



Lake Worth Lagoon Initiative Symposium
Integrating Science, Restoration, and Outreach

May 15, 2013 ~ Palm Beach Atlantic University ~ West Palm Beach, Florida

Presentation Abstracts



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Snook Islands Natural Area

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South Cove Natural Area: Overcoming Obstacles

Habitat Restoration and Enhancement

Presenter

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Presentation Abstract

In 2012, the Palm Beach County Department of Environmental Resources Management (PBCERM) completed construction of the South Cove Natural Area, an estuarine wetland restoration project located in downtown West Palm Beach and within the Lake Worth Lagoon (Lagoon). The project provides 6 acres of critical shallow water habitat for fisheries and wildlife that were lost due to development over the past century. Prior to construction, the project area consisted of a 20-foot-deep dredge hole with anoxic muck sediments. The project filled the dredge hole with approximately 150,000 cubic yards of clean sand creating three intertidal mangrove/*Spartina* islands, oyster reefs, and submerged habitat suitable for seagrass. The project also includes a mangrove/*Spartina* planter adjacent to the seawall providing a “living shoreline” along an existing sterile seawall.

Prior to construction, PBCERM had to overcome several major obstacles: (1) obtain State and Federal permits, which included a permit challenge by adjacent property owners resulting in a Chapter 120 Administration Hearing; (2) obtain City approval and permits; and (3) obtain funding for the project. Five years later and through partnerships with the Florida Department of Environmental Protection, Florida Inland Navigation District, and City of West Palm Beach, and the support of the local community, PBCERM was able to overcome these obstacles.

The end result is a project that supports a wide variety of fish and wildlife and provides tremendous ecological and recreational benefits in an area of the lagoon that was devoid of habitat. The natural area's boardwalk, observation deck and informational kiosk serve as a “living classroom” and offer both recreational and environmental educational opportunities highlighting the importance of a healthy natural ecosystem. This very visible habitat restoration and enhancement project will serve fish and wildlife and Palm Beach County's residents and visitors for generations to come.

For more information, visit http://www.pbcgov.org/erm/downloads/pdf/projectfactsheets/SouthCove_FS.pdf.

Speaker Qualifications

Eric Anderson has been an Environmental Analyst with the Palm Beach County Department of Environmental Resources Management since 2007. He is primarily involved with designing and managing estuarine restoration and enhancement projects within the Lake Worth Lagoon. Prior to obtaining the position with Palm Beach County, Eric worked for two years as a Natural Resource Specialist for the Broward County Environmental Protection & Growth Management Department. As the South Cove project manager, Mr. Anderson led project construction over the past five years from initial designs, permitting, contractor bids, daily construction management, and oversight to volunteer mangrove planting. He received his BS in Biology with an emphasis in Marine Biology and minor in Business Administration from Florida Atlantic University in 2002.

Lake Worth Lagoon Restoration Strategies

Habitat Restoration and Enhancement

Presenter

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Presentation Abstract

Proactive restoration measures are necessary to restore habitat losses in the Lake Worth Lagoon (LWL) by utilizing an adaptive management approach that balances the restoration potential against competing growth, water management and social needs. Protection, rehabilitation and creation of seagrass, mangrove, reef and oyster habitats provide the most cost effective and expedient resource recovery in the system. Beneficial reuse of lagoon materials and materials of opportunity are utilized to mitigate resource loss and provide cost savings.

In the last 20 years, an aggressive restoration program that encompasses many partnerships has successfully created and restored over 260 acres of habitat in the LWL. Remaining habitat restoration potential lies along coastal communities that have yet to fully embrace the need for remediation of the system. Our goal is to gain community support of restoration efforts for the system rebound. Our target includes mangrove, seagrass, oyster and artificial reef habitats through muck capping, filling dredged holes, and living shoreline projects.

Speaker Qualifications

Ms. Bishop is an Environmental Program Supervisor and has been with Palm Beach County Department of Environmental Resources Management since 1990. She has over 20 years of experience in restoring the Lake Worth Lagoon, with projects that include Munyon Island, Peanut Island, C-51 Sediment Trap and Artificial Reefs. Ms. Bishop enjoys the intricacies and challenges of projects that involve local, state, and federal partnerships.

Palm Beach Par 3 Living Shoreline

Habitat Restoration and Enhancement

Presenter

James Bowser, Former Town Engineer

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Coauthors/Partners

Palm Beach County Department of Environmental Resources Management

Presentation Abstract

Approximately 87% of the shoreline in the Lake Worth Lagoon has been stabilized with hardened structures, such as bulkheads, revetments, and concrete seawalls. Ironically, these structures often increase the rate of erosion and provide very little habitat for estuarine species. In 2006, the Town of Palm Beach completed the construction of a 2,000 foot mangrove planter adjacent to the Par 3 Golf Course to eliminate erosion behind the pre-existing seawall. The Town partnered with Palm Beach County and obtained funding through the Lake Worth Lagoon Partnership Program. To maintain vista, a Florida Department of Environmental Protection approved trimming plan has been implemented by the Town.

As demonstrated at the Par 3 Golf Course, living shorelines are successful in establishing biologically productive shorelines in front of hard structures. Partnerships with government agencies are encouraged to facilitate design and permitting of living shorelines on both public and privately-owned lands. When designed properly, the vista can be maintained at a minimal cost while still providing significant ecological benefits to the Lake Worth Lagoon.

Speaker Qualifications

James M. Bowser, P.E. holds a Bachelor of Science Degree in Environmental Resource Management and Master of Science Degree in Environmental Pollution Control from Penn State University, and a Bachelor of Science Degree in Civil Engineering from the University of Florida. He has worked three years in private consulting engineering, 32 years in governmental engineering, and served as the Town Engineer for the Town of Palm Beach for 26 years.

The Snook Islands Natural Area Environmental Enhancement Project: Eight Years Later

Habitat Restoration and Enhancement

Presenter

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Presentation Abstract

Construction of the Snook Islands Natural Area was completed in 2005. The project was constructed by transporting 1.2 million cubic yards of fill from Peanut Island 10 miles south to the Lake Worth golf course, creating 100 acres of diverse wetland habitats. Construction included creation of 10.1 acres of red mangroves, 2.8 acres of Spartina marsh, 2.3 acres of oyster reef, and nearly 50 acres of seagrass recruitment area. Eight years have passed since construction completion. This presentation is an update on the Snook Islands Natural Area project and public use facilities as well as the ongoing Snook Islands Phase II/Bryant Park Wetlands Restoration project.

Speaker Qualifications

David graduated in 1986 with a Bachelor of Science degree in Wildlife Ecology from the University of Florida. From 1987-1990 he worked at the Florida Department of Natural Resources, Marine Research Institute (now the Florida Fish and Wildlife Research Institute). His duties included all aspects of research on the Florida Manatee, including radio telemetry, flying aerial surveys, performing manatee rescues, and conducting necropsies on dead stranded manatees. From 1990 until the present he has been the PBCERM project manager on numerous wetland projects within the Lake Worth Lagoon.

Submerged Aquatic Resources of Lake Worth Cove

Habitat Restoration and Enhancement

Presenter

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Presentation Abstract

Lake Worth Cove is one of the few protected regions of Lake Worth Lagoon, the nearly 40 hectare Cove is located within the boundaries of John D. MacArthur Beach State Park. There was a limited understanding of the submerged aquatic resources within the cove due to a lack of staffing and resources. If changes were to occur in community composition, either by gradual succession or a catastrophic event, they would go undetected because of an absence of baseline data. In recognition of the need for a biodiversity baseline and a long term monitoring plan, a cooperative effort between the Park, university faculty, undergraduate research assistants and volunteers was formed in 2010. Using nondestructive sampling techniques, seasonal surveys were conducted within the cove.

All seven of Florida's seagrass species were found in Lake Worth Cove, including the federally listed Johnson's seagrass and widgeongrass, a species never documented previously in the cove. In one two-hectare plot, all seven species were found together. Further, macroalgae and invertebrate inventories were initiated. Similar to the Indian River Lagoon, this region of Lake Worth Cove has the highest seagrass biodiversity of any estuary in the western hemisphere. This project, despite limited resources, is successful due to the cooperative nature between the personnel of the Park, University, and community volunteers.

Speaker Qualifications

Dr. Chesnes specializes in estuarine and field biology. He has worked in estuaries and salt marshes throughout the southeastern United States, studying vertebrate, invertebrate and plant species. He is a member of the Estuarine Research Federation, the Southeastern Estuarine Research Society and the Florida Academy of Sciences. He has researched, presented, and published work in a variety of areas including seagrass and invertebrate ecology, fisheries management, and the invasive Burmese python. He is the primary instructor for Environment and Society, Natural History of the Everglades Watershed, Field Biology, and Senior Research Project. He has collaborated and coauthored works with undergraduate students in research, resulting in a number of peer reviewed publications and professional presentations. He has recently published articles appearing in *Biodiversity*, *Florida Scientist*, *International Journal Sustainability in Higher Education*, and *North American Journal of Fisheries Management*.

Waves, Wakes and Water Clarity and Quality: New Geospatial Tools to Help Manage Sediments

Habitat Restoration and Enhancement

Presenter

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Presentation Abstract

Wind waves and boat wakes are a significant source of shoreline erosion and sediment resuspension and may compromise restoration efforts. Boat wakes are also widely recognized as a safety issue. The severity of wave exposure, whether from wind or boat wakes, likely too contributes to the frequency of maintenance dredging. Despite the broad, popular perception of the effect of waves and boat wakes on erosion and optical water quality, there were few easily applied procedures to forecast these phenomena in a spatial context.

We developed software applications that can greatly simplify the accurate forecasting of wind waves and boat wakes. Similarly, we developed an optical water quality mapping tool to forecast potential impacts on seagrasses. Here, we describe applications where the use of wind wave, boat wake and optical water quality tools to assist in locating remediation options, planning erosion control, guiding shoreline management, setting no-wake zones and evaluating the consequences of turbidity levels. In one application we found that shoreline hardening was occurring in locations where marshes were forecast to naturally persist, providing opportunities for green remediation. We also delineated boat wake erosion ‘hot spots’ where no-wake zones could mitigate dredging needs as well as the geographic tipping point where wind waves exceeded boat wakes. Finally, we describe a new geospatial tool that forecasts the response of seagrass distribution to changes in optical water quality.

The availability of low-cost but quantitative and geographically accurate forecasting of wind waves, boat wakes and optical water quality provides opportunities for science-based shoreline management in Lake Worth Lagoon. These tools can be applied to improve conservation and restoration strategies for seagrass habitats. However, much work needs to now be done to relate these forecasts, using appropriate spatial and temporal scales, to predict biological responses, especially given the wide variety of physical settings and habitat types found in Lake Worth Lagoon and the communicating water bodies.

Speaker Qualifications

Mark Fonseca obtained a Ph.D. in Integrative Biology from the University of California, Berkeley. He is also the author or co-author of approximately 80 peer reviewed publications on fluid dynamics, ecology and restoration pertaining especially to seagrass ecosystems.

Sea Turtle Research in the Lake Worth Lagoon: 2005-2012

Habitat Restoration and Enhancement

Presenter

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Presentation Abstract

Sea turtles, particularly juvenile green turtles (*Chelonia mydas*), utilize the Lake Worth Lagoon (LWL) as a developmental habitat, and also serve as an important indicator of the health of the LWL system. Therefore, information on the distribution and abundance of sea turtles in the Lagoon and evaluations of their health and condition are a valuable addition to the comprehensive program to restore the LWL.

Vessel based visual transect surveys were conducted over large areas of the LWL to identify areas of particularly high sea turtle abundance. In these areas, sea turtle captures were conducted. These capture efforts allowed for the determination of the size class structure of the population, the incidence and severity of fibropapillomatosis, the population sex ratio, genetic origin, and dietary items utilized by foraging turtles. Sea turtle abundance is positively correlated with the presence of submerged aquatic vegetation, and abundance peaks in spring and summer. A total of 87 green turtles and one loggerhead turtle were captured. All green turtles captured were juveniles, with an average carapace length of 41.1cm. The prevalence of fibropapillomatosis was approximately 40% overall. LWL green turtles fed almost exclusively on seagrass species.

Specific areas within the LWL with healthy submerged aquatic vegetation communities support an extraordinarily high density of juvenile green turtles. These turtles depend directly on seagrasses, and are sensitive to and impacted by water quality. As such, long term monitoring of their population levels should be a part of restoration efforts.

Speaker Qualifications

Dr. Gorham is a founding member of Inwater Research Group, Inc. (IRG), a non-profit organization dedicated to sea turtle research and conservation and public education. IRG conducts research projects on marine turtles throughout Florida and the Gulf of Mexico, and has been working in the Lake Worth Lagoon in cooperation with Palm Beach County Department of Environmental Resource Management since 2005.

Detection of the Oyster Parasite, *Bonamia*, in Florida's Indian River and Lake Worth Lagoons {POSTER}

Habitat Restoration and Enhancement

Presenter

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Coauthors/Partners

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Presentation Abstract

The oyster parasite, *Bonamia* spp., was inadvertently discovered at Harbor Branch Oceanographic Institute while working with *Crassostrea virginica* and *C. ariakensis*. This was the first report of this parasite in Florida. To that end surveys were conducted in the Indian River (IRL) and Lake Worth Lagoons (LWL) in 2010 to determine the range of the parasite in Florida waters. Oysters and associated bivalves were collected from ten sites within the southern IRL and three sites within LWL. At each site a maximum of twenty of each bivalve species present were collected. Following taxonomic identification, tissue samples were taken for both molecular and histological assays. Gill tissue was examined for the presence of *Bonamia*, Dermo (*Perkinsus marinus*) and MSX (*Haplosporidium nelsoni*) using polymerase chain reaction (PCR).

Bonamia was detected in 22% of all bivalves tested in the IRL (8/10 sites; 6/11 species) and 18% of all bivalves tested in LWL (2/3 sites; 4/13 species). Dermo was detected in 13% of all bivalves tested in the IRL (10/10 sites; 7/11 species) and 12% of all bivalves tested in LWL (2/3 sites; 5/13 species). MSX was not found at any sites in either lagoon system. This study expands the known range of the parasite *Bonamia* in US waters and confirms the presence of both *Bonamia* and Dermo in numerous bivalve species, some of which may serve as reservoir species. This study further confirms the lack of MSX in Florida waters. The implications of these findings for oyster restoration projects is currently unknown.

Presenter Qualifications

Dr. Laramore is an Assistant Research Professor in the Aquaculture and Stock Enhancement Program at HBOI-FAU and received her Ph.D. in Marine Molecular Biology from Florida Institute of Technology. Her areas of research include evaluation of reproductive effort of both natural and cultured populations of bivalves, parasitic diseases of both natural and cultured bivalves, and viral diseases of cultured crustaceans. In addition to research she manages the Aquatic Animal Health Laboratory.

Molluscan Habitats in the Lake Worth Lagoon {POSTER}

Habitat Restoration and Enhancement

Presenter

Carole Marshall

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Presentation Abstract

Since the North and South Inlets were opened, changing the Lake from a fresh water lake to salt and brackish, many mollusks have made the Lagoon their home. Through extensive research, personal collecting trips, searches of the extensive mollusk collection at the University of Florida in Gainesville and searches of private collections plus eye witness and photographic accounts of others over 700 species of mollusks have been documented. Among those 700 plus species are some that are only able to live in brackish water, those who can only live in a high salinity environment and those that are adaptable. In this presentation I will show the different habitats in the Lagoon and some of the species that can be found in each type of habitat.

Presenter Qualifications

Carole has been collecting shells for over 45 years, she was President of the Palm Beach County Shell Club twice, President of the Treasure Coast Shell Club and the Broward Shell Club. Carol was also part time curator at the Rosenstil School of Atmospheric and Marine Science, which is part of the University of Miami, from 1998 to 2000. She has given many educational programs over the last 40 years including presentations to the American Malacological Society at their meeting in Chicago, at the Conchologists of America conventions in Corpus Christi, Tex. St. Petersburg, Florida, Mobile, Alabama, Tampa, Florida and others, as well as presentations at many shell club meetings and other gatherings of interested people. During the Pectinidae conference in St. Petersburg, Carole was invited to bring her world renowned collection of Pectinidae and her exhibit was over 96 feet in length. Carole is presently in the last stages of a book on the *Seashells of Peanut Island Florida*.

Grassy Flats Estuarine Restoration Project: A Partnership with PBCERM, FWC, and the USFWS National Coastal Wetlands Conservation Grant Program

Habitat Restoration and Enhancement

Presenter

Erin McDevitt, Florida Fish and Wildlife Conservation Commission

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Presentation Abstract

The Lake Worth Lagoon has suffered extensive loss of estuarine habitats and degraded water quality due to human development activities over the past century and is 87% armored. Large scale projects needed to re-establish critical habitat in the Lagoon are expensive. Funding sources to support such projects are limited. The USFWS National Coastal Wetlands Conservation Grant Program (NCWCGP) provides \$200,000 to \$1,000,000 to awarded projects to acquire, restore, manage, and enhance wetlands.

FWC works closely with partners and the USFWS to develop competitive habitat conservation proposals for the NCWCGP. FWC partnered with PBC ERM in 2012 on the Grassy Flats Estuarine Restoration Project proposal. This project will cap anoxic, fine-grained organic sediments (i.e. muck) creating two mangrove and salt marsh islands and creating conditions suitable for recruitment of federally listed Johnson's seagrass. Oyster reefs are also included in the project design.

Funding in the amount of \$777,000 for the Grassy Flats Project was announced in January, 2013. The Project will result in the restoration and enhancement of 22 acres of critical estuarine habitat. This will provide downstream water quality improvements and habitat for over 195 species of fish and 89 species of birds. Additionally, it will improve ecosystem resiliency by maximizing carbon sequestration and allowing for natural succession of habitat types as sea level continues to rise.

FWC worked closely with PBC to develop a successful proposal for the Grassy Flats project, which included a lengthy internal FWC review and a thorough USFWS draft regional review. Completion of the Grassy Flats project will provide a successful demonstration project and pave the way for future large scale project development in the Lake Worth Lagoon through grant programs.

Speaker Qualifications

Erin McDevitt works for FWC in the Division of Habitat and Species Conservation in Marine and Estuarine management. Erin has a Masters Degree from Florida Institute of Technology in Environmental Science. Primary job duties include identifying restoration opportunities and securing grant funding with interagency cooperation, influencing marine/estuarine habitat management activities, and providing technical assistance to marine habitat managers. Erin has worked as a partner in the NCWCGP on behalf of FWC since 2009. Currently, she manages a \$1.5 million NCWCGP grant to restore 178 acres of impounded wetlands in St. Lucie County and will be managing the \$777,000 Grassy Flats grant award for FWC.

Lake Worth Lagoon Fixed Transect Seagrass Monitoring Program: 2000-2012

Habitat Restoration and Enhancement

Presenter

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Coauthors/Partners: Julie Mitchell, Palm Beach County Department of Environmental Resources Management; Angela Delaney, Coastal Eco-Group Inc.; and Adrienne Carter, Coastal Eco-Group Inc.

Presentation Abstract

Palm Beach County Department of Environmental Resources Management (PBCERM) has been monitoring seagrass annually along 9 transects (27 stations) in the Lake Worth Lagoon (LWL) since 2001. The general objective of the fixed transect monitoring program is to document annual changes in seagrass abundance and distribution at the permanent transects as an indicator of lagoon-wide seagrass ecosystem health. Transect locations were strategically selected by PBERM by their proximity to LWL Partnership Grant projects or other water or habitat improvement projects. Transects were established in areas where the depth gradient changed by 30 to 60 cm within 15 to 30 m of an existing bed edge. Each shore-perpendicular transect consists of three 1-m² permanent stations, a shallow, mid-depth, and deep-water station, which are monitored for species presence/absence and Braun-Blanquet cover estimates. The distance to the seagrass bed edge from the landwardmost station is measured to assist in the evaluation of water clarity and target depths for seagrasses.

Annual monitoring data indicate that extreme freshwater discharges may be the largest contributor to overall seagrass trends in LWL. Major decreases in seagrass abundance were recorded after the 2004/2005 hurricanes; highest overall abundance was recorded in 2007, followed by 2002 and 2011. A substantial reduction in abundance occurred in 2010, likely in response to typical rainfall following drought conditions, and overall abundance in 2012, following a wet spring, was most similar to 2010. The fixed transect program is the longest dataset for *Halophila johnsonii* in Florida. The long-term dataset allows for evaluation of temporal trends in seagrass cover in response to large-scale environmental disturbances such as hurricanes and small-scale habitat factors such as sediment characteristics. A strong negative correlation between muck and seagrass abundance has been documented, highlighting the importance of sediment management projects in seagrass habitat restoration in LWL.

Speaker Qualifications

Ms. Cheryl Miller is President of Coastal Eco-Group Inc., an environmental consulting firm located in Deerfield Beach specializing in ecological surveys and impact assessments. Ms. Miller has more than 16 years of experience in the private and public sectors. During her tenure with the Florida Department of Environmental Protection, she served as a seagrass expert for the Bureau of Beaches and Coastal Systems and was the FDEP representative to the *Halophila johnsonii* Recovery Team in 2003-2004. Ms. Miller is currently a member of South Florida Water Management District Water Resources Advisory Commission and long-time active member of the Southeast Florida Coral Reef Initiative. Coastal Eco-Group, Inc. conducted the 2011 and 2012 seagrass fixed transect monitoring in Lake Worth Lagoon under contract to PBCERM.

The Million Dollar Muck Makeover: The Ibis Isle Restoration Project

Habitat Restoration and Enhancement

Presenter

Julie Mitchell, Palm Beach County Department of Environmental Resources Management

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Presentation Abstract

Central Lake Worth Lagoon has long been the recipient of stormwater discharges from C-51 Canal. Stormwater discharges carry suspended sediments, which settle out in Lake Worth Lagoon as “muck”. Ibis Isle sits outside the mouth of the C-51 and over time accumulated muck deposits as deep as 8 feet. The area was evaluated as a high priority site for restoration by Palm Beach County Environmental Resources Management Department (PBCERM), which partnered with the Town of Palm Beach, South Florida Water Management District, and Florida Department of Environmental Protection, to provide funding and lands to restore the impacted area. Restoration of Ibis Isle began in June 2009 and was completed in January 2010. Due to environmental constraints, shallow water depths, and muck thickness, construction of the Ibis Isle Restoration project was challenging and required “out-of-the-box” thinking and innovative equipment, including a conveyor system and “sand shooter”.

The Ibis Isle Restoration project has brought life back into an area that was once referred to as the “Dead Zone”. Since completion, PBCERM has observed the growth of planted mangroves and cordgrass, recruitment of seagrass and oysters, spawning of horseshoe crabs, foraging of manatees, and a significant increase in wading bird and shorebird species. In addition to providing habitat for fish and wildlife, this project has produced an alternative method for capturing muck sediments. With 423 acres of the surface area containing muck deposits greater than 1 foot, this successful project has demonstrated capping methodologies that can be applied to other areas of the Lagoon.

Speaker Qualifications

Ms. Mitchell has been an Environmental Analyst with the Palm Beach County Department of Environmental Resources Management since 2008. She is primarily involved with designing and managing estuarine restoration and enhancement projects within the Lake Worth Lagoon. Prior to obtaining the position with Palm Beach County, Julie worked for 7 years as a Natural Resource Specialist for the Broward County Environmental Protection and Growth Management Department. She received her BS in Biology from Florida State University in 2000 and her MS from Nova Southeastern University in Marine Biology and Coastal Zone Management in 2007.

Climate Change

Habitat Restoration and Enhancement

Presenter

Dr. Jayantha Obeysekera, **South Florida Water Management District**

Chief Engineer

Hydrologic and Environmental Systems Modeling Section

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Presentation Abstract

In view of the current projections of climate change and sea level rise, the concept of “stationarity” (past climate equals future climate) used in traditional planning efforts is no longer appropriate. Current literature is abundant with projections of temperature and precipitation for the 21st century at the global scale, but such information is not readily available nor has been evaluated adequately for subregional scales such as Lake Worth Lagoon. The primary motivation for this study was to investigate the potential implications of climate change and sea level rise in South Florida. The study focused on the current knowledge of climate change and sea level rise at the regional scale and a preliminary assessment of the hydrologic implications of increased temperature, changing rainfall patterns, and projected sea level rise. Scenario results point to significant changes in the water budget in the South Florida region and the need to conduct more comprehensive investigations at subregional scales. The resulting changes in temperature regime, water depth, salinity structure and residence time within the Lagoon are likely to alter the present extent, distribution and species composition of marine and estuarine habitats over time. Continuing efforts will be needed to evaluate the changing ecology of the Lagoon and initiate projects to maintain an appropriate balance of estuarine and marine species as this dynamic ecosystem adapts to future conditions.

Presenter Qualifications

Dr. Jayantha Obeysekera is the Chief Modeler at the South Florida Water Management District (SFWMD) and has over 25 years of experience practicing water resources engineering with an emphasis on computer modeling and implications of climate variability on planning and operations of complex water resources systems. Prior to joining SFWMD in 1987, he worked as an Assistant Professor in the Department of Civil Engineering at Colorado State University. During his career, Dr. Obeysekera has published nearly 40 research articles in peer reviewed journals and over 50 others in the field of water resources. He has taught short courses on modeling in the countries of Dominican Republic, Colombia, Spain, South Korea, and Sri Lanka, and was member of the National Research Council committees to review hydrologic studies of the Klamath River Basin in Oregon and California, and the Sustainability of California Bay-Delta, and as an external advisory member to review the computer modeling of the New Orleans area in the aftermath of the hurricane Katrina. He was a co-principal investigator for a US NSF funded project on the investigation of the tsunami impacts on coastal water resources in Sri Lanka. *He is a member of the National Climate Assessment and Development Advisory Committee (NCADAC) and has been appointed as an Affiliate Research Professor in the College of Science and at the Center for Environmental Studies at Florida Atlantic University.* Presently, he is the technical lead for climate change and sea level rise investigations at SFWMD. Dr. Obeysekera holds a bachelor's degree in Civil Engineering from University of Sri Lanka, M. Eng. from University of Roorkee, India, and a Ph.D. in Civil Engineering from Colorado State University with specialization in water resources.

Monitoring Oyster (*Crassostrea virginica*) Populations in Lake Worth Lagoon

Habitat Restoration and Enhancement

Presenter

Melanie Parker, Florida Fish and Wildlife Conservation Commission, Fish and Wildlife Research Institute

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Presentation Abstract

As a component of the Comprehensive Everglades Restoration Plan (CERP), an oyster monitoring program was implemented in several east coast estuaries, including Lake Worth Lagoon, the Loxahatchee River estuary, and the St. Lucie estuary, in early 2005. The main objective of that long-term monitoring program was to document the response of eastern oysters, *Crassostrea virginica*, to changes in the magnitude and timing of freshwater flow into each estuary as related to CERP activities. Monitored aspects of oyster ecology included settled oyster density and size, juvenile oyster recruitment, and prevalence and intensity of the disease *Perkinsus marinus* (dermo). Three separate oyster reefs were selected as study locations in the central section of Lake Worth Lagoon (LWL). Bi-annual surveys were conducted to assess settled oyster density and size, while juvenile recruitment and dermo infection rates were monitored monthly.

Mean live oyster densities ranged from 100 to 300 oysters per m² until fall 2008 when they reached 600 per m². Densities declined slightly to means near 400 per m² from 2009 through 2011, but peaked again at over 600 per m² in fall 2012. Juvenile recruitment rates typically peaked in the fall and ranged from 10 to 40 spat per shell. Approximately 30-50% of sampled oysters were infected with dermo from 2005 through 2011, but infection rates increased to more than 70% in 2012. Mean annual salinities in LWL ranged from 20 to 32 ppt during the study. Those salinities are relatively high, but fall within the tolerance range for oysters (10-30 ppt) and are often associated with maximum recruitment rates. However, high salinities also negatively impact oyster populations by increasing predation and disease. This is exemplified in LWL, where high salinities corresponded with high oyster densities and recruitment rates, as well as a higher incidence of dermo infection.

Speaker Qualifications

Melanie Parker is an Associate Research Scientist at the Fish and Wildlife Research Institute where she has worked in the Molluscan Fisheries research group since 1996. She received her Ph.D. in marine science at the University of South Florida in August 2012.

Endemism in the Molluscan Fauna of the Lake Worth Lagoon

Habitat Restoration and Enhancement

Presenter

Dr. Edward Petuch, Department of Geosciences, Florida Atlantic University

Professor of Geology

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Presentation Abstract

The Lake Worth Lagoon area represents the southernmost end of the Palm Beach Provinciatone, an area of faunal overlap between the tropical Caribbean Province and the warm temperate Carolinian Province. This provinciatonal region extends northward to approximately Fort Pierce and contains a rich molluscan fauna with a high degree of endemism. The Lake Worth Lagoon, a remnant of an extensive series of coastal paleolagoons that date back to the late Pleistocene, contains the most diverse fauna of the Palm Beach Provinciatone and houses a number of regionally-restricted Pleistocene relictual species. Some of these "living fossil" taxa include Winner's Crown Conch (*Melongena corona winnerae*), Pace's Modulus Snail (*Modulus pacei*), Verrill's Queen Conch (*Eustrombus gigas verrilli*), Pflueger's Cone Shell (*Jaspidiconus pfluegeri*), and Hart's Venus Clam (*Mercenaria hartae*). Rocky outcrops and oyster bioherms within the lagoon have also been found to house a number of endemic gastropods, including Linda's Nerite (*Nerita lindae*), Linda's Cerith Snail (*Cerithium lindae*), and Bucheck's Murex (*Stramonita buchecki*).

Speaker Qualifications

ACADEMIC BACKGROUND: B.A. and M.S in Zoology, University of Wisconsin-Milwaukee (1975); Ph.D. in Oceanography, University of Miami (Rosenstiel School of Marine and Atmospheric Sciences) (1980; Post-doctoral research (NSF funding) in the Department of Paleobiology, National Museum of Natural History, Smithsonian Institution (1980-1982).

PROFESSIONAL BACKGROUND: Professor of Geology, Florida International University (1982-1984); Professor of Geology, Florida Atlantic University (1984-present); author of 16 books and 150 papers on molluscan systematics, biogeography, ecology, and paleontology (several concerning the Lake Worth Lagoon) and have discovered and named over 1200 new species of gastropods and bivalves.

Lake Worth Lagoon's Artificial Reefs {POSTER}

Habitat Restoration and Enhancement

Presenter

Dr. Janet Phipps, Palm Beach County Department of Environmental Resources Management

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Coauthors/Partners

PBC Reef Research Team

Presentation Abstract

The Lake Worth Lagoon (LWL) is an urbanized estuary that has been degraded from decades of development and resultant runoff and other human-related activities. As a result, the LWL Management Plan was initiated, and a goal in the Plan is to increase both native and artificial habitats for fish and wildlife in the Lagoon. Artificial reefs have been constructed in the LWL since 1991. Six artificial reefs have been deployed and recently 2 new artificial reefs were constructed: Everglades Reef and

Longterm monitoring of fish and benthic assemblages on these artificial reefs has been conducted primarily by volunteers. Data on fish assemblages is available from the international database maintained by Reef Environmental Education Foundation (REEF), and the PBC Reef Research Team (RRT) has monitored 2 sites: Sugar Sands Ledges (SSL) and Rybovich Reef (RR) since the mid-1990s. REEF data is available for 4 of the artificial reef sites and is based on the roving diver method. The RRT fish data

Sixty-nine families and 334 species of fish were recorded in REEF's data for LWL sites from 475 surveys. The largest numbers were recorded from Blue Heron Bridge site. The RRT data began 1995 for RR and 1997 for SSL. For all monitoring events, a total of 34 families and 138 species (SSL) and 38 families and 121 species (RR) of fish were documented. The ledges were constructed in 1996, and corals were present within 2 yrs at RR but not until 5 yrs for SSL.

The majority (75-90%) of the fish on these reefs is Haemulidae (grunts). These artificial reefs have been very successful as exemplified by the large number of juvenile fish found in and around them. The highest numbers of fish and benthic invertebrate taxa are found at Blue Heron Bridge and Peanut Island reefs; both places that are flushed by tidal waters from the Inlet. We anticipate great successes with the newly constructed Phil Foster Snorkel Reef.

Presenter Qualifications

Dr. Phipps has been with the Palm Beach County Department of Environmental Resources Management (ERM) since 1991 and has been in her position as Coral Reef Ecologist monitoring the County's reefs since 2003. She has been SCUBA certified for 25 years diving locally and active with the Palm Beach County Reef Research Team since 1992. Prior to ERM, she worked for 6 years with the Florida Department of Environmental Regulation (now Fla. Dept. of Environmental Protection) as a Supervisor of Compliance and Enforcement over multiple regulatory programs. Janet received a Bachelor of Science in Zoology from the University of Oklahoma, a Master of Science in Ecology and a Ph.D. in Physiological Ecology from Johns Hopkins University.

Comparison of Eastern Oyster, *Crassostrea virginica*, Populations on Created Versus Natural Reefs in Lake Worth Lagoon

Habitat Restoration and Enhancement

Presenters

**Dr. John Scarpa and Dr. Susan Laramore,
Harbor Branch Oceanographic Institute at Florida Atlantic University**

Aquaculture and Stock Enhancement Program

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Dr. Susan Laramore, Assistant Research Professor - (772) 242-2525; slaramo1@hboi.fau.edu

Presentation Abstract

Oysters and oyster habitat restoration in Florida are integral to the Comprehensive Everglades Restoration Plan and local county plans. Eastern oysters, *Crassostrea virginica*, on a constructed rip-rap island (Snook Island) in central Lake Worth Lagoon, Palm Beach County, Florida, were compared to oysters at a nearby natural oyster bed (Ibis Isle). Condition index, reproduction, recruitment, growth, and health status of oysters were assessed monthly and density assessed semiannually from March 2008 to February 2010. Oysters (n=5-6) were also collected from each site to determine prevalence and intensity of Dermo (*Perkinsus marinus*) using Ray's fluid thioglycollate medium and other parasites using standard H&E histological techniques.

Average live oyster density was significantly lower in year one at the rip-rap island ($52/m^2$, $54/m^2$; April and October, respectively) compared to the natural bed ($150/m^2$, $291/m^2$), but not in year two (rip-rap = $97/m^2$, $186/m^2$; natural = $129/m^2$, $208/m^2$). Annual average recruitment was greater each year at the rip-rap island (8.5 spat/shell year one; 13.2 spat/shell year two) compared to the natural bed (4.9 spat/shell year one; 3.2 spat/shell year two). No MSX (*Haplosporidium nelsoni*) was found.

Annual Dermo prevalence was similar (57-71%) at all sites, though slightly lower at Snook Island. Average annual Dermo intensities ranged from 0.85-1.2, with MacArthur having the highest annual intensities and Snook Island the lowest. Other parasites included the gregarine protozoan *Nematopsis* sp., turbellarians, the trematode *Bucephalus*, the cestode *Tylocephalum*, cnidarians of the genus *Eutima* sp. and the pea crab *Pinnotheres* sp. Multiple parasites were found at all sites and many oysters in the study had multiple parasitic infections.

In general, oysters and the oyster population on the rip-rap island were comparable to the natural bed. Multiple parasitic infections in oysters are indicative of a healthy ecosystem that supports a diverse assortment of other species as oysters are typically the intermediate hosts with final hosts being crustaceans, fish or birds. Lake Worth Lagoon is a productive system with patches of healthy oyster populations that can be expanded with additional substrate (e.g. Snook Island) for restoration projects relying on natural recruitment.

Speaker Qualifications

Dr. Scarpa is a Research Professor in the Aquaculture and Stock Enhancement Program at Harbor Branch Oceanographic Institute at Florida Atlantic University and received his Ph.D. in Wildlife and Fisheries Sciences from Texas A&M University. His areas of research are bivalve aquaculture and ecosystem restoration. He is the current Treasurer for the National Shellfisheries Association and has been a member, as well as led, the Aquaculture section of the USDA-Small Business Innovation Research grant review panel. Dr. Laramore is an Assistant Research Professor in the Aquaculture and Stock Enhancement Program at Harbor Branch Oceanographic Institute at Florida Atlantic University and received her Ph.D. in Marine Molecular Biology from Florida Institute of Technology. Her areas of research include evaluation of reproductive effort of both natural and cultured populations of bivalves, parasitic diseases of both natural and cultured bivalves, and viral diseases of cultured crustaceans. In addition to research she manages the Aquatic Animal Health Laboratory.

Alternative Artificial Eco-Systems {POSTER}

Habitat Restoration and Enhancement

Presenter

Lee Shepard, Intracoastal Eco Systems, LLC

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Coauthors/Partners

Carolann Wade, Intracoastal Eco Systems, LLC

Presentation Abstract

According to Palm Beach County Department of Environmental Resources Management, 87% of the Lake Worth Lagoon’s shoreline is armored and provides very little habitat. Through research and development, IES has applied for patents and trademarks on a two-part artificial eco system to be placed adjacent to seawalls and under docks to help the Lake Worth Lagoon recover from our negligence. Both the Mangrove Root and Artificial Reef systems promote natural restocking by providing a rookery and spawning area for indigenous and migrating game and sportfish inshore, as well as shelter for fry and juvenile fish. In addition, both units can be textured with oyster clutch to stimulate oyster propagation. In December 2012, IES donated the Goliath Grouper Hotel to Palm Beach County Department of Environmental Resources Management for placement in the snorkeling lagoon at Peanut Island. IES will be collecting monthly data to monitor the success of the artificial reef. For more information, visit www.intracoastalecosystems.com.

Presenter Qualifications

Mr. Shepard is the founder and president of Intracoastal Eco Systems, LLC. As a concerned native Floridian, he has taken on the task of developing a series of eco-friendly products that when used in unison will help return the Lake Worth Lagoon to a healthy and thriving estuarine system.

Determining the Biodiversity of Species on the Kelsey Artificial Reef {POSTER}

Habitat Restoration and Enhancement

Presenters

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Coauthors

Students from the Riviera Beach Maritime Academy Marine Science 1 Class

Presentation Abstract

In 2009, Riviera Beach Maritime Academy and the Palm Beach County Department of Environmental Resources Management installed an artificial reef at Kelsey Park. This reef was constructed to produce a maximum amount of habitat for species that live in the area. The reef was placed at Kelsey Park to be used as an area to train students on how to determine biodiversity of species in the marine environment. We will be using the roving diver method for nekton, as well as a transect method for sessile species. The roving diver method will follow a predetermined path laid out in advance of the survey.

This poster will present the results of the February 2013 survey, which will include biodiversity of species in the area, evenness and dominance. The results are compared to the original ecosystem results to show biodiversity increases on the reef habitat. The conclusion of this experiment should demonstrate that the artificial reef at Kelsey Park has increased in biodiversity and productivity. More importantly, the poster will demonstrate that we are teaching a new generation of students how to accomplish the scientific method and get excited about accomplishing a science based inquiry experience.

Presenter Qualifications

Mr. Sellepack earned a Bachelor of Science Degree from Grand Valley State University in Marine Biology with an emphasis in fisheries, a Master of Science Degree in Marine Biology, and a Master of Science Degree in Science Education from Walden University. He has been teaching Marine Science at Riviera Beach Maritime Academy for the last 7 years.

Restoration Strategies Regional Water Quality Plan

Water and Sediment Quality

Presenter

Ernie Barnett, South Florida Water Management District

Assistant Executive Director

Office of Everglades Policy and Coordination/Water Resources

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Presentation Abstract

To address water quality concerns associated with existing flows to the Everglades Protection Area (EPA), the South Florida Water Management District (SFWMD or District), Florida Department of Environmental Protection (FDEP) and United States Environmental Protection Agency (USEPA) engaged in technical discussions starting in 2010. The primary objectives were to establish a Water Quality Based Effluent Limit (WQBEL) that would achieve compliance with the State of Florida's numeric phosphorus criterion in the EPA and identify a suite of additional water quality projects to work in conjunction with the existing Everglades Stormwater Treatment Areas (STAs) to meet the WQBEL. Based on the collaborative effort described above, a suite of projects have been identified that would achieve the WQBEL.

The projects have been divided into three flow paths (Eastern, Central and Western), which are delineated by the source basins that are tributary to the existing Everglades STAs. The identified projects primarily consist of Flow Equalization Basins (FEBs), STA expansions, and associated infrastructure and conveyance improvements. The Eastern Flow Path contains STA-1E and STA-1W and will add a FEB and expand the existing STA-1W. The Central Flow Path contains STA-2 and STA-3/4 and will add an FEB. The Western Flow Path contains STA-5/6 and will add an FEB and increase the effective treatment area within STA-5. An additional plan component includes an in basin storage feature to supplement restoration flows to the Loxahatchee River.

Presenter Qualifications

Ernie Barnett has nearly 30 years of water resources management experience and public service, during which he contributed to several landmark environmental laws. He had a lead role in the successful passage by the Florida Legislature of the Lake Okeechobee Protection Act and the Everglades Restoration Investment Act, which has provided more than \$1 billion dollars for Everglades restoration. He also helped secure approval of the Water Resource Development Act of 2000, in which Congress authorized the Comprehensive Everglades Restoration Plan. In his current position, Mr. Barnett coordinates, develops and implements comprehensive policy and projects to preserve, restore and protect the South Florida ecosystem while recognizing the needs of external constituents and stakeholders. He also oversees agency-wide scientific research, monitoring and analysis; computer modeling; regional water supply planning; and the development/application of other tools and methodologies to help meet the water needs of both people and the environment. He continues to serve as the Executive Director's representative with elected and appointed officials at all levels of local and state government. During a 22-year tenure with Florida's Department of Environmental Protection, Mr. Barnett worked as a shellfish biologist, aquatic preserve manager, environmental administrator, Water Policy Director and Ecosystem Projects Director. He was the recipient of the 2001 National Wetlands Award for Outstanding Wetlands Program Development from the Environmental Law Institute. Mr. Barnett has a Bachelor of Science degree in Environmental Resource Management and Planning and a Master of Science in Biology, both from the University of West Florida. He also holds a Master's in Environmental Engineering from the University of Florida.

The Boynton Inlet: Current Measurements and Nutrient Fluxes into the Coastal Ocean

Water and Sediment Quality

Presenters

Dr. Thomas Carsey and Jack Stamates, National Oceanic and Atmospheric Administration

Atlantic Oceanographic and Meteorological Laboratory

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Jack Stamates, Oceanographer - (305) 361-4317; jack.stamates@noaa.gov

Presentation Abstract

As a part of an ongoing project looking at southeast Florida's inlets, we wished to estimate the flux of LBSP materials reaching the coastal ocean through the Boynton Inlet. We measured the flow through the inlet via calibrated ADCP instrumentation for >1 year. During this time, we conducted two 48-hour sampling intensives, measuring nutrients, pH, salinity, total suspended solids, turbidity, and microbiological materials. The inlet was ideal for ADCP measurements, and a high-quality data set was obtained. Daily fluxes of nitrate+nitrite ranged from 16 to 565 kg N, silicate from 564 to 5197 kg Si, phosphate from 154 to 309 kg P, and ammonium from 34 to 354 kg N.

The study found a significant but highly variable flux of nutrients in the eight outgoing (ebb) tidal pulses sampled. Boynton Inlet, like other inlets, is a significant source of material to the coastal ocean, comparable to the smaller wastewater outfalls. Upstream factors (canal flow, rain) appeared to have a large effect. A longer measurement program would provide more robust flux values.

Speaker Qualifications

Dr. Thomas Carsey is Deputy Director of the Ocean Chemistry Division at NOAA/AOML. Jack Stamates is an ocean acoustics expert. Together, they manage the Florida Area Coastal Environment (FACE) program at National Oceanic and Atmospheric Administration/ Atlantic Oceanographic and Meteorological Laboratory. (<http://www.aoml.noaa.gov/themes/CoastalRegional/projects/FACE/faceweb.htm>).

Numeric Nutrient Criteria

Water and Sediment Quality

Presenter

Kevin Carter, South Florida Water Management District

Lead Scientist

Office of State Policy and Coordination

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Presentation Abstract

The development of Numeric Nutrient Criteria (NNC) has been ongoing for many years in the state of Florida, and over the last three years several milestones have been reached. This presentation will summarize the history and discuss the current events of NNC at the national and state levels. Both the United States Environmental Protection Agency (USEPA) and the Florida Department of Environmental Protection (FDEP) have the Lake Worth Lagoon in their NNC developmental processes. This presentation will discuss the current status of both rulemaking efforts and discuss potential future scenarios for NNC implementation in the Lake Worth Lagoon.

Presenter Qualifications

Kevin Carter has been with the South Florida Water Management District for over 4 and a half years, where he primarily coordinates the District's activities regarding water quality standards and all phases of the total maximum daily load process. Kevin has over 20 years of experience in the South Florida watershed and has or is currently a member of many statewide organizations including FDEP's NNC Technical Advisory Committee for its entire period (2003 until 2011).

Water Quality in the Lake Worth Lagoon: Status and Trends

Water and Sediment Quality

Presenter

Dr. Zhiqiang Chen, South Florida Water Management District

Senior Scientist

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Coauthors/Partners

Teresa Coley and Peter Doering, South Florida Water Management District

Presentation Abstract

To support preservation and restoration of ecological resources in Lake Worth Lagoon (LWL), water quality was analyzed using data collected from 2007-2012 and 2001-2005. First, water quality status was evaluated using a one-way ANOVA. Results indicated that there were significant spatial differences in water quality between the three segments (North, Central and South) of the LWL. Second, temporal trends in water quality from 2007-2012 were examined in each segment using Seasonal Kendall Trend test. Results revealed that most water quality parameters showed no significant temporal trends with exception of a decreasing Total Phosphorus (TP) trend in the north segment and a decreasing Total Suspended Solids (TSS) in the south segment. Results from this study provide the latest observations on overall baseline conditions and trends in water quality in the LWL and will help assess effectiveness of ongoing and future management actions.

Speaker Qualifications

Dr. Chen is a Senior Scientist with the Coastal Ecosystems Section, Applied Science Bureau of the South Florida Water Management District.

Southeast Florida Regional Climate Change Compact {POSTER}

Water and Sediment Quality

Presenters

Bonnie Finneran and Andy Studt, Palm Beach County Department of Environmental Resources Management

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Andy Studt, Environmental Technician II - (561) 233-2539; astudt@pbcgov.org

Presentation Abstract

South Florida is highly vulnerable to potential impacts of climate change. The Southeast Florida Regional Climate Change Initiative includes the four counties of Palm Beach, Broward, Miami-Dade, and Monroe working collaboratively on mitigation and adaptation strategies through a Southeast Florida Regional Climate Change Compact Agreement, as ratified January 2010. The primary goal is to increase community climate resiliency.

Compact collaborative methods include: (1) development of joint policies to influence climate/energy legislation; (2) seeking funding opportunities at state and federal levels; (3) development of technical documents with common methodologies; (4) development of a Regional Climate Action Plan; and (5) holding annual summits to review progress and discuss strategies.

The 4 County Compact products to date include: Annual Leadership Summits (since 2009), Joint Climate Change Policies (since 2011), Unified Sea Level Rise Projection (2011), Regional Greenhouse Gas Emissions (2011), Regional Vulnerability Analysis (2012), and Regional Climate Action Plan (2012).

The 110 mitigation and adaptation strategies found in the Regional Climate Action Plan (RCAP) are intended to enhance community resiliency. The RCAP is now adopted by Broward, Miami Dade and Monroe Counties. A process is in place to workshop the RCAP to further engage municipal governments and citizens for potential adoption by the Palm Beach County Board of County Commissioners in the fall of 2013. Local governments are encouraged to participate in this process, consider taking a Mayor's Pledge, and to adopt and implement adaptation and mitigation strategies that best serve their communities.

Presenter Qualifications

Ms. Finneran is the Division Director for Resources Protection and has been with Palm Beach County Department of Environmental Resources Management since 1988. She has been involved with the Southeast Florida Regional Climate Change Initiative since its inception.

Mr. Studt has been with Palm Beach County ERM since 2004 and is primarily responsible for implementing the County's water quality monitoring efforts within the Lake Worth Lagoon. He studied climate science at the University of Florida and has been involved with the Southeast Florida Regional Climate Change Initiative for the past year.

Lake Worth Lagoon Connections: Land-Based Sources of Pollution, Fisheries Habitats and the Florida Coral Reef Tract

Water and Sediment Quality

Presenter

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Presentation Abstract

Land-based sources of water pollution affect fisheries habitats within and outside Lake Worth Lagoon. The southeast Florida coral reef ecosystem is affected by water pollution and habitat connectivity within adjacent estuaries, including the Lake Worth Lagoon. A literature review and synthesis of land-based sources of pollution (LBSP) effects on essential fish habitats in southeast Florida was recently completed. The Lake Worth Lagoon Symposium presentation uses findings of the regional analysis to focus on the LBSP, fisheries habitat and southeast Florida coral reef ecosystem parameters applicable to Lake Worth Lagoon. LBSP are affecting the distribution and quality of estuarine and marine habitats within and outside Lake Worth Lagoon.

Coastal inlets function as a point source for LBSP to the nearshore coastal environment. Effects of LBSP on fisheries habitats can extend well beyond the vicinity of the coastal inlets, including the Florida coral reef tract. Habitat connectivity and ecosystem production along the Florida coral reef tract are affected by water quality within the adjacent estuaries, such as Lake Worth Lagoon. Reducing water pollution in Lake Worth Lagoon provides benefits beyond the geographic boundaries of the lagoon. Additional work by federal, state and local partners is beginning to assess watershed-scale approaches to LBSP reduction in Lake Worth Lagoon and other southeast Florida estuaries to guide planning for coral reef conservation activities in this region.

Speaker Qualifications

Kurtis Gregg, M.S. is a Scientist II with ECS-Federal, Inc. on contract to the National Marine Fisheries Service, Habitat Conservation Division to provide fisheries expertise and support to NOAA's Coral Reef Conservation Program, the State of Florida and the Southeast Florida Coral Reef Initiative. With a professional background in fisheries management, habitat conservation and Florida's Environmental Resource Permitting, (including nearly six years with the South Florida Water Management District), Kurtis has extensive experience with south Florida hydrology, ecology, habitat connectivity and land-based sources of pollution.

Effectiveness of the C-51 Canal Sediment Trap {POSTER}

Water and Sediment Quality

Presenter

Julie Mitchell, Palm Beach County Department of Environmental Resources Management

Environmental Analyst

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Coauthors/Partners

William Sadler, Sea Diversified, Inc.; South Florida Water Management District;

Presentation Abstract

Completed in July 2007, the C-51 Canal Sediment Management Project involved dredging muck sediments from the C-51 Canal and creating a sediment trap to capture sediments prior to their discharge into the Lake Worth Lagoon. Annual surveys were conducted from 2007-2010 to monitor trends in erosion and accretion of sediments within the canal and sediment trap. A 3-mile section of the C-51 Canal from Southern Boulevard to the S-155 Structure was surveyed using an automated hydrographic system. Upon completion, data was edited and formatted for bathymetric modeling and chart preparation. Using the models, a volumetric analysis was conducted to evaluate erosion and accretion including overall net change in sediment volumes between the four survey events. Using PBC's muck probe data, an isopach map identifying remaining muck deposits was also produced.

It was determined that for the first two years of the study period there was a net accretion of material throughout the survey area. The majority of the accretion occurred between 2008 and 2009 events and was concentrated primarily in the sediment trap area and the segment of canal east of I-95. During the final year of the study period, there was a substantial loss of material throughout the survey area, which can be attributed to an increase in discharge through the S-155 Structure. The net volume of sediments that accreted within the sediment trap far exceeded the net volume of erosion from other reaches indicating there were other contributing areas beyond the limits of the study. In that the sediment trap experienced relatively minimal sediment loss during the period of excessive discharge from the structure, it is apparent the trap is functioning as intended.

Presenter Qualifications

Julie Mitchell has been an Environmental Analyst with the Palm Beach County Department of Environmental Resources Management since 2008. She is primarily involved with designing and managing estuarine restoration and enhancement projects within the Lake Worth Lagoon. Prior to obtaining the position with Palm Beach County, Julie worked for 7 years as a Natural Resource Specialist for the Broward County Environmental Protection and Growth Management Department. She received her BS in Biology from Florida State University in 2000 and her MS from Nova Southeastern University in Marine Biology and Coastal Zone Management in 2007.

Phytoplankton and Anoxia in Little Lake Worth

Water and Sediment Quality

Presenter

**Dr. J. William Louda, Department of Chemistry and Biochemistry,
Florida Atlantic University**

Senior Scientist

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Coauthors/Partners

Mrs. Keren Prize Bolter, Department of Geosciences, Florida Atlantic University

Presentation Abstract

As part of the senior author's studies on photosynthetic microorganisms (phytoplankton, bacteria, etc.) and their relation to nutrient pollution (eutrophication) in southern Florida fresh, brackish and marine waters, a random sampling of Little Lake Worth was conducted in 2004. Finding that the bottom waters were strongly anoxic with a large growth of brown S-bacteria, a student was recruited to perform additional studies. The coauthor was that student.

Monthly water samples collected from the deep SE basin (80°03.50N x 26°51.00W) at 0.5-1.0 m intervals were filtered, extracted and pigments analyzed by HPLC-UV/Vis spectroscopy. Sediments were collected using a Wildco corer modified to be a free-fall gravity corer. Sediment samples (frozen) were sectioned in 10 cm intervals. Filtered seston or sediments were extracted and chromatographically analyzed for photosynthetic pigments. A HACH Hydrolab multiparameter sonde measured temperature, salinity, pH, nitrate and dissolved oxygen.

Pigment-based chemotaxonomic analyses of phytoplankton populations revealed a biomass, using taxon-specific chlorophyll-a as a proxy, order of: diatoms >> chlorophytes > chlorophytes ~ dinoflagellates > cryptophytes in the upper aerated water column through most of the year. In June - August a strong oxy-/chemocline formed with large amounts of Phaeobacteroides (brown S-bacteria) below about 5m. Salinity, nitrate and T indicated fresh water entering from the bottom.

We conclude that leaching from on-site disposal systems (OSDSs), namely septic tanks, plus inputs from heavily fertilized lawns / golf greens surrounding Little Lake Worth, provides enormous amounts of organic matter and plant nutrients (N,P) to the basin. The depth and lack of flushing provide the geomorphologic stage for the development of strong seasonal anoxia, supporting large amounts of the brown S-bacterium, *Chlorobium phaeobacteroides*, in the sulfide-rich hypolimnion.

Speaker Qualifications

Dr. Louda has a B.S. in Biology, M.S. in Biological Sciences, and Ph.D. in Marine Science and has studied the Kissimmee-Okeechobee-Everglades (KOE) System for greater than 20 years. He is currently a Senior Scientist at Florida Atlantic University. He is also the author or co-author of approximately 36 peer reviewed publications, 7 Book Chapters, and 120 scientific presentations. In 2011, Dr. Louda participated as a Fulbright Specialist at the Institute of Oceanology of the Polish Academy of Sciences, and specifically, with colleagues in the Marine Pollution Laboratory.

Onsite Sewage Treatment & Disposal Systems in Lake Worth Lagoon Watershed

Water & Sediment Quality
[ORAL AND POSTER PRESENTATIONS]

Presenter (Speaker)

Tim Mayer, Florida Department of Health, Palm Beach County

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Poster Presenters

Tony Coates, Environmental Specialist II

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Melinda Collins, Environmental Specialist III

Florida Department of Health

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Presentation Abstract

The purpose of this project was to determine how many onsite sewage treatment and disposal systems (OSTDS) are in the Lake Worth Lagoon watershed and where they are located so that others can use data to determine what, if any, impacts they may have on the Lagoon. New, repair, modification, and abandonment permits that have been issued within the Lake Worth Lagoon watershed have been mapped and are available for review. Areas using OSTDS have been classified using key factors. Although additional data on septic systems is necessary, the existing data set can be analyzed using GIS to determine the extent, density, and spatial relationships with the Lake Worth Lagoon and its watershed.

Presenter Qualifications

Tim Mayer currently serves as the Director of the Division of Environmental Public Health for the Florida Department of Health, Palm Beach County. He began his Environmental Health career in 1982 as a field inspector in Monroe County Florida, the Florida Keys. His experience includes working for the Bureau of Onsite Sewage Programs in Tallahassee from 1993 to 2000, and serving as Environmental Administrator of the Polk County and Broward County Health Departments. Tim was awarded a Bachelors of Science in Biological Sciences from Florida State University in 1980 and a Masters of Public Health in Environmental and Occupational Health from the University of South Florida in 1997. He received his certificate as a Registered Sanitarian in 1992.

Tony Coates, CEHP, is currently a permit review specialist for Palm Beach County's Division of Environmental Public Health. He has been with the Florida Department of Health for 11 years and is also a lifelong resident and active user of the Lake Worth Lagoon.

Melinda Collins, R.S., is currently a Data Manager Palm Beach County's Division of Environmental Public Health. She has been with the Florida Department of Health for 18 years.

Florida-Friendly Fertilization

Water and Sediment Quality

Presenter

Dr. Laura Sanagorski, University of Florida/Institute of Food and Agricultural Sciences, Palm Beach County Extension

Environmental Horticulture Extension Faculty

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Presentation Abstract

Fertilizer, when used properly, can be beneficial to your landscape, but more isn't always better. Improper fertilization directly affects ground and surface water quality. Specifically, nitrogen and phosphorus, two major fertilizer components, are considered to be major pollutants of our waterways statewide. "Fertilize appropriately" is one of the nine principles of the Florida-Friendly Landscaping program. This presentation will provide an overview of research-based fertilizer recommendations that will keep plants healthy while protecting our environment. Participants will gain an understanding about research-based fertilization best management practices and will leave with knowledge of the resources available on this topic.

Speaker Qualifications

Dr. Laura A. Sanagorski serves as Environmental Horticulture Extension Faculty for UF/IFAS Palm Beach County Extension. Her specific responsibilities are commercial and urban horticulture, and the Florida-Friendly Landscaping™ program. She coordinates educational outreach and CEU programs for Palm Beach County's diverse landscape industry as well as its residents. Dr. Sanagorski is an International Society of Arboriculture certified arborist and holds an Ed.D in Agricultural Leadership, Education, and Communications from Texas A&M University and B.S. and M.S. degrees in Environmental Horticulture from the University of Florida.

Sources of Sediment and Trace Metals to Lake Worth Lagoon

Water and Sediment Quality

Presenter

**Dr. John H. Trefry, Department of Marine and Environmental Systems,
Florida Institute of Technology**

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Coauthors/Partners

Robert P. Trocine, Florida Institute of Technology

Presentation Abstract

The objective of this study was to determine sources of muck sediments and associated trace metals that enter Lake Worth Lagoon (LWL) via the C-51 Canal. Such information can be used to develop strategies that reduce sediment and contaminant loading to the lagoon. Suspended particles and bottom sediments were collected in LWL, the C-51 Canal and upstream in the C-51 basin. Samples were analyzed for a large suite of metals, organic carbon and stable carbon isotopes. The data were first used to characterize lagoon sediments and then to identify likely upstream sources of sediment and metals to the lagoon.

Lake Worth Lagoon sediments within 2 km of the terminus of the C-51 Canal have uniform geochemical ratios (e.g., Fe/Al, Cu/Zn) over the past several decades that suggest sediment inputs from a dominant common source and/or good mixing of incoming sediments during transport to and burial in the lagoon. Organic matter makes up ~20% of the sediment in LWL and, based on stable carbon isotopes, ~65% of this organic matter is derived from land sources. A large fraction of the inorganic component of the sediment in LWL (>70%) seems to be derived from source areas west of Loxahatchee in the western reaches of the C-51 basin. Concentrations of copper, lead and zinc in sediments from LWL exceeded the State of Florida sediment quality guidelines for >40 of 72 samples. The study is part of a larger, ongoing effort to establish Best Management Practices that decrease sediment & organic matter loading to LWL; several recommendations are presented for future consideration.

Full report available at: http://www.pbcgov.com/erm/lakes/estuarine/lake-worth-lagoon/pdf/Trefry_LWL_Final_Report_Nov_2009.pdf

Speaker Qualifications

John Trefry is a Professor of Chemical Oceanography at Florida Institute of Technology. His research has involved study of trace metals in a variety of marine environments including deep-sea hydrothermal vents, the Mississippi River, the Gulf of Mexico, Florida lagoons, and the Alaskan Arctic. Studies focus on metals as natural resources as well as potential pollutants.

Restoring Our Economy By Restoring Our Shorelines

Public Use and Outreach

Presenter

Mike Antheil, Marine Industries Association of Palm Beach County

Executive Director

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Presentation Abstract

This presentation will feature a "day in the life of" cycle, showing how a resident of Palm Beach County graduates through different methods of enjoying our natural resources, i.e. he starts by fishing off a pier, then buys a kayak, then buys a small boat, etc. Along the way he buys provisions and shops for supplies all across the county. By having new and exciting place to go and explore, the resident spends money and encourages his friends to join him. Investing in natural resources and enhancing and restoring our marine environment pays dividends to every resident of the county.

Speaker Qualifications

Mike Antheil is the Executive Director and lobbyist for the Marine Industries Association of Palm Beach County. Prior to joining MIAPBC, Mike was the Executive Director of the Florida Alliance for Renewable Energy (FARE), and a legislative consultant specializing in private and public commercial finance in the clean energy industry. Mike earned two Bachelor Degrees from Jacksonville University in Sociology and Geography while playing 4 years of football. Mike grew up in Sarasota, FL and currently lives in Boynton Beach with his wife Amy and two sons, Zack and Jack.

Ichthyofaunal Diversity of Lake Worth Lagoon

Public Use & Outreach

Presenter

George Burgess, Florida Museum of Natural History, University of Florida

Director, Florida Program for Shark Research

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Coauthors/Partners

David Snyder, CSA Ocean Sciences, Inc.; Monica Clerio, Florida Museum of Natural History

Presentation Abstract

There is little if any published information on basic fish assemblage composition and diversity for the Lake Worth Lagoon (LWL). We have maintained a working list of fish species photographed in the LWL over the past decade. Most of the photographed species have come from the Blue Heron Bridges and Phil Foster causeway area. From the compilation of images contributed by cooperating diver-photographers coupled with our own observations from the area, which spans several decades, we can generally assess habitat associations, residency, seasonality, and overall diversity of the this portion of the lagoon.

We have documented over 270 species from 67 families. These tropical and temperate species can be broadly classified as having hard-bottom, soft-bottom, and pelagic affinities. Many of the species are those expected for the region and available habitats, whereas others are occasionals that settle in atypical habitat or depths. For some taxa the LWL serves as an important host for parts of their life histories and for others it likely represents an ecological trap.

The diverse and dynamic ichthyofauna of LWL is unique and should be protected as an environmental treasure. The area currently supports ecotourist diving and it would be wise to manage it as a no-take site. Monitoring the ecology of resident and transient fish species at the near-bridge sites provides insight into the health and management of the entire lagoon. The Florida Museum of Natural History currently is developing a LWL home page dedicated to the biodiversity of LWL.

Speaker Qualifications

George H. Burgess is Director of the Florida Program for Shark Research and Coordinator of Museum Operations at the Florida Museum of Natural History, University of Florida in Gainesville, Florida. He received his undergraduate education at the University of Rhode Island and did graduate work at University of North Carolina and the University of Florida. George has studied fishes throughout the southeastern United States, Gulf of Mexico, and Caribbean region.

The History, Access, and Economics of the Intracoastal Waterway in Palm Beach County

Public Use and Outreach

Presenter

Mark Crosley, Florida Inland Navigation District

Assistant Executive Director

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Coauthors/Partners

David Roach, Executive Director, Florida Inland Navigation District

Presentation Abstract

Despite its aesthetic, environmental, and recreational attributes, the Lake Worth Lagoon faces competition for funding and other resources, especially in tight budget years. FIND contracts regular economic studies throughout its 12-county district to quantify the value of a properly maintained Intracoastal Waterway. The latest study (2011) indicates \$1.26 billion in business volume, \$297.5 million in personal income, 5,879 jobs, \$53.3 million in tax revenue. The Lake Worth Lagoon and Intracoastal Waterway are good business.

Marine Life Found in Lake Worth Lagoon

Public Use and Outreach

Presenter

Anne DuPont, Scientific Diver and Underwater Photographer

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akdupont@bellsouth.net

Presentation Abstract

The Lake Worth Lagoon area between Riviera Beach and Singer Island is fast becoming a mecca for “muck” divers from around the world. This presentation will take you on a photographic journey showcasing the diversity and uniqueness of the underwater marine life found in and around the Blue Heron Bridge -- both common and unusual. Some of the species normally seen on every dive include several octopus species, opisthobranchs, mantis shrimps and other various invertebrates and endocrines. Also included will be rare species photographed throughout the Lagoon. This area of the Lagoon is especially important to tourism because recreational divers contribute to our economy by staying in hotels, eating in restaurants, and shopping at retail shops.

Speaker Qualifications

Anne DuPont is a Scientific Diver and Underwater Photographer specializing in opisthobranchs. She is also a Museum Associate in Malacology at the Natural History Museum of Los Angeles County and a volunteer scientific diver and underwater photographer for the “Flatworm Wrangler’s Team” at the University of New Hampshire. She is one of the co-authors of *Caribbean Sea Slugs*, a field guide to the opisthobranch mollusks from the tropical northwestern Atlantic. Her photos have been published in numerous books, magazines, and educational DVDs. She has been diving in the Lagoon for over 20 years, and is very knowledgeable on underwater life found in the Lagoon. Anne is a volunteer with the Florida Natural History Museum and is a Regular-Service volunteer with the Florida Fish & Wildlife Research Institute. In order to educate the public on the uniqueness of the area around the Blue Heron Bridge, Ms. DuPont is on the Speaker’s Bureau for the Lake Worth Lagoon Initiative. The Bureau provides lectures on the Lake Worth Lagoon to interested groups, and she speaks specifically to marine life found in the Lagoon.

Exploring the Creative Connection Between Science and Art

Public Use and Outreach

Presenter

Linda Emerson, Linda Emerson Interpretive Design

President

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Coauthors/Partners

Christine Thrower and Leah Rockwell, City of West Palm Beach Parks and Recreation Department

Presentation Abstract

The West Palm Beach Waterfront Interpretive Installation is an imaginative new addition to the City's highly successful urban waterfront revitalization. Recognizing the valuable opportunity to reach thousands of residents and visitors who enjoy the waterfront and inform them about the Lake Worth Lagoon and the area's cultural heritage, City staff contacted Linda Emerson, a multi-disciplinary design professional whose creative work softens the lines between science and art. Originally a signage project, under her direction it evolved to become an interpretive installation where messages are conveyed not only in words and images, but in shapes, materials, colors and textures evocative of the marine environment. Today, eight sculptural elements holding porcelain ceramic interpretive panels are tucked into the existing landscape and at the base of each City dock- to enjoy, to learn and to reconnect waterfront visitors to the Lagoon.

Much has been accomplished in our effort to restore health to Lake Worth Lagoon and its human community yet there is much more to be done. As we learn more details of our world through science and technology, it is useful to ask: How do we translate that knowledge to wisdom? To wise choice and wise action? How do we embrace the complimentary nature of science and art? The interpretive installation was created with this touchstone: part of the way back to a healthy Lagoon is through a clear perception of the Lagoon. The interpretive elements invite visitors to expand their view beyond their immediate experience and delve beneath the tidal waters of the lagoon. And to view the City and local geography through time, provoking an expanded perspective of what we experience in the present.

Speaker Qualifications

Linda Emerson is a published writer, artist, environmental educator and activist. Her work is based on her conviction that restoring connection to the Earth and each other is the path toward healing our planet and ourselves. Earning a degree in Physical Geography from the University of Delaware in 1975, Ms. Emerson trail-blazed in the emerging environmental field in Palm Beach County over the last 30 years- developing some of the first environmental field trips for Palm Beach County School Board, starting the first marine science department at the Science Museum of West Palm Beach and designing multi-disciplinary interpretive projects for entities such as The Nature Conservancy and the City of West Palm Beach. She was FLDEP permitted and led sea turtle programs for 4 years. Ms. Emerson collaborated on the design team for Green Cay Wastewater Treatment Wetlands and recently completed the West Palm Beach Waterfront Interpretive Installation. For 12 years she has focused on the potential of collaborative design to fulfill this goal. Her work creates new perspectives and engages people in caring and taking action. With her expanded vision, she has partnered with professionals in the fields of landscape architecture, ecological restoration and public art.

Recreational Angler Data: Creating the First Viable Database {POSTER}

Public Use and Outreach

Presenters

Brett Fitzgerald and Holly Andreotta, The Snook & Gamefish Foundation

Brett Fitzgerald, Managing Director - (561) 707-8923; brett@snookfoundation.org;

Holly Andreotta, Board of Directors - (352) 302-9072; holly@snookfoundation.org

Presentation Abstract

Many of South Florida's gamefish perished as a result of the extended cold snap of January, 2010, including *Centropomus undecimalis*, the native common snook. Florida's Fish and Wildlife Research Institute (FWRI) biologists, who are responsible for recommending commercial recreational harvesting laws, were unable to fully assess the impact on the snook population. Understanding that the state had finite resources, the Snook & Gamefish Foundation (SGF) offered to assist with the monumental task.

Teamed up with FWRI, Texas Wildlife Parks & Recreation and a handful of individual biologists and statisticians, the Snook & Gamefish Foundation developed a recreational angler data collection warehouse called the Angler Action Program (AAP), which focused on snook-directed fishing trips. A standardized method of collecting time spent fishing, location of fishing trip, and number and size of fish caught was developed and introduced. SGF volunteers engaged anglers in a state-wide education campaign. Many anglers were very concerned about the status of snook populations and were eager to participate in the AAP. Within a few months preliminary data were collected and processed. The results were consistent with anecdotal reports of heavy fish kills on the west coast and in the ENP. Further, through the AAP, FWRI scientists gained confidence in the ability of recreational anglers' ability to contribute meaningful data to fisheries management.

For the first time in history, recreational anglers are able to contribute to fisheries management at the state level. The AAP was initially expanded to include 5 more inshore species of gamefish, then (at the request of FWC) expanded again to include all species of fish. Recreational angler data input continues to grow at rapid rates as a smartphone app was developed and highly promoted. Over time, the AAP promises to show powerful trending data, assist biologists with locating essential fish habitats, and continue to supplement fisheries management intelligence both at the state and national level.

The volume of data collected from Palm Beach County, especially within the Lake Worth Lagoon, has been one of the largest data collection points. To continue this trend, SGF now hopes to encourage more local anglers to use the AAP. In addition, SGF seeks those already using the program to mentor new users in the Lake Worth Lagoon. Increasing the data set will help demonstrate the effectiveness of habitat restoration projects within the lagoon by tracking local fish population dynamics.

Presenter Qualifications

Brett Fitzgerald presently serves on the Snook and Gamefish Foundation's executive team as their Managing Director. He served as Chairman of the Board of the Snook and Gamefish Foundation from 2008-2011, as Regional Director (Southeast) from 2005-2007, and as a volunteer for almost 10 years prior. He is a contributing editor to Florida Sportsman Magazine and holds a Master's in Communication Sciences and Disorders from the University of South Florida. Brett was chosen as Snook and Gamefish Foundation's 2009 Person on the Year, for his accomplishments on behalf of inshore fishing, and in that year he also completed the book, *Sportsman's Best: Snook*.

Holly Andreotta has served on the Board of Directors of the Snook and Gamefish Foundation since 2011. She has a vast understanding of the role Florida's wetland habitats play in the overall health of our state. Holly has 10 years of experience working with a variety of governmental agencies in the environmental field. Currently, Holly is an Senior Environmental Analyst with the SFWMD handling all aspects of permit compliance on Everglades and large scale Restoration Projects, including permitting, policy, coordination, construction, operations, and maintenance activities throughout the District's footprint, mainly focusing on the Storm Water Treatment Areas (STA's).

An Assessment of Recreational Boating Activity in Palm Beach County

Public Use and Outreach

Presenter

Jay Gorzelany, Sea To Shore Alliance

Research Scientist

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Presentation Abstract

Palm Beach County faces the challenge of balancing coastal development and recreational use with the conservation and protection of its natural resources. A better understanding of recreational boating patterns in Florida coastal waters has become a key element in the conservation and management of the Florida manatee. This study provides the first comprehensive evaluation of recreational vessels utilizing Palm Beach County coastal waters. A series of low-level aerial surveys of Palm Beach County coastal waters was conducted. An electronic image-stabilizing camcorder was used to record all vessels in-use while flying a standard flight path. All vessels in-use were then hand-plotted directly onto a series of high-resolution digital orthophotos using ArcGIS 9.3 software. Attributes for each vessel surveyed included the location, date and time, type, class, size, activity, qualitative speed, and direction of travel.

Data from 6,211 vessels were examined from 16 aerial survey flights conducted over a one-year period. Recreational boat use varied significantly both spatially and temporally. Vessel use increased by greater than 4X during weekend surveys. Greater than 50% of all observed vessels were located within one mile of the four tidal inlets in the Palm Beach County. Along with the identification of popular boating destinations, important travel corridors were also identified. Information on recreational boating use in Palm Beach County will serve as an effective management tool from which future waterways management decisions can be made. These data may also serve as a benchmark from which future studies may be compared. Newly-available data on manatee use may be merged with boating data to evaluate the relative risk of interaction between manatees and boats. From these analyses, more effective management and conservation strategies can be developed.

Speaker Qualifications

Mr. Gorzelany is a graduate of the Florida Institute of Technology, with a Master's Degree in Bio-Environmental Oceanography. He currently directs Sea to Shore Alliance's Protected Species Monitoring Program. For more than 25 years, Mr. Gorzelany worked as senior biologist for Mote Marine Laboratory where he served as principal investigator for numerous research projects involving environmental assessment, coastal ecology, and marine mammal ecology. He has conducted more than 2,000 hours of low-level aerial surveys, and is a participant in the annual statewide manatee census. He is the author / co-author of numerous technical reports and peer-reviewed scientific publications, and is the principal author of the Sarasota County Manatee Protection Plan. He has more than thirty years of experience in marine and estuarine aquatic research.

Using Technology to Connect the Outdoors to the Classroom

Public Use and Outreach

Presenter

Janice Kerber, Friends of MacArthur Beach State Park

Director of Education

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Presentation Abstract

John D. MacArthur Beach State Park participates in a grant program with the Palm Beach County School District to bring several local Title 1 schools to the Park for two field trips in one school year. The Park maintains communication with the students through a Blog established by the school district as well as a monthly vodcast presentation to extend the learning process. Utilizing the Palm Beach County School District's vodcast presentation system, we are able to connect to dozens of classrooms. Teachers log onto to the system using a computer link enabling us to be live in the classrooms. Following our presentation, the children are able to type questions for the presenters to answer. During the 2011-2012 school term, we were able to provide a field trip experience to approximately 3,500 students. Topics include Beach and Dune Dynamics, Invasive Species, Manatees, Life Along the Mangroves, Birds, and Sea Turtles.

Our goal is to provide the children with the knowledge they need to become responsible stewards of the environment. Although we know the best way for the children to learn about the world around them is to explore natural areas, we also know we can't bring the entire County to our Park. The partnership between John D. MacArthur Beach State Park and the Palm Beach County School District, with the use of technology, has provided the Park the opportunity to extend our outreach to thousands of children in Palm Beach County.

Speaker Qualifications

Ms. Kerber is a native of Palm Beach County. She has taught for the PBC School District for 20 years. For the last seven years of her teaching, she served as a science lab teacher providing hands-on science instruction to kindergarten through fifth grade students. For six years, Ms. Kerber worked for the Florida Fish and Wildlife Conservation Commission as the Camp Director at the Everglades Youth Conservation Camp. Her current position is Director of Education at John D. MacArthur Beach State Park, where she writes and facilitates the school programs and summer camps.

Palm Beach County's Reef Mobile Map {POSTER}

Public Use and Outreach

Presenter

Matthew King, Palm Beach County Department of Environmental Resources Management

Environmental Program Supervisor

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Partners

Kavitha Kolahalam, Kelly Ratchinsky and Krassimir Stavrev, Palm Beach County Information Systems Services Janet Phipps and Joyce Moody, Palm Beach County Department of Environmental Resources Management

Presentation Abstract

Staff at Palm Beach County Department of Environmental Resources Management (ERM) was tasked with creating a mobile application that displayed the location and pertinent information for artificial and natural reefs located off the County coast. The reef business data (which included geographic coordinates) was kept in a Microsoft Access database, while the actual geographic information for use in Geographic Information System (GIS) applications was located in a separate Palm Beach County GIS Enterprise (Oracle Spatial) database. Any updates to the Access database required a separate manual update to the GIS database. This resulted in a delay of the GIS data and increased the opportunity for errors.

It was apparent that any mobile application would require the linking of the reef business data to the Enterprise GIS data. A decision was made to move the business data into ERM's existing Environmental Enterprise Database (EEDB) which is an Oracle database with a web-based front-end. With ERM oversight, the County's Information Systems Services (ISS) created the reef modules in EEDB while the ISS GIS group developed a script that automatically updates the Enterprise GIS database when reef data is entered or updated in EEDB. During this time it was decided to use the Environmental Systems Research Institute's (ESRI) ArcGIS mobile app. The ArcGIS app has the ability to connect to an ArcGIS Server and display the maps residing there. Palm Beach County has an ArcGIS Server. The process involved the creation of a map of artificial reefs using the ArcGIS desktop app. The data in the map is pulled from the County Enterprise GIS database and EEDB. This map is then placed on the ArcGIS server. Next, the map on the server is connected to ArcGIS.com where a user has the ability to share the map on the ArcGIS app. Since the ArcGIS app and ArcGIS.com account are free and by utilizing the County's existing ArcGIS server, the creation of the mobile map did not require the outlay of additional expenses (outside of staff time).

Presenter Qualifications

Matthew King has been with Palm Beach County Department of Environmental Resources Management since 2000 and has been in his position as Environmental Program Supervisor since 2005. Matthew graduated from Florida State University with a B.S. in biology. His primary duties involve performing GIS/GPS projects, biological monitoring and compliance, and Oracle database management and development. Matthew is also a Certified Arborist and serves as Legislative Committee Chair for the Florida Exotic Pest Plant Council (FLEPPC).

Update: 2002 Palm Beach County Boating Needs Assessment Study

Public Use and Outreach

Presenter

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Presentation Abstract

In 2002, the Parks and Recreation Department produced a Boating Needs Assessment Study for the County as directed by the Board of County Commissioners. An ad hoc committee of individuals representing boating interests in Palm Beach County was convened to address the public's growing concern over the shortage of saltwater boat launching facilities and car/trailer parking spaces in the County.

The Boating Needs Assessment Study analyzed the current inventory of boating facilities, current and future boating needs and developed recommendations to address these needs. The study included eight findings and six recommendations to address the current and future needs of the boating public. The study identified the need for four new boat launching facilities to access the Lake Worth Lagoon and the four ocean inlets and to provide 500 new car/trailer parking spaces. As a result of study's findings, the County implemented a development program to address boating needs, and a \$50 Million Waterfront Access and Preservation G.O. Bond Issue was passed by voters in a 2004 countywide referendum.

Over the past 10 years the County has identified and implemented a successful capital program to address boating needs identified in the study. As a result new boat ramps and parking facilities have been added at County and municipal waterfront parks providing additional public recreational boating opportunities in the Lake Worth Lagoon.

Speaker Qualifications

Jean Matthews is a Senior Planner with Palm Beach County Parks and Recreation Department and a graduate of University of Florida in Real Estate and Urban Planning. Jean's responsibilities include writing capital grants, zoning reviews and approval and dealing with a myriad of real estate issues. Jean is an avid boater, snorkeler and fisherman.

Youth and the Future of Lake Worth Lagoon

Public Use and Outreach

Presenter

**Jonathan Mayer, University of Florida/Institute of Food and Agricultural Sciences,
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Presentation Abstract

The success of the Lake Worth Lagoon Initiative depends upon children. It is critical that we provide positive engagement strategies for youth to develop their awareness, understanding and appreciation of the environmental, social and economic benefits of the Lagoon. Youth in 4-H are 3.4 times more likely to actively contribute to their communities when compared with youth who do not participate in 4-H (Lerner et al, 2012). Research also shows that young people, who engage in high-quality service learning, show an increase in awareness of community needs, believe that they can make a difference, and are committed to service now and later in life (Billig, 2000).

Through a series of hands-on activities and analysis of case studies, University of Florida/IFAS Cooperative Extension Service will introduce participants to a range of resources and techniques that utilize experiential learning and placed-based education as tools for developing life skills while engaging children (grades K-12) in the protection and enhancement of environmental resources such as the Lake Worth Lagoon. Young people who are actively engaged in environmental education and stewardship opportunities will develop valuable life skills and continue to make positive contributions towards the health of Lake Worth Lagoon as adults.

Speaker Qualifications

Jonathan Mayer has 13 years of experience developing county, state and national environmental education and youth development programs with nonprofit organizations, universities, and state and federal agencies such as Oregon Department of Forestry, US Forest Service, Bureau of Land Management and US Fish and Wildlife Service.

Statistical Analysis of Historic Recreational Fishing Catch Rates in Lake Worth Lagoon Using the Historic Fishing Records of the West Palm Beach Fishing Club

Public Use & Outreach

Presenter

**Manuel McIlroy, Ph. D. Student,
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Presentation Abstract

Overfishing and habitat degradation are believed to be major causes of significant decreases in economically important gamefish species all over the world. However, quantitative evidence of this decrease is very limited. The purpose of this study is to perform a quantitative analysis of historic recreational catch rates within the Lake Worth Lagoon (Lagoon) system over the past 50 years. Recreational fishing catch data was collected from historic fishing records donated by the West Palm Beach Fishing Club. Statistical analysis was performed using a one-way ANOVA with contrasts. ANOVA contrasts were utilized in order to quantitatively compare decadal recreational catch rates from 1960 to 2010. A better understanding of the historic quantitative trends in recreational fishing catch rates will provide very useful information to fisheries managers when deciding on appropriate measures to insure sustainable fish yields within the Lagoon. It should also be helpful in assessing fishing pressures on gamefish species within the Lagoon, which should subsequently aid in deciding upon a plan for appropriate fishing restrictions, if needed.

Speaker Qualifications

Mr. McIlroy is a Ph. D. student within the Geosciences Department of Florida Atlantic University. This study is a component of a larger study I will be performing for my dissertation, which will examine the historical trends in the habitat suitability in Lake Worth Lagoon, as well as forecast the impacts of climate change on its future habitat suitability.

Manatee Protection in Palm Beach County: Partnering for Success

Public Use and Outreach

Presenters

Dr. Thomas Reinert, Florida Fish and Wildlife Conservation Commission and Alessandra Medri, Palm Beach County Department of Environmental Resource Management

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Alessandra Medri, Palm Beach County Department of Environmental Resource Management

Presentation Abstract

The Florida manatee (*Trichechus manatus latirostris*) is a federally and state-listed endangered species protected by several federal and state laws. The Florida Fish and Wildlife Conservation Commission (FWC) is the lead state agency dedicated to manatee protection and research in Florida and FWC biologists and officers work to rescue, recover, and protect these iconic animals. In 1989, the Florida Governor and Cabinet directed 13 "Key" counties to develop manatee protection plans aimed at protecting manatees and the habitats deemed critical to their survival. Since 2008, as part of its Manatee Protection Plan, Palm Beach County has funded additional on-water law enforcement in the County's waterways. Ongoing efforts include collaboration with multiple law enforcement agencies to increase patrols in manatee protection speed zones.

Since the program was initiated in 2008, officers from ten law enforcement agencies have logged more than 8,850 hours in addition to their regular patrols, made 13,600 educational contacts, and issued 828 manatee zone citations. The increased law enforcement presence helps improve speed zone compliance thereby reducing risks to manatees and boaters. The partnership also provides specialized training for officers to assist FWC with the rescue of manatees injured by boats or that are in distress due to cold temperatures or other factors. For the past four years, the Manatee Law Enforcement Program has played a critical role in the FWC Manatee Stranding and Rescue Program, increasing capacity and reducing response time.

Speaker Qualifications

Dr. Tom Reinert is a Research Administrator with the Florida Fish and Wildlife Conservation Commission, Tequesta Field Laboratory. In addition to running the field lab, Dr. Reinert supervises field staff at four field stations statewide in FWC's manatee rescue and carcass recovery program. Dr. Reinert has been with FWC for over seven years.

The West Palm Waterfront - Embracing Our Past and Our Future

Public Use and Outreach

Presenter

Christine Thrower, City of West Palm Beach

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Coauthors/Partners

Linda Emerson, Linda Emerson Interpretive Design

Presentation Abstract

From our early history, West Palm Beach used the waterfront as a vital link for transportation, community gathering and ambiance. City Park was a central gathering point that disappeared after a time. Growth and development led West Palm Beach away from its waterfront. Recommendations by the Urban Land Institute recommended opening up the vista and reclaiming the waterfront. By relocating the City library, we effectively "uncorked the bottle" and the waterfront has come alive once again. Intense community partnerships created the plan that would relocate Flagler Drive to create more immediate and welcoming access to the Lake Worth Lagoon. Creating projects that would incorporate beauty, economic sustainability and preservation of natural resources guided our development. Designing park space that would welcome the public to events and community celebrations was essential. Creating a space for the public to access West Palm from the water led to the inclusion of our new docks.

The result is a \$30 million investment in our past that has led us to our future. West Palm's waterfront is alive and bubbling with activity. Boaters use the docks and tens of thousands of visitors come down every year. The installation of interpretive signage allowed us to share our project while defining the Lake Worth Lagoon's importance in our community's past and future. "The Waterfront" is now a recognizable identifier for West Palm Beach. The investment in our Waterfront was an important part of our downtown's continued revitalization. We are realizing greater attendance to our events and activities, recognition for West Palm Beach is growing and the area is becoming more popular. Our initiative to showcase our waterfront has educated residents and visitors alike of the importance of this valuable resource and our need to showcase it and use it for recreation, education and just plain fun.

Speaker Qualifications

Christine Thrower has been Director of the Department of Parks and Recreation for the City of West Palm Beach for the past seven years. Her responsibilities include the maintenance, programming and activation of the West Palm Beach Waterfront. Completed three years ago, her team develops programs and activities to engage the public. During the past three years, she has guided the effort to create new events and expand existing ones. Under her direction, the waterfront maintenance team keeps docks, hardscape and landscaped areas in beautiful condition, showcasing the city's efforts to encourage greater public use of the Waterfront. She coordinates with business entities that want to offer even greater opportunities to recreate on the waterfront.

Lake Worth Lagoon: Discover a Local Treasure {POSTER}

Public Use and Outreach

Presenters

Wendy Spielman-King and Kaylin Markman, School District of Palm Beach County

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Coauthors/Partners

Palm Beach County Department of Environmental Resources Management; Palm Beach Post

Presentation Abstract

The Departments of Elementary and Secondary Science Curriculum are committed to developing, providing and supporting educational programs which foster an awareness and appreciation of the natural world, promote an understanding of environmental problems and solutions, and instill a sense of responsibility toward habitats around the world. The Lake Worth Lagoon - Discover a Local Treasure Newspapers in Education project strives to enhance and promote environmental education through the exploration, conservation, and preservation of Palm Beach County's largest estuary, Lake Worth Lagoon. This unique educational product was designed specifically for use in 5th and 8th grade science classrooms. Over 30,000 publications were printed annually and delivered to elementary and middle schools for the past three school years.

Implementation of this curriculum in elementary and middle schools throughout Palm Beach County will empower the next generation of environmental leaders to develop a greater understanding of the ecology of the lagoon, participate in its protection and restoration, and connect classroom lessons to real world issues. Teacher feedback received during the evaluation process included: Terry Williams, Palm Springs Middle found the ecology information most useful. He "...tied the ecology directly to our science standards and curriculum." Karin Eller, Waters Edge Elementary, said she "loved the lessons and used the magazine as part of my reading group."

Presenter Qualifications

Wendy Spielman King is the K-12 Science Manager for the School District of Palm Beach County. She also served as the District's Secondary Science Program Planner, Elementary Science Specialist, and Southeastern Consortium for Minorities in Engineering (SECME) District Coordinator. Prior to her work at the district level, Ms. Spielman King taught science for 10 years in the gifted program at Lantana Middle School. Kaylin Markman is a Secondary Science Specialist for the School District of Palm Beach County. Before working at the district level, Ms. Markman served as a Science Coach and taught science to gifted students in grades 6 through 8. In addition, she has held the positions of Science Department Instructional Leader, Science Fair Coordinator, Lead Technology Teacher, and Academic Games Coach.

South Cove Natural Area Teacher Kits {POSTER}

Public Use and Outreach

Presenter

Amanda Zachritz, City of West Palm Beach

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Coauthors/Partners

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Presentation Abstract

Students need to experience hands-on and experiential learning in order to retain information and make it more meaningful. The idea is to make it easy for teachers to take a group of students to the new South Cove Natural Area in West Palm Beach and have on-site lesson plans. Our office created a backpack that contains materials, lesson plans, and resources that can be used in the classroom and on-site. These packs are available for check-out at the Mandel Public Library of West Palm Beach. Having the kits easily accessible at the Library with no associated costs will allow teachers to integrate an on-site visit to this beautifully constructed project at the South Cove Natural Area.

Speaker Qualifications

Amanda Zachritz is a Sustainability Program Coordinator for the City of West Palm Beach Office of Sustainability. Her goals with the City are to reach out to the community and the local teachers in West Palm Beach by creating programs, kits, and sharing resources that will allow them to apply water and energy conservation measures in their daily lives. She holds an undergraduate degree in Ecology & Evolutionary Biology, as well as a Masters Degree in Education and a Master's Degree in Biology.