nov. 12, 2008, Jr. Anglers & Hunters of America’s project “Outdoor Connections for Houston Youth” received endorsement from the National Forum on Children and Nature as one of 30 projects nationwide that best demonstrates new and creative ways to reconnect kids with nature.

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## **Concurrent Session D. How Human Behaviors Impact Galveston Bay – A Socio-Ecological Approach**

### **Development of Social Indicators for Fishing Communities**

Pris Weeks, Ph.D., Houston Advanced Research Center, The Woodlands, TX (Presenter and Moderator)

Ben Blount, Ph.D., SocioEcological Informatics, Helotes, TX (Presenter)

Lovette Miller, Ph.D., Houston Advanced Research Center, The Woodlands, TX

The FAO Technical Guidelines for Responsible Fisheries promotes the use of indicators to monitor sustainability and other measures of well-being. While there has been substantial progress in the development and implementation of indicators for marine fisheries at the national and regional levels, local and sub-regional level indicators are lacking. Additionally, the concepts of resilience and vulnerability, which have been associated with sustainability, have not been applied to fishing communities. This research combines measures of social well-being and sustainability with measures of resilience and vulnerability for coastal fishing communities to provide for improved social impact assessment.

Commercial fisheries in Texas are faced with multiple stressors including competition from imports, high fuel costs, loss of fishing infrastructure and gentrification. The ways in which, and extent to which, such stressors to fisheries have impacted individual coastal communities depends on many factors including how dependent the community as a whole is on commercial fishing. Secondary data such as that found in the US Census, landings, and trip tickets has traditionally been used to identify resilience and vulnerability. Such data is not fine scaled and potentially misses important local factors associated with well being. Therefore, in this study, quantitative indices are groundtruthed using an ethnographic assessment in eight fishing communities in Galveston, San Antonio, Lavaca and Tres Palacios bays. This presentation focuses on the ethnographic portion of the project and describes how fishermen and other coastal residents cope with the economic and demographic transitions facing their communities.

### *Presenters Bios*

**Pris Weeks**, Ph.D., is an environmental anthropologist in the Social and Policy Analysis Group. Her research interests include: the public understanding and acceptance of the scientific models that inform resource management; the social impacts of technical and resource management innovations; and the way in which scientific information, cultural models and values combine in environmental disputes. Recent research has examined issues related to rural development, the international environmental movement, protected areas and fisheries. Weeks has worked to incorporate local knowledge into environmental management through collaborative decision making and has served as a facilitator for both state and federal agencies. She has served on two National Academies of Science Panels related to her research interests. She holds a Ph.D. in cultural anthropology from Rice University and has conducted field work in Texas, the Philippines and India.

**Benjamin Blount**, Ph.D., is currently a consultant with SocioEcological Informatics and a board member of Anthropology & Environment. He retired from The University of Texas at Antonio in 2008 as a research professor. He has held academic positions with several universities including The University of Texas at San Antonio, the University of Georgia and The University of Texas at Austin. Blount has garnered over half a million dollars in grants and awards for research, developed the coastal anthropology program at the University of Georgia, and developed a procedural refinement for the

use of cultural models in environmental and ecological research, linking anthropology and linguistics through 'key-word' analysis

Blount currently serves as the editor for the *MAST* Maritime Anthropology Studies. He previously served as editor-in-chief for *American Anthropologist* from 2005-2007 in addition to authoring and co-authoring several articles in academic journals over a ten-year period. Blount also contributed to a handbook for the National Coastal and Oceanic Service on human dimensions of research on harmful algal blooms, and has

Blount has participated on several committees including the Science and Statistics Committees for fishery management councils, the South Atlantic Fishery Management Council (including 2 years as chair of the Socioeconomics Sub-Committee), and the Gulf of Mexico Fishery Management Council, and president of Culture & Agriculture (Section of AAA) from 2007 to 2008.

Blount received a Ph.D. in anthropology from the University of California, Berkeley in 1969 following a B.A. in anthropology from The University of Texas in 1963.

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### **A Historical Perspective of the Dickinson Bayou Watershed**

Alecya Gallaway, Environmental Institute of Houston, University of Houston-Clear Lake (Presenter)

This presentation offers a historical pictorial account of the habitat and the use of the land and water resources in the Dickinson Bayou watershed. The earliest known group to use the area were the Akokisa, a nomadic tribe that camped along the bayou and gathered the clams, one of their staple foods, for thousands of years. The source of the earliest known habitat information for the watershed comes from the 1821 journal of a surveyor on the schooner "*Lively*" which landed on the Dickinson Bay shore near Eagle Point. From these descriptions, we know that small oaks covered the area near Salt Lake. Settler accounts in the 1830s describe buffalo, wild mustangs, deer and Attwater's prairie chickens in the tall grass prairies. The region was also rich with cedar and pine. By 1860 the number of cattle ranging the watershed had grown to support a tannery and slaughterhouse. The Dickinson Bayou watershed was primarily open range cattle country from the 1830's until the Italian farmers settled in the area in 1890. The waterway itself remained virtually untouched until the late 1930s when dredging, land development, oil exploration, groundwater removal, sewage and subsidence gradually took its toll. The historical accounts of the habitat of Dickinson Bayou watershed give a good perspective of the habitat that has been lost over time. This presentation illustrates the uniqueness of the watershed, and brings historical value to future habitat preservation and restoration projects.

#### *Presenter Bios*

Alecya Gallaway is a historian with a background in marine biology. For the past ten years she has researched the ecological history of Galveston Bay from pre-European settlement to World War II using a combination of archival research of historical and ecological records and oral history of resource users and regulators. Some of these changes are documented in recent papers written on the history of farming and ranching the coastal saltgrass prairies, a recently published book *The History of San Leon Vol. I*, and the history of resource use on Galveston Bay in the revised edition of *The State of the Bay*. She is currently working on a history of the saltgrass cattlemen of Texas and collaborating with Chambers County historian Kevin Ladd of Wallisville Heritage Park on the history of gunfights around the bay.

Gallaway served as secretary for the executive committee and is an emeritus trustee of the Galveston Bay Foundation. She has served as the court appointed Chairperson of the Galveston County Historical Commission since 1999. From 1991 to 1994 she was the program director of the Coastal Management Program for the League of Women Voters of Texas during the successful legislative struggle to get a coastal management plan for Texas and served as environmental representative and publicity chairperson for the Bay Area League of Women Voters. She was on the board and served as president of the Galveston conchology group sponsored by TAMUG for six years. During her term as president she designed and built several permanent school displays and placed scientific collections of shells from Galveston waters at the TAMUG marine lab and at the Galveston Island State Park.

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### **Freshwater Aquarium Hobbyists and Invasive Species in the Houston-Galveston Region**

Lovette Miller, Ph.D., Houston Advanced Research Center, The Woodlands, TX (Presenter)

Pris Weeks, Ph.D., Houston Advanced Research Center, The Woodlands, TX

The aquarium trade serves as a key introduction pathway for aquatic non-native invasive species along the Upper Texas Coast. Freshwater and marine species of finfish, shellfish, and aquatic plants from Asia, South America and Africa are popular and widely sold. Although aquarium owners purchase these plants and animals with every intention of maintaining them in indoor aquaria, they are often intentionally released into local waterways when the owner can no longer care for them. Pet owners may feel that they are acting in a humane way, while uninformed about the ecological and economic impacts of release. Or, owners may place the perceived needs of their pet over ecosystem welfare (i.e. take an animals

rights approach). This paper describes results to date of a project to develop an understanding of the social drivers and decision processes leading to release of freshwater aquarium species into public waters.

The study focuses on Loricarids, the most widely sold fish in the aquarium industry. Loricarids are popular with both first time aquaria owners and aquaria enthusiasts due to their low maintenance requirements, ability to keep an aquarium clean of algae and diverse coloration. Two species have been documented in Houston waters by the USGS – [\*Hypostomus plecostomus\*](#) (suckermouth catfish) and [\*Pterygoplichthys anisitsi\*](#) (southern sailfin catfish). TPWD has determined that Loricarid catfish are established in White Oak, Greens and Braes Bayous. In its introduced range, the suckermouth catfish competes with native algae eaters, burrows into levees and banks of bayous, threatening the stability of the bank and there have been several oral reports of great blue herons being killed trying to swallow armored catfish. Although the focus of this study is on Loricarids, the model of decision making developed will be applicable to other pet species that are intentionally released.

#### *Presenter Bio*

Lovette Miller is a post-doctoral fellow in coupled natural and human systems. She obtained a Ph.D. in 2007 from the Department of Geography at the University of Maryland. Her primary research interest relates to the socioeconomic factors of natural resource use and the application of Geographic Information Systems, population surveys and statistical analysis to study social-environmental problems. Her most recent completed research centered on changes in natural resource use among the fishing, sugar and tourism populations in the Negril Environmental Protection Area, western Jamaica. Both qualitative and quantitative research and analytical methods such as trend and content analyses, focus group discussions, semi-structured interviews, a population survey, ArcGIS, and Statistical Package for the Social Sciences (SPSS) were employed in this research. Research activities included cataloguing, and mapping the wet forest's plant species; collecting and testing water samples prior to and on exit from the wet forest; and locating, recording and marking crab holes. Currently, Lovette is project manager for the Freshwater Aquarium Hobbyists in the Houston-Galveston Region Project.

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#### **Modeling Values and Perception of Release Intention for Invasive Species**

Michael Monticino, Ph.D., University of North Texas, Denton, TX (Presenter)

Non-native invasive species pose a pervasive and growing threat to eco-systems as global climate change increases the range of species to regions where they were previously not viable. Along the Upper Texas Coast, pet owners are the primary introduction pathway for aquatic non-native invasive species. Agent based models provide a powerful tool for investigating the role of both knowledge and values that lead to release decisions by pet owners.

This talk will discuss the modeling framework and how social survey data collected as part of project supported by TPWD is quantified within a multi-agent system to represent the actions and interactions of key participants in non-native invasive species release. Participants include aquarium owners, small local aquarium shops, large retail aquarium stores, Internet-based aquarium fish dealers, and regulatory agencies. The understanding gained from these models will be used to help design and evaluate strategies to discourage release.

#### *Presenter Bio*

Michael Monticino, Ph.D., is the associate dean for Administrative Affairs in the College of Arts and Sciences and professor in the Department of Mathematics and Institute for Applied Science at the University of North Texas. His research and consulting expertise includes statistical analysis, probability models, operations research (resource allocation, forecasting, inventory control, retention analysis, staffing), and environmental modeling.

Monticino's current research activities include developing and analyzing interacting models that couple ecosystem dynamics to human land-use/land change decision-making. One focus of the work is to develop models that represent values of homeowners, residential developers, and other stakeholders who affect the environment through development decisions, and how the environmental consequences of these decisions may affect changes in human values. The work involves collaboration with a multi-disciplinary team of researchers. Michael led the software development of the multi-agent models representing stakeholders, coordinated the survey analysis to elicit stakeholder values, implemented survey results within decision analysis utility functions, and led the analysis of models.

Other research interests include generation of random probability measures and their applications, addressing how ideas from complex system theory can be applied to improve physiological research, and determining optimal multiple stopping strategies - buy/sell rules - for correlated random walks.

Monticino has worked with many organizations, including the U.S. Navy, ABC TV, ARGO Data Resources, the Institute for Defense Analysis, and IBM, to solve a variety of operational and management problems. He is also the founding president of the Mathematical Association of America Special Interest Group for Business Industry and Government, and an active

### **Connecting People to the Bay**

Laura Sykes, The Trust for Public Land, Houston, TX (Presenter)

The Robert Michael Pyle quote about kids and nature could not be more appropriately applied than to the Galveston Bay system: “People who care conserve; people who don’t know don’t care. What is the extinction of the condor to a child who has never known a wren?”<sup>1</sup> What is the health of Galveston Bay to a child who has never seen or touched its waters? Outdoor educators in our region can tell dozens of stories on this topic as they have brought children to the waters of Galveston Bay and its tributaries.

The Trust for Public Land (TPL) mission to “conserve land for people” is also never more appropriate as we look to the future of implementation of the Galveston Bay Plan. TPL’s urban projects along Bay tributaries such as Buffalo and Brays bayous are prime examples of the potential for this work.

#### *Presenter Bio*

Ms. Sykes is responsible for protecting critical open space and environmentally sensitive lands with a focus on Coastal, Southeast, and Central Texas. She utilizes nonprofit land acquisition techniques to identify, negotiate, and complete complex real estate transactions. Ms. Sykes participates in both public and private fundraising efforts associated with land projects.

She joined TPL’s Southeast region in 2002 as GIS and project manager, until relocating to Houston in 2005. Subsequently, Ms. Sykes has completed numerous conservation transactions, preserving critical acres of natural areas on Galveston Island and conserving land for parks and greenways along Brays Bayou, Japhet Creek, Spring Creek, and within the San Bernard National Wildlife Refuge. She is a graduate of Auburn University, receiving her bachelor’s degree in environmental design and a master’s degree in landscape architecture.

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### **Concurrent Session I. Environmental Flows: How Much is Enough?**

#### **Establishing Environmental Flows: Where are We in the Process?**

Glenda Callaway, Ekistics Corporation, Houston, TX, (Opening Remarks and Moderator)

#### *Moderator Bio*

Glenda Callaway is a founding member, former chair and current emeritus trustee of the Galveston Bay Foundation and an advisory board member of the Bayou Preservation Association. She is a local business owner who provides services to clients in areas of socioeconomic analysis, environmental impact assessment and public involvement. She has represented environmental and consumer organizations on several state and regional agencies dealing with energy and environmental issues. She currently is an active participant on the National Resources Advisory Committee of the Houston-Galveston Area Council and the Water Rights Advisory Workgroup of the Texas Commission on Environmental Quality. She was recently selected to represent environmental interests on the Trinity and San Jacinto Rivers and Galveston Bay Basin and Bay Area stakeholder group that is part of the Senate Bill 3 process to address the need for instream flows and inflows to Galveston Bay.

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#### **Water Supply Needs and Freshwater Inflows for Galveston Bay - A Region H Water Planning Perspective**

Michael V. Reedy, P.E., AECOM, Houston, Texas (Presenter)

Jason Afinowicz, P.E., AECOM, Houston, Texas

The Texas Water Development Board (TWDB) and Texas Parks and Wildlife Department (TPWD) have been jointly studying the effects of freshwater inflows on the health of Texas estuaries for many years. In 1998, specific recommendations for Bay and Estuary (B&E) freshwater inflow targets for Galveston Bay were published by TPWD in a report entitled “Freshwater Inflow Recommendation for the Trinity – San Jacinto Estuary”. Since that time, there has been much debate and subsequent studies conducted to further assess the appropriateness of these B&E target flows and the role that these targets might play in future water supply strategies and water rights permits.

The Region H Water Planning Group was authorized by the TWDB in June 2007, as part of the regional water planning process, to conduct technical studies to further evaluate these recommended B&E target flows. These Region H studies are focused primarily on evaluating the target flows under various hydrologic conditions, assessing the impacts of future water management strategies on the target flows, and developing mitigation strategies for attaining the B&E target flows under specific desired conditions.

The results of the study will demonstrate the relationships between recommended B&E target flows and simulated inflows to the bay using the Texas Commission on Environmental Quality (TCEQ) Water Availability Models (WAM) for several baseline conditions as well as implemented future water management strategy conditions. The study will evaluate the impacts on the frequency of attaining the target B&E freshwater inflows as a result of water management strategies developed in the 2006 State Water Plan. The study also will develop and evaluate strategies for attaining a desired frequency of attainment for B&E freshwater inflow targets and evaluate the resulting impacts to water management strategies.

This study will attempt to develop an initial framework for addressing the question “Can a balance be struck between the freshwater inflow needs of Galveston Bay and the need to develop future water supplies to meet growing demands for water in Region H?” While the intuitive answer to this question is likely “yes”, this study will develop the framework and quantify the impacts associated with achieving this balance for Galveston Bay and Region H water needs.

*Presenter Bio*  
(Placeholder)

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### **Freshwater Inflows in Galveston Bay: Primary Productivity as an Indicator of Ecosystem Function**

Antoinetta Quigg, Ph.D., Texas A&M-Galveston, Galveston, TX (Presenter)

Leslie Rulon, Texas A&M University, Galveston, Texas

Amanda R. Thronson, Texas A&M University, College Station, Texas

Allison Skinner McInnes, Texas A&M University, College Station, Texas

Samuel Dorado, Texas A&M University, Galveston, Texas

Stephen Davis, Texas A&M University, College Station, Texas

Daniel Roelke, Texas A&M University, College Station, Texas

Examination of the impacts of freshwater inflow and bay circulation are priority areas for the Galveston Bay Estuary Program, specifically programs which endeavour to define beneficial freshwater inflows necessary for salinity, nutrient and sediment loading regimes adequate to maintain productivity of economically important and ecologically characteristic species in Galveston Bay. With a rapidly expanding urban population in Texas, particularly in coastal municipalities, the challenge to meet human needs for water while maintaining critical freshwater inflows will be the greatest challenge in the coming decades. We present findings of monitoring program that specifically the phytoplankton community structure in response to freshwater inflows in the Galveston Bay estuary. We measure water quality (temperature, salinity, chlorophyll a, dissolved organic matter, pH, dissolved oxygen, transparency), primary production and phytoplankton community composition on monthly time scales. Our findings will ultimately be used to develop intense process-based understanding of the linkages between the magnitude of freshwater inflows, sediment and nutrient loading on primary productivity for the Galveston Bay ecosystem.

#### *Presenter Bio*

Antoinetta Quigg, Ph. D., heads the Phytoplankton Dynamics Laboratory at Texas A&M University in Galveston and has over 15 years experience researching phyecological (microalgae, macroalgae and seagrass) physio-chemical responses to environmental stresses in freshwater, estuarine, and coastal ocean environments world wide. General areas of interest include freshwater inflows and estuarine health, phytoplankton-nutrient interactions, harmful algal blooms, ecosystem eutrophication, dead zones. In recent years her research has focused on Galveston Bay (TX), Prince William Sound (AK), the Gulf of Mexico (USA), and Moreton Bay (AUS). This research utilizes state-of-art instruments, particularly those that facilitate simpler, faster and higher resolution assessment of primary productivity and phytoplankton community composition. She currently has 5 graduate students, mentored >10 undergraduate students. She regularly attends the Texas Freshwater inflows and Harmful algal group meetings, as well as the Galveston Bay estuary program and Dickinson Bayou watershed program meetings. She is also a member of the Trinity and San Jacinto Rivers and Galveston Bay Basin & Bay Expert Science Team (BBEST).

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### **An Alternative Approach to Addressing Freshwater Inflow Needs**

Jim Lester, Ph.D., Houston Advanced Research Center, The Woodlands, TX (Presenter)

Lisa Gonzalez, Houston Advanced Research Center, The Woodlands, TX

The issue of freshwater inflows to Texas bays and estuaries continues to be an important focus for state policy makers and the coastal research community. Increasing water demand, limited freshwater resources, and ecological needs of estuarine ecosystems are three primary factors driving this issue. Senate Bill 1, passed by the state legislature in 1997, and Senate Bill 3, passed in 2007, task state agencies with the analysis of data, development of models, and the formulation of management solutions using a stakeholder approach.

Texas Water Code defines "Beneficial Inflows" to mean: "a salinity, nutrient, and sediment loading regime adequate to maintain an ecologically sound environment." While it calls for the maintenance of productivity of economically important and ecologically characteristic sport or commercial fish and shellfish species, the Texas Water Code also calls for the maintenance of estuarine life upon which such fish and shellfish are dependent. State agencies have developed models that attempt to link estuarine freshwater inflows to the productivity of commercially and recreationally important fish species. This is done by analyzing relationships among inflow, salinity and fisheries harvest. Currently the models use fisheries independent monitoring data of selected species.

We believe that models of the relationship between freshwater inflow and productivity are unlikely to provide a sound basis for regulating freshwater inflow because water cannot be directly linked to ecosystem productivity. A new approach is required for estuaries, similar to the one used for instream flows, that defines the relationship between freshwater inflows and the maintenance of ecologically characteristic estuarine communities. We use 1982 to 2007 fisheries independent monitoring data collected by the Texas Parks and Wildlife Department expressed as relative abundance to analyze the relationship between community composition of the Galveston Bay Estuary and freshwater inflows to the bay. Variables of inflow are derived from gauged flow and salinity values. Patterns of abundance are measured by individual collection, but analyzed for temporal patterns on a seasonal or annual basis. Results show that the abundance of certain characteristic species in Trinity and Upper Galveston Bay is directly related to the quantity of freshwater flowing into the estuary.

#### *Presenter Bio*

Dr. Jim Lester holds a Ph.D. in zoology from The University of Texas at Austin and is currently the Vice President of the Houston Advanced Research Center. As Vice President, he is responsible for development and implementation of projects to make more sustainable our management of water, air and biological resources and our use of energy. He was a faculty member and administrator in the University of Houston System from 1975 to 2002. Dr. Lester held administrative positions at UH Clear Lake as a dean, associate vice president, and director of the Environmental Institute of Houston.

Dr. Lester serves in an advisory capacity to a variety of organizations. He is past president of the Texas Environmental Education Partnership. He serves as the chair of the Monitoring and Research Committee of the Galveston Bay Estuary Program, serves on advisory committees for the Texas Sea Grant Program and was recently elected vice chair of the Bay and Basin Expert Science Team for Galveston Bay.

His scientific work is grounded in ecological and population genetics, which he has applied to projects dealing with biodiversity and development of new species for sustainable aquaculture. Dr. Lester has worked in Asia and Latin America on aquaculture and fishery development projects. He is currently engaged in projects that analyze compilations of data from multiple sources to obtain new insights for ecosystem management or environmental policy.

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### **Concurrent Session J. Bacteria in Our Waterways: New Research and Solutions**

**Moderator: Lori Gernhardt, Gulf Coast Waste Disposal Authority**  
(Placeholder)

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#### **Association of Virulent *Vibrio* SPP. Bacteria with Hard Head and Gafftop Catfish**

Leslie D Gilbert, Texas A&M University, College Station, TX (Presenter)  
Mona Hochman, Texas A&M University at Galveston, Galveston, TX  
John R. Schwarz, Texas A&M University at Galveston, Galveston, TX  
Robin Brinkmeyer, Texas A&M University College Station, TX

*Vibrio vulnificus* and *V. parahaemolyticus* are naturally occurring bacteria in Galveston Bay. *V. vulnificus*, described as a 'flesh eating bacterium' by the local newspapers, was the cause of death for a fisherman two years ago after he sustained a stab wound purportedly from a hard head catfish. Examination of Galveston County epidemiology files revealed additional records of *V. vulnificus* and *V. parahaemolyticus* infections in fisherman through cuts and stab wounds caused by the handling of hard head (*Arius felis*) and gafftop catfish (*Bagre marinus*). In summer 2006, over 360 catfish (both species) collected from Galveston Bay were tested for *V. vulnificus* and *V. parahaemolyticus*. Catfish were collected from shrimpers' by-catch at the Galveston harbor and were also obtained through the Texas Parks and Wildlife fish population survey program and gill net program. Tests were conducted with vibrio-specific growth media followed by DNA probing to confirm presence of the virulence genes. Almost 100% of the catfish tested positive for virulent *V. parahaemolyticus* and over 40% were positive for virulent *V. vulnificus*. Currently strains of catfish derived *V. vulnificus* and *V. parahaemolyticus*

are being compared to strains found in oysters and the water column using randomly amplified polymorphic DNA (RAPD) PCR and DNA sequencing.

#### *Presenter Bio*

Leslie Gilbert is currently pursuing a master's degree from the Department of Wildlife and Fisheries Sciences at Texas A&M University. In 2006, Ms. Gilbert received an undergraduate research fellowship from the Texas Institute of Oceanography for her initial work with virulent *Vibrio spp.* bacteria on hard head and gafftop catfish. Throughout her undergraduate and graduate coursework, Ms. Gilbert has held positions as a teaching assistant, a research assistant for extracting, purifying and amplifying DNA using PCR, and a chemistry laboratory assistant.

Ms. Gilbert received a Bachelor of Science from Texas A&M University at Galveston in marine biology, with a minor in chemistry in December of 2007.

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### **Total Maximum Daily Load for Indicator Bacteria in Oyster Waters in Galveston Bay**

Ron Stein, Texas Commission on Environmental Quality, Austin, TX (Presenter)

Section 303(d) of the federal Clean Water Act requires all states to identify waters that do not meet, or are not expected to meet, applicable water quality standards. The Texas Commission on Environmental Quality (TCEQ) is responsible for ensuring that TMDLs are developed for impaired surface waters in Texas. The TMDL Program is a major component of Texas' overall process for managing surface water quality. The primary objective of the TMDL Program is to restore and maintain the beneficial uses—such as drinking water supply, recreation, support of aquatic life, oyster harvesting, and fishing—of impaired or threatened water bodies.

In the Galveston Bay system along the Texas upper Gulf Coast near Houston and Galveston, six segments have concentrations of bacteria that exceed the criteria used to evaluate the attainment of the designated oyster waters use, as identified in the state's *Texas Water Quality Inventory and 303(d) List*. Listings for oyster waters are based on information developed by the Texas Department of State Health Services (DSHS, formerly the Texas Department of Health) to classify oyster waters according to the potential risk to consumers of eating oysters harvested in a particular area. Restricted Harvest Zones (RHZs) are areas where oyster harvesting is not allowed for direct marketing. In these areas, harvested oysters must be moved to approved areas for a period of time to be depurated prior to marketing.

The criteria for the oyster waters use are based on fecal coliform concentrations. If the minimum sample requirement is met (ten samples during the previous five years), then the oyster waters use is not supported when median fecal coliform concentrations in bay and gulf waters, exclusive of 1,000-foot buffer zones along shorelines:

- exceed 14 colonies per 100 mL; and/or
- the 90th percentile of all samples exceeds 43 colonies per 100 mL

The 1,000-foot buffer zone provides protection from runoff from the watershed and for human use of the beaches. Within the 1,000-foot buffer, the contact recreation standard applies.

Samples collected within the RHZ for Upper Galveston Bay, Lower Galveston Bay, Chocolate Bay, and West Bay exceed the 90th percentile criterion. Within the six water bodies, the 90th percentile criterion was exceeded at 25 of the 41 locations routinely sampled within the RHZs; the median criterion was exceeded at only 2 of the 41 sample locations. The most probable sources of the impairment are marinas, boat traffic, failing septic systems, treatment facility discharges of untreated waste, migratory birds, wildlife refuges, storm water, and other unmanaged animals. The magnitude of exceedance of the bacteria criteria varies widely throughout all the bays. Analysis indicates that isolated zones of high bacteria concentrations occur in isolated areas near shorelines, rather than occurring chronically throughout the bays. Because the exceedances are confined to discrete areas, reductions will be achieved by targeting each isolated zone.

#### *Presenter Bio*

Ron is a geologist by training with Geology degrees from the State University of New York at Buffalo and the University of Oklahoma. Following a short career in academia, Ron became an environmental consultant for 12 years. Consulting experience included soil and groundwater investigation and remediation, superfund and RCRA projects, development of environmental compliance systems, and environmental compliance audits. As a professional project manager, Ron developed the project management system for his company. At the TCEQ since 2001, Ron has been part of the Total Maximum Daily Load team working on TMDL projects throughout the Houston area.

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### **Constructed Waste Water Treatment Plant Wetland**

Allen Sims, P.E., Carroll & Blackman (Presenter)  
(Abstract Placeholder)

#### *Presenter Bio*

Allen Sims is the vice president of Carroll & Blackman, Inc. since 1990. Mr. Sims holds a B.S. in civil engineering from Lamar University and is a registered professional engineer in the State of Texas. His experience includes water distribution, wastewater collection and treatment, including constructed wetlands, major watershed management studies, drainage facilities, and transportation projects.

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#### **Innovative Wetland on Brays Bayou Effectively Removes Bacteria from Polluted Stormwater Runoff**

Marissa Sipocz, Texas Sea Grant/Texas AgriLife Extension, Houston, TX (Presenter)

Bacteria is the number one pollutant of concern in Houston's waterways. Recent health concerns about contact recreation activities in waters with high fecal coliform contamination (bacteria) and the closing of Galveston Bay oyster beds, have brought the issue of bacterial contamination to the forefront. Contamination may arise from several sources, from aging and failing stormwater and wastewater infrastructure to contaminated stormwater runoff. A recently constructed stormwater wetland on Brays Bayou at Mason Park, in southeast Houston, is proving to be remarkably effective at removing bacteria from polluted stormwater runoff. Constructed wetlands are known to be fairly effective at removing bacteria from stormwater, but the Mason Park stormwater wetland is the first documented proof of the effectiveness of this method in the Houston region. This wetland consistently removes nearly 99% of the bacteria in the stormwater inflow.

Stormwater wetlands are few and far between within our watersheds. In a heavily urbanized park in the middle of a mega-metropolis such as Houston, a local neighborhood has an effective tool for controlling insidious pollution, and a beautiful magnet for birds in the bargain. With four million additional residents coming to Houston in the next few decades, pollutant loadings in Houston's bays and bayous will increase dramatically, increasing the urgency for finding a solution to the pollution in our waterways. The Mason Park wetland suggests a simple method for cleaning our stormwater runoff while adding to the beauty and diversity of our natural environment.

#### *Presenter Bio*

Marissa Sipocz is the wetland program manager for the Texas Coastal Watershed Program. She has worked as a field biologist doing wetland restoration around Galveston Bay for 12 years. Marissa facilitated the development, construction and planting of the Mason Park Stormwater Treatment Wetland, which created 3.5 acres of wetlands along Brays Bayou in Houston. She is currently working on a Stormwater Treatment Wetland Creation Manual for Dickinson Bayou and completing several restoration projects within the Galveston Bay watershed.

She also restored wetlands along Sims Bayou, Buffalo Bayou, Sheldon Lake, San Jacinto River and various bay systems within Galveston Bay.

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### **Concurrent Session K. Reducing Boater Waste**

#### **Moderator: Nancy Parra, Ph.D., League of Women Voters**

Nancy Parra, Ph.D., serves on the League of Women Voters Board of Directors as organization vice president. A member of the League's Natural Resources Committee, she actively participates in the formation of the League's positions on environmental and natural resource issues. Nancy also represents the League on the Galveston Bay Council where she is serving her second term. She is chairman of the Council's Public Participation and Education Subcommittee and is a member of the Budget and Priorities Subcommittee.

Nancy also volunteers for the Women's Resource of Greater Houston, teaching financial management courses for lower-income Hispanic women, and has helped establish a stronger foothold for the Women's Resource in the Hispanic community.

Nancy is retired from a career in teaching and technical writing. She received her bachelor's degree from DePaul University, and her master's and doctorate degrees from the University of Chicago in English language and literature.

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#### ***Pump It-Don't Dump It – A Boater Education Campaign***

Bob Stokes, J.D., Galveston Bay Foundation, Webster, TX (Presenter)

Vanessa J. Mintzer, Galveston Bay Foundation, Webster, TX

The Galveston Bay Foundation's boater waste education campaign, *Pump-It-Don't Dump It*, addresses the issue of illegal sewage discharge in Galveston Bay through targeted outreach and education to boaters. The purpose of the campaign is to decrease the incidence of illegal discharge of boater sewage waste to the Galveston Bay Estuary, particularly Clear Lake.



This project is a unique example of how non-profit organizations, government agencies, and local business are working together to conserve Galveston Bay. The work group has successfully developed campaign messages, created marketing materials, and distributed materials in the Clear Lake community through a variety of methods (flyers, signage, billboards, etc.). The Clear Lake community has shown sincere interest in tackling this environmental issue and has played an instrumental role in the development of the campaign. Marina owners and managers who are involved in the project have been willing to help with all aspects of the campaign and the boaters reached during the events and exhibits have been receptive to the campaign messages.

To complement the education and outreach component of the project, the Galveston Bay Foundation has been working with regulatory entities to increase enforcement of related statutes.

GBF is pleased with the progress that has been made with the campaign in 2008 and plans to continue in 2009. The work group will continue to focus on distribution of the campaign message through printed and outdoor advertisement and through direct mailings to boaters.

#### *Presenters Bios*

**Bob Stokes** is a 1990 graduate of Yale University and a 1994 graduate of The University of Texas School of Law. He began his legal career with the firm of Blackburn & Carter, an environmental law firm in Houston. At Blackburn & Carter his practice consisted of both civil and administrative matters, mainly on behalf of community groups.

In February of 1997, Bob moved to the Harris County Attorney's Office where he began practicing in the Environmental Division. His practice consisted primarily of civil enforcement matters, but he also had an active administrative practice, both in opposition to and in pursuit of, state environmental permits in front of the Texas Commission on Environmental Quality.

In June 2004, Bob left the County Attorney's Office to become president of the Galveston Bay Foundation. The Galveston Bay Foundation's mission is to preserve, protect, and enhance the natural resources of Galveston Bay and its tributaries. It has programs in advocacy, conservation, education, and research. Bob had served on the board of the Foundation for five years prior to taking over as president and had served as the board's chair for the previous two years.

Bob has also served on the Houston Wilderness Board of Directors since 2004 and on the Governing Board of Earth Share of Texas since 2007.

**Vanessa Mintzer** graduated from the University of Florida in 2004 with a B.S. in environmental science and from Duke University in 2006 with a master's in environmental management. She joined the Galveston Bay Foundation in May of 2006. As the Director of Community Programs, Vanessa recruits and trains GBF volunteers, plans community restoration projects, coordinates and manages outreach and education events and projects, and takes on a variety of other tasks that promote appreciation and stewardship of Galveston Bay.

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#### **State Environmental Laws for Coastal Boaters Hard to Enforce**

Dewayne Hollin, Texas Sea Grant Program, College Station, TX (Presenter)

Direct discharge of sewage, municipal waste, recreational waste, agricultural waste, or industrial waste into state waters of Texas is illegal—at least it says so in the Texas Water Code. But try and enforce that law and you become easily discouraged and even angry with the confusing and often lack of enforcement of the state laws provisions.

This presentation will discuss Texas laws as they apply to boat sewage discharge. The term "no discharge zone" in Texas will be reviewed as well as the application of enforcing fines and penalties to boaters discharging sewage into no discharge zones. The presentation will also examine the number of pump-out stations by inland area lakes and coastal bays and estuaries.

A summary on the Texas marina industry's position on the present system and how the Marina Association of Texas (MAT) would like to see the system changed will be presented.

#### *Presenter Bio*

Mr. Dewayne Hollin has been marine business management specialist for the Sea Grant College Program at Texas A&M University since 1972. He received both his BBA and MBA from the University of Houston. He currently provides advisory services for marine-related businesses operating along the Texas Gulf Coast; plans and coordinates training programs and seminars in the areas of safety, business management and economics, marketing, environmental issues, recreational boating and commercial fishing, and conducts basic research on environmental issues, recreational boating, marine industrial development and commercial fishing industry safety. He serves as the state-wide coordinator for the Clean Texas Marina Program and Clean Texas Boater Program.

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## **Marine Effluent Reduction: A Working Model**

Autie McVicker, President, Maritime Sanitation, Inc. Kemah, Texas

Our Bay, like all other well traveled and heavily populated waters of the United States, are suffering from the very people who love her. Continuous increases in population, every growing numbers of recreational boaters and larger, more home-like vessels all provide explanation for increased waste discharges from vessels. While using education, enforcement and implementation of support programs to cajole the masses into doing the right thing, we have found a model of behaviors that works very well.

Doing the right thing by pumping waste tanks into pump out stations rather than directly discharging overboard can drastically reduce biological oxygen demand and coli form concentrations in our estuary. Most folks will follow the proper procedure if no undue discomfort is involved. Even those willing to take a difficult path to the better outcome can be helped by convenient and inexpensive methods of compliance. We are fortunate to have both public and private means to move vessel waste from the Bay to the appropriate sewers for disposal.

Making services available to boaters, providing constant training and enlightenment and enforcing regulations all play a part. But, the single most important element we have discovered is a CONTAGEOUS ENTHUSIASM for clean water. Modeling the behaviors we feel are important causes our clients, our elected officials and our neighbors to choose the better path. Adopting an area for litter removal, practicing the clean wake concept, giving time and energy to the public good and, above all, telling the story with a smile really works.

Suggestions for how you and your company or agency can continue the massive work already begun are abundant. Take your beliefs to the water. Take your friends and family for a learning outing on the Bay. Call for information on pump out systems, ways to properly dispose of boater waste, oil and many other pollutants and litter, especially plastic. Join us in the every day effort to keep the water clean so many generations to come can enjoy recreation, bask in the beauty and savor the produce of our Bay.

*Presenter Bio*  
(Placeholder)

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## **Concurrent Session L. Ecological Services of Freshwater Wetlands**

### **Moderator: George Guillen, Ph.D., University of Houston-Clear Lake**

*Moderator Bio* Dr. George Guillen received his B.S. in marine biology from Texas A&M University (TAMUG) (Galveston, Texas) in 1979. He received his Masters Degree in wildlife and fisheries sciences in 1983 from TAMU (College Station, TX). In 1996, Dr. Guillen received his Ph.D. in community health science (environmental science option) from The University of Texas - School of Public Health in Houston, TX.

Dr. Guillen is a long time resident of the Houston-Galveston area having lived in the area for over 40 years. He has over 25 years experience in the field of fisheries, marine biology and water quality assessment. From 1984 to 1998, Dr. Guillen worked for various state conservation and environmental agencies including the Texas Parks and Wildlife Department and Texas Commission on Environmental Quality (formally TNRCC and TWC) in Houston, Texas. He was responsible for management and direction of various environmental research, monitoring and enforcement programs. In 1998, Dr. Guillen took a position section manager with the Minerals Management Service (MMS) in New Orleans, Louisiana. During 2000 through 2004, Dr. Guillen served as the Fisheries and Contaminants Program leader for the US Fish and Wildlife Service (FWS) in the Arcata, California. During his tenure at FWS he managed the fisheries program and administered a research program dealing with instream flows on the Klamath and Trinity Rivers. This involved extensive collaboration with various federal, state, local and tribal agencies and organizations.

Dr. Guillen currently serves as the executive director of the Environmental Institute of Houston, part of the University of Houston system. He also serves as an associate professor in biology and environmental science at the University of Houston - Clear Lake. His current research interests include evaluation of the influence of fisheries, water and sediment quality and habitat loss on aquatic resources.

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### **Evaluating Water Quality and Water Storage Functions of Coastal Prairie Freshwater Wetlands in the Houston-Galveston Bay Area**

Maggie Forbes, Ph.D., Center for Reservoir and Aquatic Systems Research, Baylor University, Waco, TX (Presenter)  
Nicholas Enwright, Baylor University, Waco, TX (Presenter)

Coastal prairie freshwater wetlands (CPFWS) are small depressions or flats that are prevalent in the Houston-Galveston Bay. These wetlands, which are part of a globally imperiled ecosystem, are disappearing at an alarming rate. They have not typically been deemed jurisdictional due to their apparent isolation from navigable waters and their tributaries. In order to establish a “significant nexus” between these wetlands and receiving waters, we began a study to assess the functions these wetlands perform on a regional basis. Using conceptual HGM-type models and field sampling, our study seeks to evaluate the potential of wetlands to trap and store pollutants and store floodwaters. We developed five functional assessment models to predict water storage and water pollution attenuation for these wetlands. In addition, we are conducting hydrologic and water quality measurement to quantify the water quality improvement potential and water storage capacities of six selected CPFWS. We present conceptual models for heavy metal retention, phosphorus retention, nitrogen removal, and PAH attenuation, as well as a water storage model. We will also present results of initial water quality and hydrologic data.

#### *Presenters Bios*

**Maggie Forbes**, Ph.D., is currently a research associate at Baylor University where she is studying the water quality and water storage functions of coastal prairie wetlands in the Galveston Bay area. Dr. Forbes earned a B.S. and M.S. in environmental engineering with an emphasis on wastewater treatment wetlands at Humboldt State University, in Arcata, California. Forbes’ doctorate in environmental science is from the University of North Texas, where she examined the ability of wetlands to remove phosphorus from wastewater effluent. She has worked as an environmental consultant performing wetland delineations, mitigation design, habitat assessments, ecological risk assessments, and related activities.

At The University of Texas Marine Science Institute, Dr. Forbes studied wetland plant ecology and water quality processes in wetlands in the Nueces Delta, Texas. Her focus was on long-term changes in plant community in response to climate, wastewater additions, and restoration efforts. Presently, she is researching primary production, nitrogen fixation, and water quality in Texas reservoirs and in local treatment wetlands. Dr. Forbes is also a co-investigator on a research project that quantifies the ability of subsurface flow wetlands to treat septic tank effluent. The results of this project will provide passive, low cost water quality improvement in discharges from on-site systems in Texas. Dr. Forbes has been a professional wetland scientist since 2003.

**Nicholas Enwright** is a graduate student majoring in applied geography with a concentration in water resource management at the University of North Texas. He received a B.S. in geography and a certification in Geographic Information Systems from the University of North Texas in 2007.

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#### **Quantifying Water Budgets for Coastal Prairie Freshwater Wetlands**

Adam Clapp, Baylor University, Waco, TX (Presenter)

Margaret Forbes, Ph.D., Center for Reservoir and Aquatic Systems Research, Baylor University, Waco, TX

Joe C. Yelderman, Jr., Ph.D., Baylor University, Waco, TX

Coastal Prairie Freshwater Wetlands (CPFWS) are characterized by depressions and flats that are common in the Coastal Prairie ecosystem of the Galveston Bay area, which extends from southwestern Louisiana to the south Texas coastal plain. Studies estimate that between 1992 and 2002, over 9,000 acres of these Coastal Prairie Freshwater Wetlands (CPFWS) were lost. The cumulative loss of water quality and flood storage function associated with the rapid disappearance of these wetlands may have detrimental effects on water quality and flood attenuation in the lower Galveston Bay watershed. There are few quantitative data available to explain hydrologic processes of palustrine (freshwater) wetlands nationwide, far less in the Texas Coastal Prairie region. The purpose of this study is to gain a more complete understanding of CPFWS hydrology by monitoring individual CPFWS with hydrologic instruments to create a water budget for the wetlands including possible hydrologic interactions of CPFWS with groundwater and nearby surface water. Seven wetland sites have been instrumented with a combination of weirs, piezometers and rain gages; each with data loggers to record wetland, groundwater and nearby surface water levels. CPFWS on the Gulf Coast are most commonly characterized by soils with high clay content which makes them less permeable than other soils. In general, wetlands in these soils are less affected by groundwater or nearby surface water; however, further investigation is needed to understand the interactions among wetlands, groundwater and surface water. Early data have begun to explain these interactions and quantify the amount of water storage in these wetland systems.

#### *Presenter Bio*

Adam Clapp is a graduate student at Baylor University, where he is working on his Masters of Science in environmental studies. Adam’s studies have focused on water/wastewater management and hydrology. At Baylor, Adam has worked for two years with the Baylor Wastewater Research Program (BWRP) researching onsite wastewater treatment technologies. Managing the BWRP site has allowed Adam to participate in a number of different nutrient and bacterial reduction studies with conventional anaerobic treatment, aerobic treatment and constructed subsurface flow wetlands. As a recipient of the Gus C. Glasscock Endowed Fund for Excellence in Environmental Studies in 2007 and 2008, Adam Clapp had the

opportunity to work and learn in Latin America, where he studied water and wastewater management in rural Costa Rica. In addition to his work in water management, Adam's thesis is part of a study evaluating the hydrology and ecological function of coastal prairie freshwater wetlands. His thesis focuses on the water budgets of these wetlands and their storm-water storage capability.

Prior to attending graduate school, Adam received a Bachelors of Science in environmental studies from Baylor University in 2005. Following completion of his undergraduate, Adam worked for The Nature Conservancy of Texas at Fort Hood. With The Nature Conservancy, he took part in a woody vegetation inventory of Golden Cheek Warbler and Black Capped Vireo spring breeding habitat.

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#### **Created Wetlands and Water Quality Enhancement**

Carolyn White, Harris County Flood Control District, Houston, TX (Presenter)

Catherine Elliott, Harris County Flood Control District, Houston, Texas

Robert E. Snoza, Harris County Flood Control District, Houston, Texas

Michael Bloom, PBS&J, Houston, Texas

Jason Maldonado, PBS&J, Houston, Texas

Chad Richards, PBS&J, Houston, Texas

The Harris County Flood Control District ("HCFCD" or "District") holds a federal municipal separate storm sewer system ("MS4") discharge permit for stormwater and is required to monitor and address water quality concerns. In accordance with the District's Storm Water Management Plan, water quality enhancements are incorporated into new projects where practicable. Stormwater treatment systems implemented by the District include the creation of wetland areas within wet bottom detention basins and riparian channels. The District initiated a program to uniformly and consistently evaluate the effectiveness of these stormwater enhancement systems. A study of the overall effectiveness of these created wetlands for the treatment of stormwater will be used to modify and update design criteria for District stormwater features and to improve the use of stormwater best management practices ("BMP's") in the Houston-Harris County area. Currently the District is conducting stormwater monitoring studies at two facilities with wetland enhancement areas within Harris County: the Greens Bayou Wetlands Mitigation Bank and the riparian corridor and Detention Basin at Mason Creek, HCFCD Units T101-01-00 and T501-01-00 respectively.

This paper presents key provisions of the monitoring plans, monitoring activities, and monitoring results collected as of December 1, 2008. Quality-assured pollutant loading data for various water quality parameters were obtained from both sites. Statistical analyses were performed to evaluate if pollutant removal was occurring in the facilities that would reduce concentrations within receiving waters. Initial results from the current studies indicate various performances of pollutant removal at each facility. The District plans to implement stormwater monitoring at six additional facilities that will include similar created wetland areas. Continued monitoring will be utilized to refine wetland and BMP designs and to recognize any water quality benefits of current systems. Created wetlands for water quality enhancement are expected to provide benefits to the Harris County region by reducing need for costly stormwater treatment facilities, reducing pollutant loading, enhancing downstream natural resources, and providing wildlife habitat.

#### *Presenter Bio*

Carolyn White is a project manager for the Harris County Flood Control District Environmental Services Department. She has been with the District since February 2006. Prior, she was a project scientist at the environmental consulting firm, ENTRIX, Inc., for 11 years. Ms. White holds a master's degree in landscape architecture from University of California Berkeley and a bachelor's degree in geology from Carleton College. She currently manages projects under the water quality and revegetation programs for Harris County Flood Control District. Ms. White's projects include: ongoing water quality monitoring of District facilities, wetland planting plans for water quality enhancement, detention basin layout, and preparation of tree planting plans. Ms. White is registered as a certified professional in erosion and sediment control.

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#### **Evaluation of Surface Hydrological Connectivity between a Forested Coastal Wetland and Regulated Waters of the United States.**

Dex Dean, Texas A&M University, College Station, TX (Presenter)

Brad Wilcox, Ph.D., Texas A&M University, College Station, TX (Presenter)

John Jacob, Texas Sea Grant, Houston, TX

Andy Sipocz, Texas Parks & Wildlife Department, Dickinson, TX

Clyde Munster, P.E., Ph.D., Texas A&M University, College Station, TX

Rapid urbanization, industry, and agriculture have put enormous developmental pressure on coastal forested wetlands along the Texas coast. At least 97,000 acres of freshwater forested wetlands on the Texas coast have been lost since 1955, amid much larger losses of other coastal wetland types (TPWD: Texas Wetlands Conservation Plan, 1996). Some

coastal wetlands are protected by federal regulations under the Clean Water Act in an effort to maintain wetland hydrological and ecological services, such as water quality improvement and flood control. However, federal protection of many important coastal wetlands is dependent upon documented proof of a hydrologic connection to federally protected Waters of the United States, and an influence on the quality of those waters.

This study focuses on a 13 acre catchment of coastal flatwoods wetland with an ambiguous legal status because of a possible, but undocumented, hydrologic connection to regulated Waters of the United States. Documentation of the hydrologic connectivity of this type of wetland is critical because of the geographic extent of similar wetlands and their contributions to water quality. The objective of the study was to determine if a hydrologic connection exists, and if so, to quantify the strength of the connection. A surface connection was established based on runoff and rainfall data collected since April of 2005, with the wetland discharging surface water directly into an adjacent protected wetland. The connection was weak during dry years, but in years with average rainfall, surface runoff accounted for a much more significant portion of the water budget. These results suggest that runoff water from similar wetlands contributes directly to protected wetland waters, and may influence water quality downstream.

#### *Presenters Bios*

**Dex Dean** is pursuing a Master's degree at Texas A&M University in the Department of Ecosystem Science & Management. He has been working with a forested wetland watershed at the Armand Bayou Nature Center. He holds a bachelor's degree in agricultural engineering from Texas A&M University. As an undergraduate, he assisted with research, under the direction of Clyde Munster and Brad Wilcox, that focused on developing a water budget and recharge analysis for karst landscapes on the Edwards Plateau.

**Brad Wilcox**, Ph.D., is a professor with expertise in rangeland watershed hydrology and management. Dr. Wilcox joined Texas A&M's Department of Rangeland Ecology and Management in September 2000. He received his B.S. (1978) and M.S. (1982) in range management with emphases in ecology and soils from Texas Tech University; and his Ph.D. (1986) in range management with an emphasis in range hydrology from New Mexico State University. Since completing his Ph.D., Dr. Wilcox has taught watershed management in the classroom and the field at Colorado State University (1985-1988) and has conducted hydrologic research at the Northwest Watershed Research Center in Boise, Idaho (1988-1990) and at the Los Alamos National Laboratory in Los Alamos, New Mexico (1990-1996). Most recently (1996-2000), Dr. Wilcox served as Chief Scientific Officer at the Inter-American Institute for Global Change Research, headquartered in Brazil. The essence of rangeland hydrology is understanding how vegetation and water interact in these regions. Dr. Wilcox is conducting research in Texas and New Mexico, involving both field and modeling work, to better understand and predict water and sediment movement in drylands. His particular interest is how vegetation modifies the water cycle (and vice versa) and how these relationships change with scale and spatial variability. Dr. Wilcox teaches the graduate-level course Rangeland and Forest Watershed Management.

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### **Concurrent Session M. The Science of Estuarine Wetlands**

**Moderator: Jim Dobberstine, Lee College**  
(Placeholder for Bio)

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#### **Influence of Ecotypic and Environmental Factors on Stress Biomarkers in *Spartina alterniflora***

Cindy Howard, Ph.D., University of Houston-Clear Lake, Houston, TX (Presenter)

Jeff Borski, University of Houston-Clear Lake, Houston TX

J.C. Whitney, University of Houston-Clear Lake, Houston TX

Coastal marsh ecosystems in Galveston Bay are anchored by smooth cordgrass (*Spartina alterniflora*). As *Spartina* will grow naturally wherever the sediment type and salinity regime are conducive, a number of *S. alterniflora* communities exist in areas of Galveston Bay where contaminants have accumulated over the years. *S. alterniflora* populations in Galveston Bay have been monitored for density and nekton use, and we have recently been comparing growth metrics and stress biomarkers in this species among undisturbed, restored and pollutant impacted marshes. However, our results have been extremely variable. Although two growth forms of *S. alterniflora* are recognized (tall and short), we have observed several different growth forms distributed among the different marsh types in Galveston Bay. *S. alterniflora* planted in marsh restoration projects around the bay have come from various sources; however, there is no information on ecotypic (or ecophenic) changes that may have occurred in any of the marshes as a result. The objective of the present study was to determine the relationships among growth metrics, stress biomarker activity and *S. alterniflora* ecotypes. A total of 14 marsh communities bordering Galveston Bay were sampled, representing all observed *Spartina* growth form types. At each site, shoot and leaf metrics and chlorophyll concentrations were recorded for at least 15 individual plants, which were then frozen for biomarker analyses. Sediment samples were collected synoptically for grain size, TOC, nutrients, salinity and heavy metal analyses. Peroxidase (POD) and catalase (CAT) activities were determined

spectrophotometrically. Specific allozyme variations in POD and CAT were determined among *S. alterniflora* ecotypes using one-dimensional polyacrylamide gel electrophoresis against known enzyme standards. Results indicate that there are at least three *S. alterniflora* ecotypes present in Galveston Bay that vary in POD and CAT activity, which may influence their establishment at polluted versus restored and non-polluted sites.

*Presenter Bio*

Cindy Howard is a professor of biology and environmental science at the University of Houston -- Clear Lake. She and her students have been studying stress adaptations in various organisms in Galveston Bay and its salt marshes for over 15 years. She has also worked on ecology and ecotoxicology studies on yearly trips to the Brazilian Amazon.

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**How Do Common Salt Marsh Plants Deal With Nutrient Additions**

Leslie Rulon, Texas A&M-Galveston, Galveston, TX (Presenter)

Antionietta Quigg, Ph.D., Texas A&M University, Galveston and College Station, Texas

Salt marshes are dynamic ecosystems undergoing continued change due to sea level rise, eutrophication, subsidence and other impacts. Studies show that the addition of nutrients, especially nitrogen in salt marshes results in increased growth. Few studies have however investigated which plants respond best or why or competition between species. In addition, no studies have observed plant characteristics after nutrient additions have ceased. Nitrogen, phosphate and potassium were added in different amounts (0, 5, 15 and 30g) to *Spartina alterniflora*, *Salicornia virginica*, and *Batis maritima* plots. We hypothesized that plant responses would be plant specific but not necessarily dose dependent. Plant height, biomass, dry weight and chlorophyll were measured bimonthly from August 2007 to September 2008. Field observations revealed a significant change in the vitality of plants with nutrient added relative to the control (no addition). In October 2008, fertilizing will cease so that the hypothesized decline in growth can be followed. This study will help us to understand the impact of eutrophication on salt marsh plant dynamics.

*Presenter Bio*

(Placeholder)

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**Patterns of Plant Diversity in Texas and Georgia Salt Marshes**

Steven Pennings, Ph.D., University of Houston, Houston, TX (Presenter)

Amy Kunza, University of Houston, Houston, TX (Presenter)

A fundamental question in ecology is how biological interactions and biogeographic processes interact to determine the biodiversity of local sites. We quantified patterns of plant species diversity on transects across elevation at 59 salt marsh sites in Georgia and 49 sites in Texas. Although these regions have similar climates and floras, we anticipated that diversity might differ because of differences in tidal regime. Diversity was measured at global, regional, site, and plot scales to consider processes occurring at all levels. Species pools were similar between regions. Texas had greater diversity at the site and plot scales, suggesting that processes occurring at the site scale differed. The greater diversity of Texas sites and plots was associated with wider distributions of individual species across the marsh landscape, and proportionally more middle marsh (a high diversity zone) and less low marsh (a low diversity zone) than in Georgia marshes. Preliminary data suggested that these differences were not due to differences in salinity regime or standing biomass between regions, leaving differences in tidal regime as the most plausible hypothesis accounting for differences in plant diversity. We speculate that the less-predictable tidal regime in Texas leads to temporal variation in abiotic conditions that limit the ability of any one species to competitively exclude others from particular marsh zones.

*Presenters Bios*

Steven Pennings, Ph.D., is an associate professor at the University of Houston. His research focuses on the community ecology of salt marsh plants and herbivores, and geographic variation in salt marsh community structure. Pennings received his Ph.D. from the University of California - Santa Barbara in 1990.

Amy Kunza worked with Pennings and received her M.S. degree from the University of Houston in 2006.

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**Assessing the Ecological Efficacy of Select Wetland Restoration Approaches in the Northwestern Gulf of Mexico**

Antionietta Quigg, Ph.D., Texas A&M-Galveston, Galveston, TX (Presenter)

Anna R. Armitage, Texas A&M University at Galveston, Galveston, TX

The hydrological restoration - raising elevations and installing canal plugs and culverts - and planting of the Lower Neches Wildlife Management Area (LNWMA) Wetland Restoration Project in Port Arthur was recently completed. This study focuses on the structural, biological, and ecological integrity of the developing plant and animal communities. We will

evaluate how landscape engineering, which includes sediment sources, hydrology, and vegetation establishment, generates ecologically functional marshes. We will quantify recovery of marsh plant and animal assemblages following hydrological restoration and will use experimental approaches to compare ecological functions among marshes restored with different methods. Findings will be directly applicable to restoration efforts in Galveston Bay as well as other systems along the Northwestern Gulf of Mexico.

#### *Presenter Bio*

Antonietta Quigg, Ph. D., heads the Phytoplankton Dynamics Laboratory at Texas A&M University in Galveston and has over 15 years experience researching phyecological (microalgae, macroalgae and seagrass) physio-chemical responses to environmental stresses in freshwater, estuarine, and coastal ocean environments world wide. General areas of interest include freshwater inflows and estuarine health, phytoplankton-nutrient interactions, harmful algal blooms, ecosystem eutrophication, dead zones. In recent years her research has focused on Galveston Bay (TX), Prince William Sound (AK), the Gulf of Mexico (USA), and Moreton Bay (AUS). This research utilizes state-of-art instruments, particularly those that facilitate simpler, faster and higher resolution assessment of primary productivity and phytoplankton community composition. She currently has 5 graduate students, mentored >10 undergraduate students. She regularly attends the Texas Freshwater inflows and Harmful algal group meetings, as well as the Galveston Bay estuary program and Dickinson Bayou watershed program meetings. She is also a member of the Trinity and San Jacinto Rivers and Galveston Bay Basin & Bay Expert Science Team (BBEST).

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### **Concurrent Session N. Addressing Long-Lasting Contaminants**

#### **Moderator: Scott Jones, Galveston Bay Foundation**

(Placeholder for bio)

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#### **Review of Historical Galveston Bay Contaminants**

Lisa Gonzales, Houston Advanced Research Center, The Woodlands, TX (Presenter)

Jim Lester, Ph.D., Houston Advanced Research Center, The Woodlands, TX

In July 2008 the Texas Department of State Health Services released results from the most recent seafood contamination survey undertaken in Galveston Bay. The data resulted in the issuance of a seafood consumption advisory for dioxin and PCBs in spotted seatrout and catfish harvested from Galveston Bay waters. Also of concern are organochlorine pesticides as evidenced by previous seafood consumption advisories issued for the Houston Ship Channel. The continuing problems associated with toxic contaminants in sediments and fish tissue, particularly those associated with legacy pollutants such as PCBs, are of growing concern to coastal managers and residents.

The Galveston Bay Estuary Program funds the Galveston Bay Status and Trends project to collect and analyze historical data describing the health of the Galveston Bay Estuary. The Galveston Bay Status and Trends project has collected contaminants data from a variety of agency sources including the Texas Department of State Health Services, the Texas Commission on Environmental Quality, the NOAA Mussel Watch Program, the US Army Corps of Engineers, and the EPA National Coastal Assessment. Thirty years of contaminants data from sediment and tissue sampling by these agencies for PCBs, dioxins and organochlorine pesticides will be analyzed and summarized for temporal and spatial patterns.

#### *Presenter Bio*

Lisa Gonzales is a research scientist with the Houston Advanced Research Center (HARC). Her work focuses on the analysis and dissemination of environmental data relating to the health and productivity of coastal ecosystems, particularly the Galveston Bay Ecosystem. Recent projects include the Galveston Bay Status and Trends Project, the Galveston Bay Ecological Indicators Project and the Galveston Bay Invasive Plant Field Guide.

Lisa joined HARC in 2002 after working as a research associate for the Environmental Institute of Houston at the University of Houston-Clear Lake. Lisa received a Bachelor of Science degree in marine fisheries from Texas A&M University at Galveston in 1992. She earned a Master of Science degree in environmental management from the University of Houston-Clear Lake in 2000. Lisa is currently enrolled as a doctoral student in the Department of Wildlife and Fisheries Sciences at Texas A&M University at College Station.

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#### **Dioxin and PCB in the Houston Ship Channel and Galveston Bay**

Hanadi Rifai, Ph.D, P. E., University of Houston, Houston, TX (Presenter)

Divagar Lakshmanan, Ph.D, CEE Department, University of Houston, Houston, TX

Nathan Howell, CEE Department, University of Houston, Houston, TX

Monica Suarez, Parsons Water & Infrastructure, Houston, TX

Randy Palachek, Parsons Water & Infrastructure, Houston, TX  
Larry Koenig, P. E., TCEQ, Austin, TX

An on-going study in the Houston Ship Channel and Upper Galveston Bay characterized dioxin and PCB levels in sediment, water, and tissue and has additionally characterized current and historical sources of dioxin into the water body. The data from 2002-2003 indicate dioxin levels that exceed water quality standards in most segments while PCB levels that exceed standards were confined to specific segments of the channel. Catfish concentrations exceeded health-based standards for both dioxin and PCB while crab concentrations exceeded the dioxin standard only. Source characterization for dioxin involved industrial and municipal dischargers, wet and dry air deposition, and runoff as well as in-stream sediment. Results from the dioxin sampling data indicated that sediment is the major source of dioxin into the water column and that attainment strategies will need to be focused on this historical source. A dioxin model was used to evaluate various strategies and attainment levels for dioxin. PCB data for the system gathered to date indicated different patterns of distribution of PCBs among the various media—water, sediment and tissue—and might therefore point to different sources, distribution and mitigation strategies for dioxin and PCB. Past and current sampling for dioxin and PCB will be presented and put in the context of the recent health advisories for the two pollutants in Galveston Bay. Similarities and differences between these two persistent organic pollutants will be presented in terms of strategies and Total Maximum Daily Load (TMDL) development.

#### *Presenter Bio*

Hanadi Rifai is a professor of civil and environmental engineering at the University of Houston (UH). She teaches courses in Computers for Engineers, Engineering Design, Contaminant Fate and Transport, and Geographical Information Systems. Dr. Rifai received her bachelor's in civil engineering from the American University of Beirut in Beirut, Lebanon. She received her Masters and Ph.D. from Rice University in Houston, TX. Prior to joining UH, she served as executive director of the Energy and Environmental Systems Institute (EESI). Dr. Rifai's research program is currently focused on pathogens and persistent organic pollutants in surface water bodies and on total maximum daily loads and Best Management Practices. She has authored numerous papers and co-authored two textbooks: *Natural Attenuation of Fuels and Chlorinated Solvents in the Subsurface* published by Wiley and *Ground Water Contamination: Transport and Remediation* published by Prentice-Hall.

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#### **Factors Regulating Microbial Degradation of Dioxins in Estuarine Sediments: Houston Ship Channel and Galveston Bay, Texas**

Robin Brinkmeyer, Ph.D., Texas A&M University at Galveston, Galveston, TX (Presenter)  
Peter H. Santschi, Texas A&M University at Galveston, Galveston, TX  
A.-S. Charlotte Hieke, Texas A&M University at College Station, College Station, TX  
Patrick Louchouart, Texas A&M University at Galveston, Galveston, TX  
Bryce Johnson, Texas A&M University at Galveston, Galveston, TX  
Kevin M. Yeager, University of Southern Mississippi, Stennis Space Center, MS

Results from a three year study to examine the physical and biological factors influencing the microbial degradation of dioxin in the Houston Ship Channel (HSC) and in Galveston Bay (GB) will be presented. The main objectives of the study were: 1) to evaluate natural, microbially-mediated degradation of dioxins in sediments of a documented impacted estuary; 2) to develop, via the construction of a quantitative, high resolution, interdisciplinary data set including elements of sedimentology, radiochemistry, aqueous geochemistry and microbial biology, a comprehensive understanding of the processes which accentuate and inhibit the microbial degradation of dioxins in sedimentary systems; 3) to determine the impacts of dredging upon the natural remediation processes and resuspension of dioxins into the water column.

*Dehalococcoides* spp. bacteria were detected in dioxin contaminated sediments. Bacteria of the genus *Dehalococcoides* reductively dechlorinate highly chlorinated dioxins, making the resulting congeners and other metabolites more susceptible to degradation by other bacterial groups. Black carbon as well as aqueous geochemical factors were characterized to determine their influence upon availability of dioxin for microbial degradation. Dioxin data from sediments collected throughout the HSC and GB including the paper mill 'sludge pit' in the San Jacinto River, dredge spoil islands, and newly created wetlands in GB will be reported.

#### *Presenter Bio*

Dr. Brinkmeyer is a microbial ecologist specializing in emergent marine diseases and the role of bacteria in degradation of persistent pollutants in coastal environments. She is the Principal Investigator of the Coastal Health Laboratory at Texas A&M University at Galveston. Current projects in her lab that focus on Galveston Bay examine the microbial degradation of dioxins, identification of sources and quantification of human enteric viruses and bacteria, bacteria and phytoplankton in ship's ballast water potentially released at the Port of Houston, characterization of toxic *Vibrio* spp. bacteria associated with finfish and shellfish, correlation of nutrient inputs and increases in harmful bacteria such as *Vibrio* and *Mycobacterium*, and epigenetic DNA markers in keystone organisms as indicators of bay health.



Dr. Brinkmeyer received her Ph. D. in 2003 from the University of Bremen in Bremen, Germany in association with the Max Planck Institute for Marine Microbial Ecology. She received undergraduate and master's degrees from the University of Texas at Austin and worked for the San Antonio Water System as a storm water biologist and as an environmental consultant in Houston, TX prior to pursuing her doctorate. She is currently assistant professor in the Department of Marine Sciences at Texas A&M University at Galveston and holds a joint appointment in the Department of Oceanography at Texas A&M University at College Station.

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### **Ecological Implications of Recent Dioxin Advisories: Potential Food Web Interactions and Ecotoxicity**

George Guillen, Ph.D., Environmental Institute of Houston, University of Houston Clear Lake, Houston, TX (Presenter)

Recent advisories and TMDL studies conducted within the Houston Ship Channel and Galveston Bay have identified dioxin and PCB compounds (persistent organic pollutants POP's) as causing a significant human health risk from consumption of selected species of contaminated seafood including spotted seatrout and catfish. Ongoing TMDL studies have provided useful information on potential sources within the Galveston Bay system including recently discovered waste disposal sites and atmospheric deposition. However, little is known about potential ecological pathways including the role of animal migration and food webs in transferring POP's within the Galveston Bay system. In addition, potential impacts on species of aquatic organisms have not been comprehensively addressed. Due to the inherent ability of POP's to bioconcentrate and biomagnify, the ultimate impacts on higher trophic levels and the ecosystem is largely unknown but potentially significant. A careful analysis of existing local data, ecological, fisheries and toxicological literature and toxicological endpoints provides a basis to begin to address these questions. Supplemental data provided by recent food web studies and ecological model development was also utilized in determining possible pathways and impacts. A discussion of likely ecological effects is provided.

*Presenter Bio* Dr. George Guillen received his B.S. in marine biology from Texas A&M University (TAMUG) (Galveston, Texas) in 1979. He received his Masters Degree in wildlife and fisheries sciences in 1983 from TAMU (College Station, TX). In 1996, Dr. Guillen received his Ph.D. in community health science (environmental science option) from The University of Texas - School of Public Health in Houston, TX.

Dr. Guillen is a long time resident of the Houston-Galveston area having lived in the area for over 40 years. He has over 25 years experience in the field of fisheries, marine biology and water quality assessment. From 1984 to 1998, Dr. Guillen worked for various state conservation and environmental agencies including the Texas Parks and Wildlife Department and Texas Commission on Environmental Quality (formally TNRCC and TWC) in Houston, Texas. He was responsible for management and direction of various environmental research, monitoring and enforcement programs. In 1998, Dr. Guillen took a position section manager with the Minerals Management Service (MMS) in New Orleans, Louisiana. During 2000 through 2004, Dr. Guillen served as the Fisheries and Contaminants Program leader for the US Fish and Wildlife Service (FWS) in the Arcata, California. During his tenure at FWS he managed the fisheries program and administered a research program dealing with instream flows on the Klamath and Trinity Rivers. This involved extensive collaboration with various federal, state, local and tribal agencies and organizations.

Dr. Guillen currently serves as the executive director of the Environmental Institute of Houston, part of the University of Houston system. He also serves as an associate professor in biology and environmental science at the University of Houston - Clear Lake. His current research interests include evaluation of the influence of fisheries, water and sediment quality and habitat loss on aquatic resources.

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### **Concurrent Session O. Invasion of the Aliens—Can We Control Them?**

#### **Moderator: Nicole Hausler, Port of Houston Authority**

##### *Moderator Bio*

Ms. Hausler has been employed with the Port of Houston Authority since 2004 in the Environmental Affairs Department. She has worked on a variety of projects while at the Port Authority including the Environmental Management System and acting as the lead auditor for the EMS program. She is currently the project manager for water quality. Her project areas include the Port Authority's storm water, waste water, drinking water, and ballast water. Ms. Hausler is served as President of the Texas Association of Environmental Professionals in 2007 and was selected at the 2006 Young Environmental Professional of the Year. She is an active member of the Galveston Bay Estuary Program Invasive Species Working Group and the Water and Sediment Quality Sub-Committee.

Ms. Hausler received a Bachelor of Science degree in Marine Sciences from Texas A & M University at Galveston and a Bachelor of Science degree in Political Science from Texas A&M University. Additionally, Ms. Hausler is a PhD candidate in Marine Policy at the University of Delaware. Her doctoral research is on the technology and policy implications of ballast water mediated introductions of invasive species.

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## **Statewide Invasive Species Management**

Earl Chilton, Ph.D., Texas Parks & Wildlife, Austin, TX (Presenter)

(Abstract Placeholder)

### *Presenter Bio*

Dr. Chilton is currently the aquatic habitat enhancement program director with Texas Parks and Wildlife Department. He directs the statewide Aquatic Habitat Enhancement Program, and coordinates aquatic habitat enhancement and invasive species prevention and management activities in Texas' public water. Dr. Chilton previously served as adjunct faculty at Texas A&M University and Texas State University.

Chilton's key accomplishments include the following: establishing the Texas Invasive Species Coordinating Committee; being appointed by the Secretary of the Interior to the Invasive Species Advisory Committee of the National Invasive Species Council; establishing and implementing the Texas Aquatic Vegetation Management Plan, and wrote *Aquatic Vegetation Management in Texas: A Guidance Document*; heading a Bi-national committee made up of the Comision Internacional de Limites Y Aguas (Mexico), Comision Nacional del Agua (Mexico), as well as various U.S. and Texas agencies that drafted and implemented a plan for exotic plant control on the lower Rio Grande—submitted to both Mexico and Texas, and approved; working with the Texas Legislature to establish legislation to protect freshwater mussels, and drafting the resulting regulations; establishing the development of aquatic vegetation management plans for individual waterbodies in Texas; representing Texas on the Gulf and South Atlantic States, the Mississippi River Basin, and the Western Regional panels of the Aquatic Nuisance Species Task Force; drafting the Texas State Comprehensive Management Plan for Aquatic Nuisance Species that has been reviewed and submitted to the ANS Task force in 2009; establishing the Lake Austin Hydrilla Management Plan that successfully utilized triploid grass carp to control an expanding hydrilla infestation while maintaining a viable aquatic plant community capable of sustaining a trophy largemouth bass fishery; authoring the book *Freshwater Fishes of Texas*.

Earl Chilton received his doctorate in zoology (aquatic ecology) from The Ohio State University, in 1986.

He earned a M.S. in biology in 1982 and a B.S. in biology and history from Union College in 1979.

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## **Integrated Management of Exotic Invasive Plants in Coastal Prairies of Texas**

Warren C. Conway, Ph. D., Stephen F. Austin State University, Nacogdoches, TX (Presenter)

David J. Rosen, Lee College, Baytown, TX

Ecological and economic impacts of successfully naturalized exotic invasive plants are considered to be the most potentially devastating and damaging threat to natural ecosystems. Control and management of exotic invasive species generally continues to be reactive and post-hoc, where lack of specific biological, ecological, and physiological data for already established exotic invasive plants hinders and stalls control and management program implementation. Not unlike most areas, coastal prairies and marshes of Texas are threatened by a diverse suite of exotic invasive species. However, such threats may be compounded within the coastal prairie region, as < 1% of the original prairie remains, primarily in fragmented, isolated patches, due to alterations in natural disturbance regimes, land use practices, and successful exotic invasive plant establishment. As the region is critically important for wintering waterfowl, waterbirds, and grassland birds, as well as the last vestige for Attwater's prairie chickens (*Tympanuchus cupido attwaterii*), successful control and management of exotic invasive species and subsequent restoration of remaining coastal prairie habitats may be the only way in which ecoregional conservation may be achieved. Using approaches employed in past and current exotic invasive plant research, we outline ways in which private and public land managers may approach integrated management of exotic invasive species. We draw upon research conducted upon Chinese tallow (*Triadica sebifera*) and deep-rooted sedge (*Cyperus entrerianus*) during the last 10 years to (1) highlight the impacts of exotic invasive species and (2) provide a framework to guide future research, management, and restoration of degraded sites for long-term regional conservation.

### *Presenter Bio*

Warren Conway, Ph.D., was born and raised in Rhode Island. He moved to Lubbock to attend graduate school in June 1995. Dr. Conway received his doctorate in wildlife sciences from Texas Tech University. He moved to Nacogdoches to join faculty at Stephen F. Austin State University in August 2002. Been there since!

Conway has authored and coauthored 18 peer reviewed journal articles and 55 professional presentations. He also generated more than \$2.1 million in external funding to support graduate research projects at SFASU since 2003.

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## **Community Changes in the Ports of Houston and Galveston, Texas, from June 2007 to June 2008**

Elizabeth Neyland, Texas A&M University, College Station, TX (Presenter)

Antonietta Quigg, Ph.D., Texas A&M University at Galveston, Galveston, TX

Robin Brinkmeyer, Ph.D., Texas A&M University at Galveston, Galveston, TX

The Port of Houston is the top port in the nation in foreign waterborne commerce, the 2nd largest national port and 8th largest in the world in terms of tonnage (Union of Concerned Scientists, 2007). In the summer and fall of 2005, Louisiana and Mississippi ports were damaged or lost due to Hurricanes Katrina and Rita respectively resulting in increased commerce to Texas ports. With increased ship traffic arriving to major Texas ports, concerns about bacterial invaders and their impacts on ecosystem health have elevated. However, little is known of the endemic bacterial populations of the port of Houston. Several studies have examined pathogenic *Vibrio* bacteria in Galveston bay, the estuarine system separating the port of Houston from the Gulf of Mexico, but the main habitants are still a mystery. Polymerase chain reaction and denaturing gradient gel electrophoresis will be used to examine bacterial community changes in both the ports of Houston and Galveston by month between June of 2007 and June of 2008. Seasonal trends are expected in groups such as the cyanobacteria, which are known to be in high abundance in warmer months. Other groups are expected to be found all year long. Because the salinities of the ports differ greatly, community members are expected to vary between ports. This study is the first to examine total bacterial diversity of the ports of Houston and Galveston, Texas, providing a framework for invasive species studies in the future.

#### *Presenter Bio*

Elizabeth Neyland earned a B.S. in marine biology from Texas A&M University at Galveston in May 2006. Ms. Neyland was a lab manager and research assistant for Dr. Fred Pearl in the A&M Galveston archeology lab, and studied early South Pacific Islander tools, in particular, adzes from early American Samoa cultures. She also interned at The University of Texas Medical Branch animal research center. Her primary responsibilities were animal husbandry, but she was able to interact with current researchers in the fields of pharmacology, virology, microbiology and neurology, which led me down my current path.

Ms. Neyland is currently working on a M.S. at Texas A&M University in the department of biology. During her first year, she performed gene-knockout experiments studying circadian rhythms in the cyanobacterium, *Synechococcus elongates*, as a research assistant. Ms. Neyland's current thesis work focuses on microbial ecology in the Texas ports and bay systems, as well as microbial diversity in ballast tanks of commercial cargo ships. She also teaches introductory biology labs at Texas A&M University, and has co-taught the marine genetics lab at Texas A&M University at Galveston.

Ms. Neyland is a member of the Beta Beta Beta Biological Honor Society since 2003, and a member of the American Society of Microbiology since 2007. She was awarded the Who's Who Among Students in American Universities and Colleges in 2006 as well as numerous scholarships throughout her academic career.

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#### **Transportation of Invasive Species of Phytoplankton into Texas Ports by Way of Ballast Water**

Jamie Steichen, Texas A&M University, College Station, TX (Presenter)

Elizabeth Neyland, Texas A&M University, College Station, TX

Robin Brinkmeyer, Ph.D., Texas A&M University, Galveston, TX

Antionietta Quigg, Ph.D., Texas A&M University, Galveston, TX

The Port of Houston is ranked first in the United States in foreign waterborne tonnage. All of the ships bound for the Port of Houston and the Port of Texas City must travel across Galveston Bay to reach their destination. Invasive species of phytoplankton have the potential to be transported to Galveston Bay through the ballast water contained in ships. Regulations are put in place by the International Maritime Organization to insure that the water in ballast tanks undergo an open ocean exchange to prevent the deballasting of foreign waters into local ports. This open water exchange assists in the prevention of introducing invasive species to coastal waters. This study monitors the phytoplankton communities within these major ports as well as the ballast water of ships entering these ports. Monthly surface water samples, water quality data and phytoplankton tows are collected from the Port of Houston, Port of Galveston and Port of Texas City. Ballast water samples are collected from select ships that are entering the Port of Houston. Molecular level analysis is performed to compare differences between local species of phytoplankton in these ports to ballast water samples from incoming ships. DNA is extracted from filtered water samples, followed by polymerase chain reaction (PCR) with phytoplankton specific primers. Denaturing gradient gel electrophoresis (DGGE) is performed to determine the diversity within these communities. Future work will include sequencing of the species for a phylogenetic analysis. This project has the ability to determine if invasive species of phytoplankton are being introduced to local port waters by way of ballast water contained in ships.

#### *Presenter Bio*

Jamie Steichen graduated in 2006, from Texas A&M University at Galveston, with a Bachelor of Science in Marine Sciences. Jamie is now in graduate school, pursuing her PhD in Oceanography at Texas A&M University. Her project duties entail, investigating the transportation of potentially invasive species of phytoplankton to coastal Texas waters via ballast water of ships. Her primary sampling focus is on ballast water samples retrieved from various ships entering the

Port of Houston, as well as waters within the major ports along the Texas coast. Her field work duties include collecting monthly surface water samples from the Port of Houston and the Port of Galveston. In the laboratory, she conducts molecular analysis of the surface water samples including: DNA extraction, polymerase chain reaction (PCR), denaturing gradient gel electrophoresis (DGGE) and phylogenetic analysis. Chlorophyll analysis is conducted on the surface water samples and microscope analysis is performed on phytoplankton tows.

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### **Concurrent Session P. Modeling the Physical Processes of Galveston Bay**

**Moderator: Geoffrey Matthews, Ph.D., National Oceanic & Atmospheric Administration**

*Moderator Bio*

Geoffrey Matthews, Ph.D., received his doctorate in biology from Texas A&M University in 1980, and his bachelor's degree in biology from the University of Puget Sound in 1966.

His current research interest is in applying geographical information system technology to solving fisheries ecology problems. Such problems have included: 1) locating, cataloging, and monitoring restorations of estuarine salt marshes; 2) delineating fisheries habitats and identifying changes to them; 3) modeling the effects of freshwater inflows to fisheries populations and fisheries habitat functions; and 4) evaluating potential effects of spiny lobster trap fishing on benthic fauna and flora.

Other work at NMFS involved developing shrimp harvest forecasting models using environmental and fisheries dependent variables, developing estimates of freshwater inflow required for Matagorda Bay, Texas, and surveying the influxes of postlarval shrimp through Bolivar Roads into Galveston Bay.

He has published several articles in professional publications.

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### **Parametrization of Hurricane Surge**

Rajat Katyal, Ph.D., Texas A&M University, College Station, TX (Presenter)

Jennifer Irish, Texas A&M University, College Station, TX

Hurricane flooding is a major threat along the Texas coast. To reliably assess hurricane flooding risk and to develop a generalized method for quick and accurate prediction of hurricane surge as a hurricane approaches the Texas coast, the development of parameterized surge response functions for Texas coastal bays is explored. The benefit of a surge response function approach is twofold. First, this approach provides a means for developing continuous probability mass functions for risk assessment. Second, this approach provides a means for emergency responders to rapidly estimate the magnitude and spatial range of flooding by hurricane surge without numerical simulation. These benefits will help in more effective planning of evacuation and rescue work and of flood risk assessment.

The surge response function approach when applied along the open coast demonstrates prediction accuracy within 30 cm and is comparable with numerical simulation accuracy. However, the surge response function inside coastal bays tend to differ from that along the open coast due to various local parameters related to bay configuration, including horizontal dimensions, relative position of the vortex wind field, mean water depth, and shoreline irregularities. Research results show that the surge inside Matagorda Bay can indeed be described in terms of these parameters. Thus these new parameters can be integrated with the open coast surge response to efficiently predict the surge values inside a bay. In this paper, we introduce additional physical scaling laws to account for local bay parameters. The various factors which affect the surge values and the resulting generalized bay surge response function will be introduced. Finally, results for applying the developed surge response function methodology to Matagorda and Galveston Bays will be presented.

*Presenter Bio*

Rajat Katyal is a second-year graduate student in ocean engineering at Texas A&M University. He completed his bachelor's degree in civil engineering from Punjab Engineering College (INDIA). After receiving his degree, he worked as a structural engineer for 2.5 years at Larsen & Turbo. He is currently working on his thesis project "Parameterization of hurricane surge inside the bays" under Jennifer Irish, Ph.D.

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### **Vulnerability of the Galveston Bay Estuary Complex to Accelerated Sea-Level Rise and Reduced Sediment Supply**

John B. Anderson, Ph.D., Rice University, Houston, TX (Presenter)

Seismic data and sediment cores from the Galveston Estuary Complex (GEC) were used to reconstruct the estuary's evolution. The objective of this investigation was to see how the GEC responded to past changes in the rate of sea-level

rise and sediment supply related to climate change. These data show that the GEC has had a history of rapid and dramatic change. The most notable changes were up-valley shifts in the Trinity bayhead delta of tens of km in a few centuries. Radiocarbon ages indicate that these events took place ~ 9,600, ~8,500 and between ~7700 and ~7400 years ago. The early flooding events occurred when sea level was rising rapidly (average 4.1 mm/yr) and perhaps episodically. The ~7700 to ~7400 year flooding episode was the most dramatic in terms of its impact on the estuary setting. Following this event, the area of the estuary increased by approximately 30%. At the same time, Matagorda Bay to the west and Sabine Lake to the east experienced similar dramatic flooding episodes. This flooding event occurred as the rate of sea-level rise was starting to decrease, but the climate of east-central Texas was in transition from cool and moist to warm and dry, and the vegetation cover of the region was undergoing a reduction in forest and an increase in grasslands. Hence, this event was apparently caused by a reduction in sediment supply to the estuary triggered by this regional climatic change. Following the ~7700 to ~7400 year flooding event, the estuary setting changed relatively little as the rate of sea-level rise decreased to less than 2.0 mm/yr. By ~2600 cal yr. BP, the modern Trinity bay-head delta began to form. Approximately 1600 cal yr. BP, the delta experienced a phase of rapid growth. This more recent episode of delta growth may have resulted from an increase in the rate of sediment supply since that time, perhaps associated with human occupation and agriculture in the drainage basin. Our results indicate that the GEC may undergo dramatic changes by the end of this century if the current increase in the rate of sea-level rise continues.

#### *Presenter Bio*

John Anderson received his B.S degree in 1968 from the University of South Alabama, his M.S. degree in 1970 from the University of New Mexico, and his Ph.D. in 1972 from Florida State University. He joined the faculty at Rice University in 1975, where he is currently the Maurice Ewing Professor of Oceanography. He served as chairman of the department from 1992 through 1998.

John has conducted research on various aspects of Antarctic marine geology since his first visit there as a student in 1970. He has participated in 24 scientific expeditions to Antarctica, focusing on the history of the ice sheet, glacial response to climate change and potential contributions to sea-level rise. His other research focuses on the response of coastal systems to global change. He has published two books, *Antarctic Marine Geology* (Cambridge University Press) and "The Formation and Future of the Upper Texas Coast" (Texas A&M Press) and recently co-edited a Geological Society of America Special Paper entitled "Response of Upper Gulf Coast Estuaries to Holocene Climate Change and Sea-Level Rise".

John received the 1992 GCAGS Outstanding Educator Award, the 1996 Rice University Graduate Teaching Award, 2004 Rice University Presidential Mentoring Award, and was the 2007 recipient of the Society of Sedimentary Research Shepard Medal. He has served as associate editor for a number of professional journals, including *Geology*, the *American Geophysical Union Antarctic Research Series*, *American Association of Petroleum Geologists Bulletin*, *Sedimentology*, and *Marine Geology*. He is a Fellow of the Geological Society of America and past president of the Society for Sedimentary Research.

John has served on the AAS-Polar Research Board, on the 1997 NSF Oversight Panel for Polar Programs, and is currently chairman of the Antarctic Research Vessel Oversight Committee.

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#### **Projecting Impacts of Relative Sea-Level Rise, Erosion, and Storms on Galveston Bay Barrier Islands**

Jim Gibeaut, Ph.D., HART Research Institute for Gulf of Mexico Studies, Texas A&M-Corpus Christi, Corpus Christi, TX (Presenter)

Fringing and interior salt- and fresh-water wetlands, interior ridges and swales, and the Gulf beach and foredune system are habitats important to maintaining the ecological health of Texas barrier islands. These geomorphic features and habitats also act as buffers to the effects of hazardous geological processes such as flooding and storm washover. Rising sea level and ongoing shoreline retreat have caused and will continue to cause these features to migrate and change character. A principal challenge in barrier-island environmental management, therefore, is to anticipate these changes and to develop policy that will not only sustain or improve upon the current functions of natural environments, but will also allow them to maintain their effectiveness as sea-level rise and erosion continue in the future. A sea-level rise model, based on detailed topography and geoenvironmental mapping, was developed and combined with shoreline-change information to project how the distribution of Texas barrier-island environments, including wetlands, beaches, and dunes, will change. Resulting maps can be used to (1) plan for future impacts to infrastructure, (2) plan restoration and mitigation projects, and (3) guide development away from areas prone to becoming future critical environments. The maps can also place the impacts of shoreline development and storms such as Hurricane Ike (2008) in a long-term context needed for planning a resilient island.

#### *Presenter Bio*

Dr. Gibeaut is the endowed associate research professor for geospatial sciences at the Harte Research Institute for Gulf of Mexico Studies, Texas A&M University – Corpus Christi. He is a coastal geologist who uses topographic lidar, remote sensing, GIS, and field surveys to measure and understand coastal change. He has studied shorelines in a variety of locations including Rhode Island, Florida, Texas, Alaska, Honduras, Venezuela, Brazil and Saudi Arabia. Dr. Gibeaut often provides scientific input and advice to those developing and applying coastal management rules and policies. Currently, his main research focus is modeling the effects of relative sea-level rise and storms on barrier island environments and projecting future change.

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### **Seabed Changes in Bolivar Roads Inlet and Offshore Bolivar Peninsula from Hurricane Ike: Implications for the Barrier System Sand Budget**

John Goff, Ph.D., Institute for Geophysics, The University of Texas at Austin, Austin, TX (Presenter)

Mead Allison, Institute for Geophysics, The University of Texas at Austin, Austin, TX

Sean Gulick, Institute for Geophysics, The University of Texas at Austin, Austin, TX

A reconnaissance seafloor survey of the Bolivar Roads inlet, at the mouth of Galveston Bay, was conducted just a week and a half after the passage of Hurricane Ike, and compared to survey data collected in May of 2008. Our survey goals were to investigate the impact of the storm surges on the movement of sediment into and out of the beach barrier system. Maintenance of the barrier system requires an influx of sand, which is usually provided by rivers. Human modifications to rivers by dams or levees disrupts the delivery of sand to the shore, which can cause the barrier system to degrade. The transport of sediments during large storms is a poorly-known quantity. Surges could potentially boost the barrier island sand budget by delivering sediments to the shore face, or they could subtract from it by moving sand too far off shore to be incorporated into the barrier system. Hurricane Ike's surge on September 13, 2008 filled Galveston Bay with 12 feet of water, which subsequently drained back into the ocean as a "back surge." Although considerable amounts of water flowed over the Bolivar Peninsula and other lower-lying portions of the barrier system, most of the surge and back surge likely passed through Bolivar Roads, which is by far the deepest access between the Gulf and the Bay. Comparison of pre- and post-Ike survey data reveals that the storm activity significantly modified the seabed over broad areas within Bolivar Roads. Large shell-gravel ridges up to 3 m high have been substantially degraded, and have migrated many 10's of meters seaward. Erosional pits up to 1.5 m deep have formed in one area, gouging out Pleistocene-age sediments. Mobilized sediments appear to have been redeposited over large regions in a layer 0.2-1.0 m thick, and in isolated spots up to 2 meters thick. Most of the movement of sediments is to seaward, and thus can be associated with the back surge.

Additional post-Ike reconnaissance was conducted in November 2008 offshore of the Bolivar Peninsula, where aerial and satellite photos suggest significant amounts of surface erosion during the back surge. Initial observations suggest that a thin (few cm) storm layer of sand has been deposited broadly across the inner shelf. Similar observations were made following the passage of Hurricane Carla in 1961. If verified, this observation would suggest significant loss of sand from the barrier system as a result of the hurricane activity.

#### *Presenter Bio*

John Goff uses swath sonar mapping and seafloor characterization to investigate the large- and fine-scale morphology of the seafloor and its pattern of acoustic reflectivity. He also investigates the stratigraphy of the shallow seabed using ultra-high resolution seismic reflection systems (chirp) and core samples. He has participated in several Office of Naval Research projects which have included major, multidisciplinary field programs in shallow water settings, including the continental shelves off northern California and New Jersey, and the near shore environment off Martha's Vineyard. Goff also uses the statistical analysis of geophysical fields associated with seafloor bathymetry, sedimentary texture, sea ice draft, and crustal heterogeneity to relate their complex morphology to the geological processes which form or interact with them.

Goff received his bachelor's degree in geology-physics-math from Brown University in 1985. He received his doctorate from the MIT - Woods Hole Joint Program in oceanography in 1990. He spent two years as a post doc at WHOI before joining The University of Texas Institute for Geophysics as a research scientist in 1993. Goff now holds the position of senior research scientist at the Institute for Geophysics.