BASIS 6

Bay Area Scientific Information Symposium

Photo by Rick Schwartz

NAVIGATING CHANGING TIDES

Addressing New Challenges with Effective Science and Management

Tampa Bay Estuary Program

Tampa Bay Regional Planning Council
ESTABLISHED 1962

USF St. Petersburg University Student Center
200 6th Avenue South | St. Petersburg, FL
September 28-30, 2015

BASIS 6
Bay Area Scientific Information Symposium

NAVIGATING CHANGING TIDES

Addressing New Challenges with Effective Science and Management

Since its inception in 1982, BASIS has provided a forum for sharing state-of-the-art research on Tampa Bay and its watershed. The theme of the 6th Bay Area Scientific Information Symposium, *Navigating Changing Tides*, features work that explores the 21st century dimensions of environmental challenges and the innovative and practical strategies devised by regional researchers and resource managers to address them.

Presentations are organized around four primary session topics:

Coastal Connections

Explores offshore and near shore interactions between marine resources in the Gulf of Mexico and Tampa Bay; the interface between the natural environment and built environment; linkages between the environment and the economy; and public engagement in bay protection and restoration efforts.

Practical Applications of Environmental Management and Policy

Focus on the regulatory frameworks governing restoration and management activities; watershed management planning; habitat restoration techniques; and lessons learned.

Emerging Issues, Technology & Methods

Highlights several challenges facing Tampa Bay, including harmful algal blooms, sediment contamination hot spots, microplastics and other contaminants of emerging concern; also looks at how new mapping technologies and restoration techniques can be used to improve resource management.

Climate Change

Discusses the potential effects of a changing climate on an urbanized estuary, with special attention to habitat migration, sea level rise, salinity regimes, rainfall patterns and ocean acidification.

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SCHEDULE AT A GLANCE

Day 1 (September 28, 2015)		Day 2 (September 29, 2015)		Day 3 (September 30, 2015)	
8:00 AM		8:00 AM	Registration Opens	8:00 AM	
8:15 AM	Registration Opens	8:15 AM	Breakfast	8:15 AM	Registration Opens
8:30 AM	Breakfast	8:30 AM	Emerging Issues: Tampa Bay Management	8:30 AM	Breakfast
8:45 AM		8:45 AM		8:45 AM	
9:00 AM	BASIS 6 Opening Remarks	9:00 AM		9:00 AM	
9:15 AM		9:15 AM	Emerging Technology & Methods: Habitat Management	9:15 AM	Coastal Connections: Bay Resources & Community Nexus
9:30 AM	Coastal Connections: Bay Resources & Community Nexus	9:30 AM		9:30 AM	
9:45 AM		9:45 AM	Q&A	9:45 AM	
10:00 AM		10:00 AM	Break	10:00 AM	
10:15 AM	Q&A	10:15 AM	Emerging Technology & Methods: Habitat Management	10:15 AM	Q&A
10:30 AM	Break	10:30 AM		10:30 AM	Break
10:45 AM		10:45 AM		10:45 AM	
11:00 AM	Practical Applications for Management: Tampa Bay Light Environment & Seagrasses	11:00 AM	Q&A	11:00 AM	Climate Change: Mitigating Climate Change Impacts in Tampa Bay
11:15 AM		11:15 AM	Practical Applications of Environmental Management & Policy: Habitat Management	11:15 AM	
11:30 AM		11:30 AM		11:30 AM	
11:45 AM		11:45 AM		11:45 AM	
12:00 PM	Q&A	12:00 PM	Q&A	12:00 PM	Q&A
12:15 PM	Lunch Begins	12:15 PM	Lunch Begins	12:15 PM	Lunch Begins
12:30 PM	RESTORE Act Panel Discussion/Presentations	12:30 PM	WLERA	12:30 PM	Community Connections / Student Awards
12:45 PM		12:45 PM		12:45 PM	
1:00 PM		1:00 PM		1:00 PM	
1:15 PM		1:15 PM	Break	1:15 PM	Break
1:30 PM	Break	1:30 PM	Practical Applications of Environmental Management & Policy: Meeting Regulatory Requirements	1:30 PM	
1:45 PM		1:45 PM		1:45 PM	Climate Change: Management Implications Presentations
2:00 PM	Coastal Connections: Watershed to the Bay to the Gulf	2:00 PM		2:00 PM	
2:15 PM		2:15 PM	Q&A	2:15 PM	
2:30 PM		2:30 PM	Break	2:30 PM	Q&A
2:45 PM	Q&A	2:45 PM		2:45 PM	
3:00 PM	Break	3:00 PM	Practical Applications of Environmental Management & Policy: Watershed Management	3:00 PM	Climate Change Panel: Communicating the Science
3:15 PM		3:15 PM		3:15 PM	
3:30 PM	Coastal Connections: Watershed to the Bay to the Gulf	3:30 PM		3:30 PM	Break
3:45 PM		3:45 PM	Q&A	3:45 PM	
4:00 PM	Q&A	4:00 PM	Poster Social	4:00 PM	BASIS 6 Synthesis
4:15 PM	Day 1 Ends	4:15 PM		4:15 PM	
4:30 PM		4:30 PM	Day 2 Ends	4:30 PM	
4:45 PM		4:45 PM		4:45 PM	
5:00 PM	Happy Hour at 3 Daughters Brewery	5:00 PM	Dinner Event Featuring Jeff Klinkenberg	5:00 PM	Symposium Ends
5:30 PM		5:30 PM		5:30 PM	
6:00 PM		6:00 PM		6:00 PM	

BASIS 6
Bay Area Scientific Information Symposium

AGENDA

DAY 1 (September 28, 2015)

Start	Session	Presenter	Title
8:30 AM	Registration Opens		
8:30 AM	BREAKFAST		
8:45 AM			
9:00 AM	BASIS 6 Opening Remarks: Jackie Dixon, Dean USF CMS		
9:15 AM			
9:30 AM	Coastal Connections: Bay Resources & Community Nexus (15minP) *Lindsay Cross*	Holly Greening *hgreening@tbep.org*	Incorporating valuation metrics into long-term restoration goals in Tampa Bay
9:45 AM		Jennifer Shafer *jennifer@shafer-consulting.org*	Innovation in Collaborative Ecotourism
10:00 AM		Nanette O'Hara *ohara@tbep.org*	Be Floridian: Using Social Marketing (and a Plastic Flamingo) to Reduce Fertilizer Use
10:15 AM		Q&A	
10:30 AM	BREAK		
10:45 AM	Practical Applications for Management: Tampa Bay Light Environment & Seagrasses (15minP) *Ed Sherwood*	Cary Lopez *cary.lopez@myfwc.com*	The role of seedbeds in Pyrodinium bahamense blooms in Tampa Bay
11:00 AM		Jennifer Cannizzaro *jpatch@mail.usf.edu*	Light absorption properties of algal blooms in Old Tampa Bay: Implications for management
11:15 AM		Roger Johansson *johanssonjor@gmail.com*	Long-term underwater light climate variation and trends of submerged seagrass abundance in Tampa Bay, Florida: with a discussion of phytoplankton and CDOM interactions
11:30 AM		Kristen Kaufman *kristen.kaufman@watermatters.org*	Navigating the road to recovery: a spatial examination of how Tampa Bay achieved its seagrass restoration target
11:45 AM		Keith Fischer *Keith.Fischer@MyFWC.com*	Seagrass restoration success in Tampa Bay and nekton community structure: build it and the fish will come
12:00 PM		Q&A	
12:15 PM	LUNCH		
12:30 PM	RESTORE Act *Rob Brown*	Holly Greening *hgreening@tbep.org* Andy Squires *ASquires@pinellascounty.org* Doug Robison *drobison@esassoc.com*	Discussing Implementation of the RESTORE Act at State and Local Level
12:45 PM			
1:00 PM			
1:15 PM			
1:30 PM	BREAK		
1:45 PM	Coastal Connections: Watershed to the Bay to the Gulf (15minP) *Ryan Moyer*	Ryan Moyer *ryan.moyer@myfwc.com*	Distribution and fluxes of dissolved organic carbon and trace elements in tidal rivers of the Tampa Bay Estuary
2:00 PM		Anthony Janicki *tjanicki@janickienvironmental.com*	Old Tampa Bay Integrated Model System
2:15 PM		Mark Luther *mluther@usf.edu*	Changes in Residence Time due to Large-Scale Infrastructure in a Coastal Plain Estuary
2:30 PM		Robert Weisberg *weisberg@usf.edu*	A West Florida Coastal Ocean (Circulation) Model
2:45 PM		Q&A	
3:00 PM		BREAK	
3:15 PM		Brianna Michaud *bmichaud@mail.usf.edu*	The Influence of Anthropogenic and Physical Effects on Zooplankton and Hyperbenthos Community Structure: A Comparison of West-Central Florida Estuaries[S]
3:30 PM		Sheri Huelster *sheri.huelster@cardno.com*	Comparison of Isotope-Based Pathways with Groundfish Community Structure in the Eastern Gulf of Mexico
3:45 PM		Brock Houston *brockhouston@mail.usf.edu*	Baseline information for Otolith Microchemistry Obtained from Pre-Columbian Middens[S]
4:00 PM		Q&A	
4:15 PM	Day 1 Ends		
4:30 PM	Happy Hour at 3 Daughters Brewery		
5:30 PM			
6:00 PM			
6:30 PM			

9:30 AM

INCORPORATING VALUATION METRICS INTO LONG-TERM RESTORATION GOALS IN TAMPA BAY

Holly Greening

The establishment of science-based environmental management goals is just the first step in what is typically a decades-long process to restore estuarine and coastal ecosystems. In addition to adequate monitoring and reporting, maintaining public interest, financial support and political will are crucial elements in sustaining progress towards goals. The local government and agency partners participating in the Tampa Bay Estuary Program have established numeric areal extent goals for seagrass, emergent coastal habitats and freshwater wetlands in the watershed, and water quality targets necessary to meet seagrass goals. Progress towards these goals are monitored and reported on a regular basis, and eagerly tracked by local governments, agencies and the environmental community. However, engaging the business community and the general public in understanding the value of restoring habitats and water quality, and encouraging their participation in maintaining forward progress has been challenging. Adding new metrics to convey the value of reaching long-term goals has proven an effective method for reaching previously unengaged elements of the community. Ecosystem services valuation, including nitrogen removal via denitrification, indicate that seagrass extent recovered over the last 20 years now generate nitrogen removal services equivalent to building a new wastewater treatment plant. An economic evaluation indicates that water quality and habitat improvements now support one of every five jobs in the Tampa Bay area and add $22B US per year, or 13% to the local economy. Economic valuation metrics provide important, and relevant, new tools for sustaining the community support necessary for successful attainment of long-term goals.

9:45 AM

INNOVATION IN COLLABORATIVE ECOTOURISM

Jennifer Shafer

Nature-based tourism on the Gulf Coast has experienced an unprecedented surge in popularity over the past five years, on par with arts-based tourism and far exceeding sports-based tourism. To meet this growing demand while protecting the natural resources that support it, the Science and Environment Council developed ECKO, a collaborative non-profit web-based business platform. It serves as the organizing hub for local ecotourism, providing international marketing and reservations for our unique ecotravel packages as well as ecotours from local guides. The Council offers five exclusive multi-day sustainable ecotours that combine the assets and destinations of member organizations, including "insider knowledge" about where to go and exclusive "behind the scenes" experiences. In parallel, a voluntary locally tailored education program is being developed to provide local guides assistance in implementing sustainable practices for their tours and the opportunity to use the platform to promote them. As a collaboration of leading science-based environmental organizations, the Council has extensive and unparalleled local environmental knowledge and expertise and is the natural organizing hub for sustainable ecotourism. ECKO will uniquely brand our Gulf Coast as an ecotourism destination, promote environmental stewardship and volunteerism, protect our natural and cultural heritage, and support sustainable economic development.

10:00 AM

BE FLORIDIAN: USING SOCIAL MARKETING (AND A PLASTIC FLAMINGO) TO REDUCE FERTILIZER USE

Nanette O'Hara and Sara Isaac

Residential runoff, including lawn fertilizer, is a significant source of nutrient pollution in Tampa Bay. The Tampa Bay region has the nation's strongest urban fertilizer ordinances, banning use and sale of nitrogen fertilizers in the summer. The "Be Floridian" social marketing campaign was developed to support the ordinances. Be Floridian is a replicable example of using both environmental and social science to identify a priority education need; analyze audiences, attitudes and barriers; and employ proven marketing techniques to address the problem. Be Floridian departs from traditional education and incorporates behavioral determinants, such as perceived social norms, to foster a permanent change in both fertilization practices and cultural attitudes about what constitutes an attractive landscape. 2015 marks the 5th and final year of the Be Floridian campaign, a partnership of Pinellas, Manatee and Sarasota counties, and the city of Tampa. Campaign tools included a website; print, outdoor and digital advertising; social media; and retail and community outreach. More than $350,000 has been invested -- excluding staff time– a significant commitment for an education effort funded largely by local governments. Pre-campaign marketing research included focus groups, demographic analysis and message testing. Program evaluation shows measurable changes in behavior regarding fertilizer ordinance knowledge and decreased fertilizer use among target audiences. This presentation will demonstrate how this successful model for non-traditional "government" environmental education can be applied to other environmental issues that could benefit from target audience behavior change.

10:45 AM

THE ROLE OF SEEDBEDS IN PYRODINIUM BAHAMENSE BLOOMS IN TAMPA BAY

Cary Lopez, Marci E. Maroth, Christopher G. Smith, David J. Karlen and Alina Corcoran

Habitat restoration and water quality improvements in Tampa Bay provide a success story in estuarine management. An exception to this story is Old Tampa Bay (OTB), a sub-estuary of Tampa Bay that has recovered more slowly than other bay segments. This lag, signified by missed water quality targets and declines in seagrass coverage, is due in part to recurring blooms of the dinoflagellate *Pyrodinium bahamense*. In this work, we use historical analysis, field observations, and laboratory experiments to uncover contributing factors to *P. bahamense* blooms. As part of its life cycle, *P. bahamense* produces resting cysts that settle to the seafloor, creating a reservoir that serves to seed future blooms. Sediment core data reveal that *P. bahamense* cysts predate observations of notable blooms -- indicating historical presence of *P. bahamense* at low levels in the phytoplankton community. In a single core from 2014, increases in accumulation of fine-grain sediment and organic matter correspond temporally to the emergence of recurring *P. bahamense* blooms. These results suggest that relatively recent physical and/or environmental changes may have led to conditions that favor bloom formation. Moreover, higher cyst abundance in surface sediments of OTB correlates with finer sediments and is co-located with bloom initiation. Laboratory experiments show that cysts can germinate over a range of conditions present in Tampa Bay, but that changes in environmental parameters, such as temperature, influence

germination rates. Together, our results suggest restoration strategies that consider cyst dynamics may improve recovery of OTB through mitigation of nuisance *P. bahamense* blooms.

11:00 AM

LIGHT ABSORPTION PROPERTIES OF ALGAL BLOOMS IN OLD TAMPA BAY: IMPLICATIONS FOR MANAGEMENT

Jennifer Cannizzaro, A.A. Corcoran, J.L. Wolny, C. Hu

Bio-optical models for estimating light attenuation coefficients, $K_d(\lambda)$, in marine and inland waters require knowledge of light absorption and scattering properties of optically significant constituents. For management purposes, these parameters are often derived empirically from standard water quality measurements (i.e., chlorophyll-*a* concentrations (Chl-a), color, turbidity). Global power-law functions for estimating phytoplankton absorption coefficients, $a_{ph}(\lambda)$, from Chl-a in marine and coastal waters often succeed because phytoplankton pigment composition and mean cell size, which control $a_{ph}(\lambda)$, change predictably over space and time. However, regional-tuning in estuarine and inland waters is often necessary because of dynamic hydrographic conditions which can impact nutrient and light regimes, promoting the dominance of variable phytoplankton groups.

Here, the effects of phytoplankton community shifts on $a_{ph}(\lambda)$ in Old Tampa Bay (Florida, USA) were examined using field measurements obtained at nine locations between June and December 2013. Chl-a ranged from 2.0 to 330.3 mg m^{-3}, with higher values typically observed in northern-central bay segments from July to October and associated with high concentrations (>10^5 cells l^{-1}) of the toxic dinoflagellate *Pyrodinium bahamense*. Spatiotemporal shifts in phytoplankton community composition as determined from High-Performance Liquid Chromatography (HPLC) pigment concentrations were found. Blooms dominated by diatoms, dinoflagellates, and chlorophytes were observed. Chlorophyll-specific phytoplankton absorption coefficients, $a^*_{ph}(\lambda)$, at 443nm and 675nm varied four-fold between *P. bahamense*- and chlorophyte-dominated populations with differences attributed mainly to cell size. Future refinements to existing bio-optical models for estimating $K_d(\lambda)$ in this region may need to consider phytoplankton type, especially during bloom events, to more accurately assess light penetration at depth for seagrass restoration efforts.

11:15 AM

LONG-TERM UNDERWATER LIGHT CLIMATE VARIATION AND TRENDS OF SUBMERGED SEAGRASS ABUNDANCE IN TAMPA BAY, FLORIDA WITH A DISCUSSION OF PHYTOPLANKTON AND CDOM INTERACTIONS

Roger Johansson

Seagrasses have successfully adapted to a submerged existence over the last 100 million years. The Tampa Bay basin has had a relatively stable sea level over the recent 3,000 years; allowing its seagrass to adapt to local underwater light conditions to ensure survival and healthy growth. A rapid change of underwater light climate that accompanied the human influenced water quality degradation during the early 80 years of the 20th century likely exceeded the seagrasses ability to adapt, thus providing cause for large seagrass losses that occurred during this period. Water quality and the under-water light climate improved in the early and mid-1980s following large reductions in nutrient pollution. Seagrass losses soon climaxed following the improvements; and a foundation had been created for a remarkable recovery of Tampa Bay, indicated by ongoing water quality improvements and a near continuous increase in seagrass acreage. In a historical perspective, the current Tampa Bay underwater light climate is now likely more similar to conditions that the Tampa Bay seagrass community adapted to during the several millennia prior to the period of eutrophication, as evidenced by long-term trends in field measured optically important water quality parameters and spectral-specific optical model predictions reported on herein. Results indicate that the long-term changes in chlorophyll has substantially affected light climate changes in all bay segments except LTB, specifically in wavelength ranges required for sustained seagrass growth. This indicates that the reduction of phytoplankton biomass during the recent 30 years has been an important driving force of the ongoing Tampa Bay seagrass recovery.

11:30 AM

NAVIGATING THE ROAD TO RECOVERY: A SPATIAL EXAMINATION OF HOW TAMPA BAY ACHIEVED ITS SEAGRASS RESTORATION TARGET

Kristen Kaufman

The Southwest Florida Water Management District (District) documented that Tampa Bay supports 40,295 acres of seagrasses in 2014. This marks the successful achievement of the Tampa Bay Estuary Program's 38,000 acre seagrass restoration target. Spatial analyses and creation of seagrass persistence maps provide insight into how seagrass expansion occurred over the last three decades. Persistence maps, documenting the number of years a particular area contained seagrass, show there are portions of Tampa Bay where the presence of seagrass is only documented intermittently during the 27-year mapping program. Examples such as Mobbly Bay, where seagrasses were documented discontinuously over time and experienced gains from 2012 to 2014, will be reviewed. These ephemeral seagrass areas will be further investigated to determine if localized management actions could provide any benefits for sustaining these resources.

11:45 AM

SEAGRASS RESTORATION SUCCESS IN TAMPA BAY AND NEKTON COMMUNITY STRUCTURE: BUILD IT AND THE FISH WILL COME

Keith Fischer

Seagrass growth and distribution is influenced by many interrelated factors, including light penetration, nutrient levels, salinity, freshwater inflow, turbidity, and type of substrate. Furthermore, studies indicate that seagrass bed architecture, seagrass species composition, salinity, and freshwater inflow can affect nekton use of seagrass habitats. After decades of declining seagrass coverage in Tampa Bay (from 153.778 km^2 in 1950 to 101.170 km^2 in 1995), the Tampa Bay Estuary Program set a goal to restore seagrass coverage to levels found in the estuary in the 1950's. This restoration goal was surpassed in 2014 with a record 163.065 km^2 of seagrass observed in the Tampa Bay estuary. We analyzed fisheries-independent monitoring data collected using 21.3-m seines (N=31,586 hauls) in Tampa Bay during this restoration period (1996 – 2014) to document patterns of spatiotemporal distribution and abundance of small-bodied nekton and to determine changes in the nekton community associated with increasing seagrass coverage and the influence of freshwater input. Nekton community structure had a strong seasonal component, partly due to recruitment patterns of abundant species,

and was influenced not only by the presence or absence of seagrass, but by the species composition of the grasses within the beds. Consequently, while seagrass cover has increased through time, the species composition of these seagrass beds and their proximity to freshwater inflow also impacts nekton community structure.

LUNCH

12:30 PM

DISCUSSING IMPLEMENTATION OF THE RESTORE ACT AT STATE AND LOCAL LEVEL

Andy Squires, Doug Robison and Holly Greening

Overview of the Florida State Expenditure Plan - Following the Deepwater Horizon oil spill Congress passed the Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economy of the Gulf Coast Act (RESTORE Act) that provides a mechanism to hold the responsible parties financially accountable for restoring the Gulf. Signed into law in 2012, the Act is expected to generate unprecedented funding for both ecological and economic restoration of the Gulf Coast. Among the five affected states Florida is unique with regard to the prominent role of its 23 Gulf Coast counties, as well as the large geographic extent of its coastline and the associated diversity of coastal ecosystems and communities. This paper will focus specifically on the Spill Impact Component of the Act, and how that component will be executed in Florida through the development of the Florida State Expenditure Plan by the Gulf Consortium. The types of projects, programs and activities eligible for funding under the Spill Impact Component will be reviewed, and priorities applicable to Tampa Bay will be discussed.

Development of a Multi-year Implementation Plan: The Pinellas County Experience - The RESTORE Act of 2012 allocates 80% of the Clean Water Act penalties from the Deepwater Horizon oil spill to the Gulf Coast Restoration Trust Fund. The Trust Fund is allocated to five funding components including the Direct Component allocation that provides funds directly to each of 23 Gulf coast Florida counties. As of March 2015, Pinellas County had received a Direct Component allocation of $1,548,321 to fund projects. In January 2014, Pinellas County began a collaborative process with a citizen-based stakeholder group to develop a Multiyear Implementation Plan (MYIP) for submittal to the U.S. Treasury. A Treasury-approved MYIP is required by each county prior to applying for project-specific Direct Component grant funding. The stakeholder group assisted staff in the development of the MYIP through a series of publicly-noticed meetings over a 17-month period. An open competitive process was used to select and rank projects for MYIP inclusion. The end product was a MYIP with County Commission approval and broad stakeholder support that included the four highest ranked projects meeting Treasury guidelines and requirements. The Direct Component funding process will be compared to other RESTORE Act funding components, and the specific steps of the County's process to develop the MYIP will be discussed.

1:45 PM

DISTRIBUTION AND FLUXES OF DISSOLVED ORGANIC CARBON AND TRACE ELEMENTS IN TIDAL RIVERS OF THE TAMPA BAY ESTUARY

Ryan Moyer, Mike Lizotte, Christina E. Powell, Christopher S. Moore, Ioana Bociu and Kimberly K. Yates

The delivery of dissolved constituents, including carbon (C) and trace elements, from rivers to the coastal ocean via estuaries is recognized as an important component of the global biogeochemical budgets. Smaller river systems are often overlooked and unique mixing dynamics associated with estuaries can make interpretations of mixing and fluxes difficult. The seasonal concentration and fluxes of dissolved organic C (DOC) were measured in five tidal rivers and creeks that drain into Tampa Bay. Concentrations of 15 trace elements were also measured in the tidal portion of the Little Manatee River. DOC distributions were highly variable in all river catchments and no significant differences were observed among or between DOC concentrations with respect to river catchment, season, or year of sampling. DOC generally mixed non-conservatively during the wet seasons, and conservatively during the dry seasons, with the estuarine reaches of each river serving as a sink of DOC. Material fluxes were tied to discharge irrespective of season, and the estuaries removed 15-65% of DOC prior to export to Tampa Bay and the Gulf of Mexico. Trace elements were grouped into three distinct mixing patterns: conservative, quasi-conservative, and non-conservative. In addition to geomorphic properties, the role of past, present, and future land cover and other anthropogenic environmental change in the coastal catchments exerts control on the quantity and flux of DOC and trace elements in these systems. The characterization of DOC and trace elements in tidal rivers and estuaries is critical for quantitatively constraining these systems in local-to-regional scale biogeochemical budgets.

2:00 PM

OLD TAMPA BAY INTEGRATED MODEL SYSTEM

Anthony Janicki

The Tampa Bay estuary has undergone a remarkable ecosystem recovery since the 1980s despite continued population growth within the region. However during this time, the Old Tampa Bay (OTB) segment has lagged behind the rest of the Bay's recovery relative to improvements in overall water quality and seagrass coverage. In 2011, the Tampa Bay Estuary Program, in partnership with the Southwest Florida Water Management District, began development of an integrated set of numerical and empirical modeling approaches to determine the best management actions needed to improve the ecology of the OTB estuarine segment. While two previously developed models (empirical and simple box) have successfully met the management needs they could not provide the desired spatial and temporal scale for predicted responses to various management actions. Thus, the need for a series of models that included watershed, hydrodynamic, water/sediment quality, and ecological models (light and biota) to simulate changes in OTB at the desired spatial and temporal resolution. The proposed management actions included: diverting freshwater input from Lake Tarpon, diverting directly discharged AWT, physically altering causeways that intersect OTB, reducing stormwater nutrient loads, and various combinations of these actions. The integrated model set was used to evaluate net ecological improvements to OTB's water quality, sediment quality, seagrass coverage, and benthos/nekton habitat suitability. Based

upon this evaluation, management actions that produced the greatest predicted improvements relative to costs are being considered for future implementation in the OTB segment and watershed.

2:15 PM

CHANGES IN RESIDENCE TIME DUE TO LARGE-SCALE INFRASTRUCTURE IN A COASTAL PLAIN ESTUARY

Mark Luther, Steven D. Meyers and Amanda J. Linville

Alteration of bathymetry by the dredging of shipping channels and the construction of bridges and causeways are found to change residence time in a coastal plain estuary. Two identical three-year simulations are performed using realistic numerical circulation models of Tampa Bay that differ only in their bathymetry. The first bathymetry is based on present-day depth measurements and contains the modern infrastructure; the second is based on depth soundings from the pre-construction year 1879. Both models are seeded evenly with over 456,000 passively advected particles at the beginning of three distinct 90-day time periods within the simulations representing low, average, and high fresh water inflow conditions. Two types of Lagrangian residence time are studied: 1) The baywide residence time based on the total number of particles remaining in the bay. 2) The gridscale residence time based on the total number of particles in each model grid cell. The largest change in baywide residence time due to infrastructure is found during a period when the subtidal Eulerian circulation is strongly impacted by the infrastructure. During periods of weak to moderate Eulerian impact the baywide residence time is largely unaffected by infrastructure. At the grid-scale there are significant impacts such as decreased residence time headward of the bridges and decreased residence time in the portion of the bay where relatively deep dredging has occurred.

2:30 PM

A WEST FLORIDA COASTAL OCEAN (CIRCULATION) MODEL

Robert Weisberg and Lianyuan Zheng

In place (and available at http://ocgweb.marine.usf.edu) is a daily, automated, nowcast/forecast coastal ocean circulation model that down-scales from the deep-ocean, across the continental shelf and into the estuaries. Recent ecological applications include explanations of: 1) red-tide occurrence and tracking, 2) gag larvae recruitment and 3) fish lesions post DWH oil spill. Model simulations, when gauged against in situ observations, also provide the offshore conditions that affect water properties within Tampa Bay and other west Florida estuaries, and hence may find use in the event of a future oil spill. Connections may also be addressed between different coastal regimes such as the communication of materials between the Big Bend Nature and Springs Coasts with the Tampa Bay and Charlotte Harbor regions. Being that water properties and transport routes are full three dimensional, with near bottom currents being of particular importance throughout the west coast of Florida, this West Florida Coastal Ocean Model (WFCOM) is germane to anything pertaining to the ecosystems services of the west Florida coastal ocean.

3:15 PM

THE INFLUENCE OF ANTHROPOGENIC AND PHYSICAL EFFECTS ON ZOOPLANKTON AND HYPERBENTHOS COMMUNITY STRUCTURE: A COMPARISON OF WEST-CENTRAL FLORIDA ESTUARIES[S]

Brianna Michaud

We are comparing zooplankton and hyperbenthos communities with a diversity of environmental metrics from 18 estuarine gradients along the west-central Florida coast to determine which ecosystem features correlate best with variation in community composition. The zooplankton and hyperbenthos data used in this study originate from surveys that were conducted by the Southwest Florida Water Management District and public water utilities over a 25-year period. Community variation will be compared with (1) vertical profiles of salinity, dissolved oxygen, pH, and water temperature taken at the time of the biological collections, (2) chlorophyll *a*, color, and turbidity data obtained from the EPA STORET database, and (3) data that characterizes the effects of freshwater flow on different estuarine zones, including metrics for flashiness, water turnover time, and temporal instability in water turnover time. The objective of this comparison is to establish a model that will predict how different estuarine communities will respond if one or more environmental factors are changed. Principle component analysis will be performed on the Bray-Curtis similarity matrix of 78 estuarine survey zones composited together (i.e., regardless of estuary of origin). This will be followed by multiple regression to quantify the relative impact of the above environmental factors (after standardization). Finally, a model will be constructed using partial least squares regression with leave-one-out cross validation. It is anticipated that the resulting model will help inform resource managers of the most efficient and productive mitigation approaches for improving estuarine condition, while providing insight into the processes that influence estuarine community structure.

3:30 PM

COMPARISON OF ISOTOPE-BASED PATHWAYS WITH GROUNDFISH COMMUNITY STRUCTURE IN THE EASTERN GULF OF MEXICO

Sheri Huelster and Ernst B. Peebles

We compared traditional community analysis with stable-isotope trophic analysis to define process-based trophic elements of community structure in the eastern Gulf of Mexico, and developed a predictive capability regarding changes to fish community structure that would be expected from increasing eutrophication. Specifically, we used an existing trawl survey program (SEAMAP) to compare invertebrate herbivore (sponge and sea urchin) isotopes with groundfish isotopes, and then compared the resulting spatial patterns with spatial variation in community structure, as identified by cluster analysis. The comparison was applied to seven NMFS survey zones that extended offshore from the Caloosahatchee River northwest to Mobile Bay, AL. Isotopic patterns were consistent with the presence of an oligotrophic-eutrophic spatial gradient in this region. δ15N values increased in the northwestward direction in herbivores and in each of the 17 fish species examined. In the southern NMFS survey zones, δ13C was elevated in shallow depths for individual fish species, but not in herbivores, indicating a higher proportion of benthically derived biomass contributed to the biomass of fish in the shallow parts of the southern NMFS zones. Fish community analysis using SIMPROF created a similar pattern, with distinct nearshore and

offshore communities and also a northwesterly community transition. Among the 17 fish species, eight appeared to have obligate dependence on either benthic or planktonic basal resources, while nine species appeared to have facultative relationships. Impairment of current water-quality (nutrients, turbidity, light transmission, chlorophyll a) is expected to lead to reductions in the abundance of the obligate benthic-dependent fishes.

3:45 PM

BASELINE INFORMATION FOR OTOLITH MICROCHEMISTRY OBTAINED FROM PRE-COLUMBIAN MIDDENS[S]

Brock Houston, Steve Murawski, Elizabeth A. Southard and Ernst Peebles

The absence of baseline information prior to the Deepwater Horizon (DWH) oil spill is often cited as an impediment to assessing the spill's impacts. We use data from pre-industrial-age otoliths to compare Red Drum otolith microchemistry between ancient and modern times. Red Drum otoliths were obtained from three sources: (1) Native American middens at Weedon Island and Crystal River in west-central Florida, (2) fish collected from Tampa Bay and other areas on the Florida Gulf Coast, and (3) fish collected from coastal Louisiana soon after the Deepwater Horizon spill. We used laser-ablation ICP-MS to compare concentrations of nine hydrocarbon-associated trace metals (Mg, Cr, Mn, Fe, Ni, Co, Cu, Zn, and Pb) among the three otolith sources. We used SIMPROF analysis to identify a clean reference group of modern specimens (sources 2 and 3) that had low metal concentrations, and found that the best-preserved portion of an ancient Weedon Island otolith was also classified into the clean reference group for modern otoliths, supporting the idea that midden otoliths can be used as a pre-industrial baseline for otolith microchemistry. Specimens with high concentrations of hydrocarbon metals occurred in both Louisiana and Florida, with contamination occurring both before and after the DWH spill. Contaminated portions of poorly preserved midden otoliths were also observed. Because the midden otoliths were removed from contact with seawater >800 years ago, we suggest that their route of contamination with hydrocarbon metals was atmospheric.

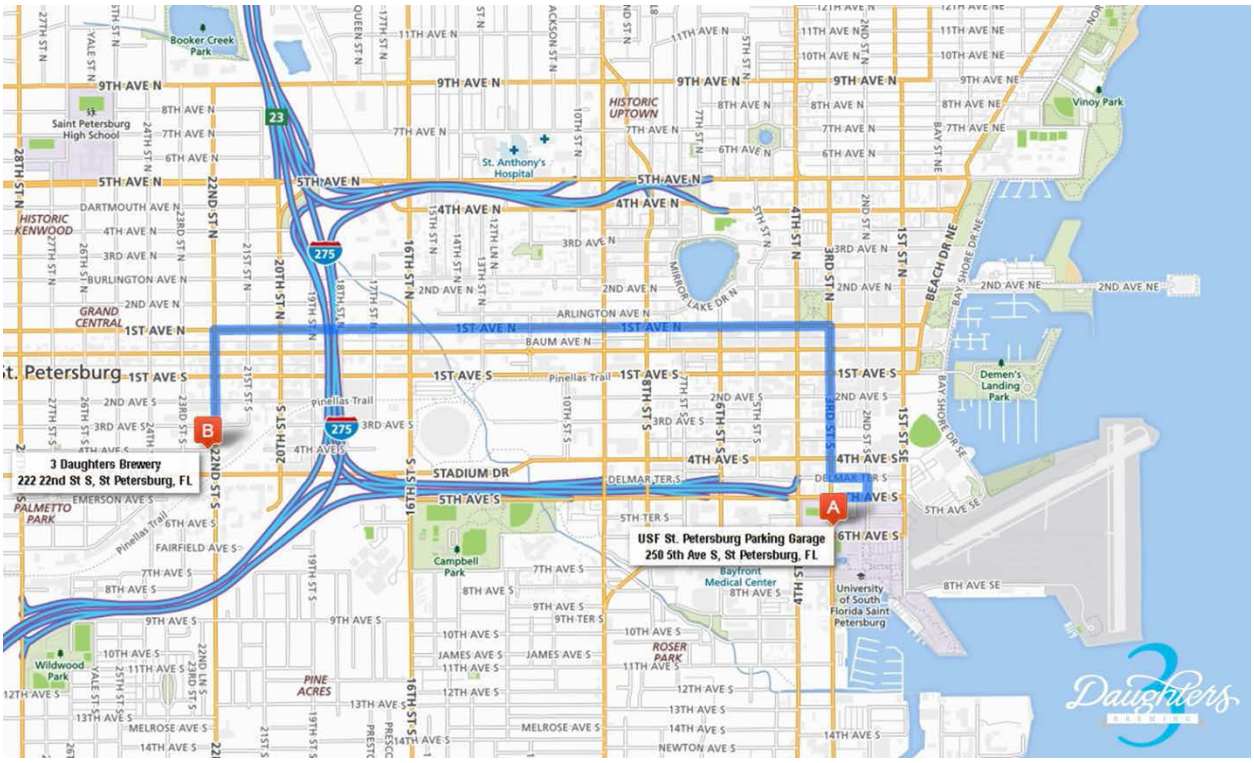
HAPPY HOUR AT

3 DAUGHTERS BREWERY

Photo by Lindsay Cross

BASIS6
Bay Area Scientific Information Symposium

HAPPY HOUR



DRIVING DIRECTIONS

USFSP Parking Garage (250 5th Ave S, St Petersburg, FL) to 3 Daughters Brewery (222 22nd St S, St Petersburg, FL)

Distance: 2.425 miles
Time: 5 min

Travel east/right on 5th Ave S toward 2nd St S.
Turn left onto 2nd St S.
Turn left onto Delmar Ter S.
Turn right onto 3rd St S.
Turn left onto 1st Ave N.
Turn left onto 22nd St N/S.
Destination is on the left.

BASIS 6
Bay Area Scientific Information Symposium

AGENDA

DAY 2 (September 29, 2015)

Start	Session	Presenter	Title
8:00 AM	Daily Registration Opens		
8:00 AM	BREAKFAST		
8:15 AM			
8:30 AM	Emerging Issues: Tampa Bay Management (15minP) *Ann Hodgson*	Gerold Morrison *gerold.morrison@amecfw.com*	Potential biotic effects of sediment contaminants in McKay Bay
8:45 AM		David Hastings *hastindw@eckerd.edu*	Microplastics in Tampa Bay: Abundance, spatial and temporal variability
9:00 AM		Steven Meyers *smeyers@mail.usf.edu*	How Losing Egmont Key Will Impact Tides and Storm Surge in Tampa Bay
9:15 AM	Emerging Technologies & Methodologies: Habitat Management (15minP/) *Kris Kaufman*	Zachary Tyler *zacharyjames@mail.usf.edu*	Physical Monitoring of Various Beach Nourishment Methods on Egmont Key, Florida[S]
9:30 AM		Mark Rachal *mrachal@audubon.org*	Breakwaters to protect eroding islands and conserve living shorelines
9:45 AM		Q&A	
10:00 AM		BREAK	
10:15 AM		Alissa Powers *Alissa.Powers@mymanatee.org*	Hyperspectral Imaging as an Indicator Tool for Restoration Success
10:30 AM		Brad Weigle *bweigle@quantumspatial.com*	Environmental Assessment using Emerging Technologies: 21st Century Advancements for Resource Managers and the Public
10:45 AM		Stephanie Powers *stephanie.powers@watermatters.org*	Evaluating new solutions to persistent problems in habitat restoration
11:00 AM		Q&A	
11:15 AM	Practical Applications of Environmental Management & Policy -- Habitat Restoration (15minP) *Bruce Hasbrouck*	Tom Ries *tries@scheda.com*	Saltern Restoration via Hydro-blasting Techniques
11:30 AM		Damon Moore *damon.moore@mymanatee.org*	Lessons Learned in Restoration of Diverse Native Ground Cover in Upland Habitats of Two Coastal Preserves in Manatee County
11:45 AM		Aaron Brown *atbrown@mail.usf.edu*	Long-term viability of constructed freshwater wetlands in Hillsborough County, Florida[S]
12:00 PM		Q&A	
12:15 PM	LUNCH		
12:30 PM	Special Topic Presentation *Ed Sherwood*	Justin Saarinen *jsaarinen@ncf.edu*	WLERA - Western Lake Erie Restoration Assessment
12:45 PM			
1:00 PM			
1:15 PM	BREAK		
1:30 PM	Practical Applications of Environmental Management & Policy -- Meeting Regulatory Requirements (15minP) *Tom Ash*	Jackelyn Julien *jjulien@tampaport.com*	One-Stop Permitting through Delegation
1:45 PM		Anthony Betts *bettsa@hillsboroughcounty.org*	TMDL Implementation in Delaney Creek
2:00 PM		Shelley Thornton *shelley.thornton@mosaicco.com*	Mining Restoration Activities
2:15 PM		Q&A	
2:30 PM	BREAK		
2:45 PM	Practical Applications of Environmental Management & Policy -- Watershed Management Focus (15minP) *Tom Ash/Bruce Hasbrouck*	Robert Conner *robert.conner@lakelandgov.net*	Multi-Party Reuse Agreements
3:00 PM		Adit Patel *aditp@mail.usf.edu*	A Sustainable Outlook on Direct/Indirect Potable Reuse: Challenges and Solutions on Overcoming Social Stigma[S]
3:15 PM		Greg Blanchard *greg.blanchard@mymanatee.org*	Lake Manatee Watershed Management Plan
3:30 PM		Ed Sherwood *esherwood@tbep.org*	A Need for Future Integrated Watershed Management in Tampa Bay
3:45 PM		Q&A	
4:00 PM	POSTER SOCIAL		
4:15 PM			
4:30 PM	Day 2 Ends		
5:00 PM	Dinner Featuring Jeff Klinkenberg		
5:15 PM			
5:30 PM			
5:45 PM			
6:00 PM			

8:30 AM

POTENTIAL BIOTIC EFFECTS OF SEDIMENT CONTAMINANTS IN MCKAY BAY

Gerold Morrison and Ed Sherwood

McKay Bay has been subject to various anthropogenic discharges that have contributed to its existing sediment contamination. In 2009-2010 the area was sampled extensively to identify localized sediment contaminant "hot spots." Several contaminants of potential concern (COPCs) were identified, and approximately 300 acres of tidal flat sediments with active fish and wildlife use were identified as degraded based on observed contaminant levels. Nine sediment quality management areas (SQMA) were identified based on the types and concentrations of contaminants present. Some of the COPCs present in the bay (such as low molecular weight PAHs) have the potential to be acutely toxic to some resident organisms, while others (such as high molecular weight PAHs and organochlorine pesticides) have the potential to bioaccumulate and have impacts at higher levels of the food web. The current project was undertaken in 2013 to quantify the acute toxicity and bioaccumulation of sediment contaminants and provide information on their potential impacts on fish and invertebrates in the area. Ten-day laboratory bioassays were used to assess acute toxicity, and 28-day bioassays were used to assess potential bioaccumulation. In the 10-day tests significant acute toxicity was detected in sediment samples from three SQMAs. In the 28-day bioaccumulation test, two individual PAHs – the LMW acenaphthene and the HMW fluoranthene – were detected in test bivalve tissue at concentrations exceeding EPA Region 4 thresholds for potential ecological effects. Updated risk assessment information, and identification and control of active contaminant sources in the watershed, are potential next steps in the bay management process.

8:45 AM

MICROPLASTICS IN TAMPA BAY: ABUNDANCE, SPATIAL AND TEMPORAL VARIABILITY

David Hastings, Scott Adams, Breege Boyer, Holly Buresh, Bradford Cederburg, Alice Frye, Connor Gallagher, Kristina Petraites, Cameron Raguse and Emily Smith

The discovery of ubiquitous microplastics in our oceans and waterways has highlighted plastic waste as a significant threat to estuarine health. Microplastics result from the breakdown of larger plastics and fishing line, from laundry lint or plastic microbeads added to cosmetics. Some marine species consume these microplastics, which can cause digestive blockages and accumulation of toxic chemicals absorbed by the plastic. A unique microbial assemblage is associated with the plastic surfaces.

We have sampled microplastics for the past three years in Tampa Bay using two different methods. Our primary approach was to collect discrete water samples, filter through 0.45µm filters and count microplastics under a dissecting microscope. For comparison, we identified particles collected in a 220µm plankton net towed at 1-2m depth, a method frequently used in other studies.

The primary type of particle we identified were plastic fibers, 1-5mm long. Spherical beads from 100-500µm were also identified, but were much less common. Both types are distinctive and recognized by their coloration and shape, unlike any natural marine particle. The abundance of microplastics varied considerably in Tampa Bay from 10-72 particles/L using the first method. Sampling with the plankton net resulted in lower abundances, ranging from 0.02 to 1.6 particles/L. In general, the lowest values were at the mouth of Tampa Bay, near Egmont Channel with higher values in Middle Tampa Bay. We compare values for Tampa Bay with those of the Jiulong Estuary, Fujan Province, China. We will continue to monitor microplastics in Tampa Bay to constrain temporal changes.

9:00 AM

HOW LOSING EGMONT KEY WILL IMPACT TIDES AND STORM SURGE IN TAMPA BAY

Steven Meyers, Thomas Wahl and Mark Luther

The Egmont Key barrier island at the mouth of Tampa Bay is documented to be shrinking and, at current rate of loss, is projected to disappear within a few decades. A calibrated numerical circulation model (based on the Delft3D code) for Tampa Bay is run with realistic boundary and forcing conditions using present day bathymetry and coastline morphology. A second model run is performed assuming Egmont Key has completely eroded. The amplitude and phase of the dominant astronomical tides are calculated from the model output along with changes in these quantities due to the loss of Egmont Key. Similar calculations are being performed for tidal velocities, maximum tidal water levels and current speeds, as well as a large storm surge event during Hurricane Frances in 2004. The impact of losing Egmont Key varies spatially and is found to be relatively strong in the vicinity of present-day Egmont and around the estuarine coastline.

9:15 AM

PHYSICAL MONITORING OF VARIOUS BEACH NOURISHMENTMETHODS ON EGMONT KEY, FLORIDA BEACHS

Zachary Tyler and Ping Wang

Nourishment of the highly eroded northern and western portions of Egmont Key, Florida occurred from November 2014 to March 2015. The nourishment material was obtained from the dredging of Tampa Harbor's navigation channel entrance. These beneficial use nourishments were permitted to place material with in situ fines content (material passing the 230 sieve) of 20.7%. Two placement methods were utilized: a traditional methodology on the northern portion of the island, and an experimental "cross shore swash zone placement" method on the south-western portion. Pre and post construction monitoring of both nourishments has been conducted by the Coastal Research Laboratory at the University of South Florida. In addition, beach changes have been monitored since August 2012, two years prior to this most recent nourishment.

Twenty- seven beach profile transects have been measured monthly since construction of the nourishments. Profiles extend from the dune field to approximately 3 meters water depth. Sediment cores were procured from the navigation channel margins and characterized. Beach and nearshore surficial and core sediment samples have been collected and analyzed pre and post construction. High resolution UAV aerial imagery has been collected during all phases of the nourishment. Aerial LiDAR imagery from 2013 and 2015 has been collected and analyzed.

Morphological and sedimentological analyses of both nourishments allowed for the comparison of the performance of each nourishment. An examination of the fate of the fine grained material placed on the beach indicates that initially the fine grained materials are deposited in relatively large volumes in the nearshore. Subsequently energetic wave and tidal action transported and deposited the fine grained material out of the nearshore zone.

9:30 AM

BREAKWATERS TO PROTECT ERODING ISLANDS AND CONSERVE LIVING SHORELINES

Mark Rachal and Ann Paul

Waves and wakes generated by sea level rise and increases in the amount of commercial ship and recreational boat traffic and the size of ship vessels threaten nesting bird islands in the Tampa Bay area. Breakwaters of various size and configurations installed to dissipate on-shore wave and wake energy, provide a near-shore quiet water "lagoon" and protect shoreline habitats important to wildlife, including nesting birds. Design of breakwaters should consider site-specific shoreline configurations, on-shore wave energy components, and cost of the breakwater installation. We will discuss breakwater design, installation and effectiveness. Additional habitat benefits of breakwater installation include oyster attachment substrate, in-water reef habitat for small fish and bird foraging sites.

10:15 AM

HYPERSPECTRAL IMAGING AS AN INDICATOR TOOL FOR RESTORATION SUCCESS

Alissa Powers, Kathleen Barrett, Mitch Stack and Brian Ormiston

In an effort to better understand, quantify and document the real benefits of hydrologic restoration projects in east Manatee County, the County began a data intensive, three-year monitoring program. The protocol for this program aims to efficiently document changes in water storage, wetland acerage, as well as vegetative composition over a large area (i.e., greater than 23,000 acres). The primary tool for assessing the hydrologic restoration activities is an advanced remote sensing technique called Hyperspectral Imaging (HIS), which utilizes specialized spectral aerial imaging and mapping techniques, supported by on-the-ground field studies to obtain the soil moisture, wetland hydration and functional condition data. HIS is being used to extrapolate and map soil moisture and wetland hydration across the entire project area. Efforts to effectively evaluate restoration projects provide valuable information in support of current restoration methods and provides opportunities for adaptive management strategies in support of further success. As a result of the County's extensive restoration efforts on Duette Preserve, preliminary findings indicate that the designed restoration strategies are working. Wetlands are experiencing longer hydrologic regimes as a result of ditch blocking and filling. The data gathered is confirmation that the resources expended have fulfilled the desired outcome and that future funding of restoration in the watershed will continue to be beneficial to the drinking water supply.

10:30 AM

ENVIRONMENTAL ASSESSMENT USING EMERGING TECHNOLOGIES: 21ST CENTURY ADVANCEMENTS FOR RESOURCE MANAGERS AND THE PUBLIC

Brad Weigle

New century advances in the acquisition and processing of aerial and terrestrial imagery, LiDAR, and satellite imagery along with ever increasing computer processing power and storage capabilities have stimulated development of mature automated analytical algorithms for classification, mapping, and quantitative inventory of our global environment, both on a local scale in high resolution and on a landscape scale. Since BASIS 5 in 2009, we have achieved what I once considered the holy grail of automated vegetation mapping: species identification, height and density measurements, and canopy coverage for a variety of natural and human-impacted landscapes using remote sensing. Visual (3D, 4D, & VR) immersion into the enhanced digital data is nearly mature as geospatial software and hardware providers move their focus to the consumer market. This presentation will demonstrate currently available geospatial analytical and visualization technologies and discuss monitoring and analyzing the earth's environment utilizing remote sensing and GIS technologies over the next decade.

10:45 AM

EVALUATING NEW SOLUTIONS TO PERSISTENT PROBLEMS IN HABITAT RESTORATION

Stephanie Powers

The Southwest Florida Water Management District (District) has completed over 60 habitat restoration projects in Tampa Bay, many with several phases of work. New techniques to conquer old and ongoing problems are constantly being evaluated. In 2004, the District employed the use of hydroblasting, or hydroleveling, to eliminate spoil mounds and their associated exotic vegetation in mangrove ecosystems, limiting collateral damage normally experienced with this activity. Ten years post-construction, the District has completed a monitoring exercise to evaluate the efficacy of this technique. Additionally, the use of remote sensing has been explored to provide an inexpensive, efficient method of monitoring habitats, such as mangrove systems, on sites that are too large or inaccessible for on-the-ground methodologies. Results from these approaches will be presented.

11:15 AM

SALTERN RESTORATION VIA HYDRO-BLASTING TECHNIQUES

Tom Ries

The Tampa Bay Estuary Program's "Restore the Balance" paradigm for Tampa Bay's estuarine systems identified saltern habitat as being disproportionally impacted. There has been a concerted effort by the various restoration practitioners to restore this unique habitat. This paper will summarize the various restoration techniques (creation, restoration and enhancement) and the subsequent results. Eight saltern restoration projects were examined (Mangrove Bay Golf Course, Weedon Island, Gateway Tract, Lost River Preserve, Newman Branch Creek Phase I, Feather Sound Preserve, MacDill AFB, and Newman Branch Phase II Expansion). The various restoration techniques are evaluated by cost, temporary construction impacts, and the documented results.

Creation costs ranged from $30K to $52/acre; restoration costs ranged from $10K to $18K/acre, and enhancement costs ranged from $14K/acre to $21K/acre. The associated temporal construction impacts and related recovery times varied from moderate impacts with a 3-year recovery for traditional heavy equipment construction, to minimal site impacts and weeks of recovery for hydro-blasting methods. The effectiveness of the various restoration techniques can be difficult to discern, however, the early indications are that these rare habitats can be successfully restored.

Finally, the use of the hydro-blasting process to eliminate spoil mounds and to strategically block ditches is discussed and analyzed to assess whether it is as an effective habitat restoration tool. Recommendations for future Tampa Bay saltern restoration endeavors are also provided.

11:30 AM

LESSONS LEARNED IN RESTORATION OF DIVERSE NATIVE GROUND COVER IN UPLAND HABITATS OF TWO COASTAL PRESERVES IN MANATEE COUNTY

Damon Moore

Two coastal preserves in Manatee County, Ungarelli Preserve and Perico Preserve, contain upland habitats that have successfully undergone a restoration in groundcover composition from being dominated by nuisance and exotic vegetation to coverage by a diverse assemblage of desirable native vegetation. Coastal properties in the Tampa Bay area that are acquired for habitat restoration and enhancement typically contain a upland habitats that are highly disturbed with a high level of nuisance and exotic vegetation from prior land uses, typically agriculture. Former agricultural uses lead to a condition in which vegetative cover is dominated by weedy exotic vegetation and the seedbank of native species is largely depleted. This makes restoration groundcover stratum to levels of diversity approaching un-impacted habitats a very challenging undertaking.

Successful restoration of groundcover was achieved on Perico Preserve and Ungarelli Preserve utilizing a restoration strategy that involved an intensive weed management and monitoring program, soil inversion, native groundcover seeding, out planting of a wide array of native plants, and habitat establishment period adaptive management. This was accomplished using a diversity of funding and labor sources. Through this groundcover restoration process, lessons were learned that could be applied to other habitat improvement projects in the Tampa Bay area.

11:45 AM

LONG-TERM VIABILITY OF CONSTRUCTED FRESHWATER WETLANDS IN HILLSBOROUGH COUNTY, FLORIDA[S]

Aaron Brown and Thomas Crisman

In 1987, the first successful constructed wetlands permitted by the Hillsborough County Environmental Protection Commission (EPC) were released from their mitigation obligations. Since then, over 1,200 freshwater wetlands have been constructed in accordance with EPC's environmental policies. Although released wetlands are intended to mature and eventually replace the functions of the impacted, natural wetland, monitoring after release is not required. As such, there is little to no information regarding their long-term viability for ecosystem structure and function. The objective of this study is to determine how design variables such as wetland type, size, location, and vegetation community affect wetland structure and function over time. A total of eighty (N=80) forested and herbaceous freshwater wetlands were selected via stratified random sample for in-depth evaluation to determine if they have continued on their intended design trajectories or have degraded to undesired conditions. Preliminary data analyses are indicating that long-term structure and function of constructed wetlands are affected by factors such as design, location in the landscape, and on-going maintenance. Results from this study may provide invaluable insight into wetland construction and long-term successional trends of freshwater wetlands in the Tampa Bay metropolitan area.

LUNCH

12:30 PM

WLERA WESTERN LAKE ERIE RESTORATION ASSESSMENT

Justin Saarinen

1:30 PM

ONE-STOP PERMITTING THROUGH DELEGATION

Jackelyn Julien

Marine construction projects in Hillsborough County are regulated by multiple federal, state, and local agencies. In an effort to streamline and improve this multi-layered and often confusing permitting process, some Port Tampa Bay minor work permitting authority was delegated to the Environmental Protection Commission (EPC) of Hillsborough County in 2009. This delegation was followed by additional delegations from the Florida Department of Environmental Protection (FDEP) and U.S. Army Corps of Engineers (ACOE) to initiate one-stop regulatory permitting. The goal of this delegation is to create a one-stop permitting program at EPC that satisfies the rules of the Port, EPC, FDEP, and ACOE. This panel will discuss the delegation process, challenges, successes, results, customer feedback, and future goals.

1:45 PM

TMDL IMPLEMENTATION IN DELANEY CREEK

Anthony Betts

The State of Florida has adopted nearly 400 Total Maximum Daily Load (TMDL) documents – thirty in Hillsborough County alone – and each demands significant costs and effort to manage. The Cycle III NPDES permit requires Municipal Separate Storm Sewer Systems (MS4s) begin to address prioritized TMDLs, quantify pollutant loading, and make concerted steps toward mandated pollutant reductions. Under this framework, Hillsborough County has developed a plan for improved stormwater management in Delaney Creek. Historically, Delaney Creek was one of the more highly polluted waterbodies in Hillsborough County. Stormwater infrastructure, built before modern stormwater regulations, will be retrofitted with a focus on using green infrastructure and low impact development principles to make measurable improvements in water quality. Pollutant reduction recommendations were developed with high-resolution water quality monitoring, community input, and consultation with engineers, landscape architects, and social marketers. The effort better characterizes stormwater runoff in the watershed, addresses diverse community concerns, and lays out a plan to achieve important reductions in pollutant loading. The presentation also compares Event Mean Concentration (EMC) based pollutant loading models and empirically derived pollutant loading through storm event monitoring. The model developed through this pilot process provides Hillsborough County a practical template to achieve TMDL compliance and can be replicated in future basins.

2:00 PM

MINING RESTORATION ACTIVITIES

Shelley Thornton and Laura Morris

Mosaic has reclaimed the Central Florida Phosphate District since the reclamation rule was enacted in 1975. Restoration and reclamation science, as well as the understanding of the watershed's

ecology, have evolved over the past 20 years and new advances continue to be developed. Not only are these advances utilized to assure reclamation success, effective maintenance strategies are implemented to proactively manage these landscapes during establishment to ultimately meet specific permit success criteria. From an ecological standpoint, success is also defined as how well the created systems function and, among other things, "fit" into the landscape (i.e., how well upland habitat transitions to a wetland or stream). Mosaic's current approach to satisfy compensatory mitigation requirements include both onsite and offsite mitigation. Onsite mitigation is required pursuant to FDEP's Reclamation Rule 62c-16, requiring all wetland impacts be reclaimed at least acre for acre, type for type. Offsite mitigation projects focus on benefits at a watershed management level incorporating the Integrated Habitat Network (IHN) and the CHNEP CCMP priority actions. This mitigation offsets wetland impacts by preserving and restoring wetlands outside the mine boundary, in addition to onsite mitigation, all within the same watershed. The offsite mitigation projects are constructed prior to mining activities, which reduces the temporal lag traditionally associated with onsite mitigation; involve large, ecologically significant parcels; incorporate rigorous scientific and technical analysis, planning and implementation; and require a significant investment of financial resources.

2:45 PM

MULTI-PARTY REUSE AGREEMENTS

Robert Conner

Three very different entities, TECO, City of Lakeland & SWFWMD, assembled to undertake a project to supply reclaimed water to the Polk Power Station. This removes a significant flow/load from the Alafia River and Hillsborough Bay for up to 30 years. It also reduces present and planned groundwater pumping in the region. While not yet fully operational, the major components are in place and acceptance testing is underway. Additionally, the project makes a 1600-acre tract of land, similar to Circle B Bar, available for environmental education in 2016.

3:00 PM

A SUSTAINABLE OUTLOOK ON DIRECT/INDIRECT POTABLE REUSE: CHALLENGES AND SOLUTIONS ON OVERCOMING SOCIAL STIGMA[S]

Adit Patel

As water scarcity becomes more prominent over the next several years, scientists will be forced to come up with innovative alternatives to meet increasing water demands. One promising solution is the direct and indirect utilization of potable reuse water, which could significantly offset water consumption within the watershed. This solution is not yet readily used due to social stigma and negative perceptions portrayed by the media and general public. A sustainability study was conducted that analyzed environmental and economic benefits associated with potable reuse and solutions were generated in order to overcome the social stigma. The social solutions, coupled with knowledge of its economic and environmental benefits will facilitate a paradigm shift in popular perception that will allow the Tampa Bay region to move toward a more sustainable future.

3:15 PM

LAKE MANATEE WATERSHED MANAGEMENT PLAN

Greg Blanchard

Manatee County and the Southwest Florida Water Management District have developed a Watershed Management Plan for Lake Manatee, the principal potable water supply for Manatee County and the region. An essential component of this effort was the creation of a pollutant loading model encompassing the watershed of Lake Manatee and the upper Manatee River linked to water quality models for the operating reservoir. The final Watershed Management Plan will focus on water quality assessment and support predictive investigations of reservoir water quality. The County will use this tool to consolidate and update the goals and objectives from the District's SWIM Plan, the Tampa Bay Estuary Program (TBEP) CCMP and the County into one strategy that includes comprehensive monitoring of water quality and pollutant loads, detailed mapping, flood and pollutant load modeling and practical projects to improve water quality, restore natural runoff regimes, provide water supply and protect natural resources.

3:30 PM

A NEED FOR FUTURE INTEGRATED WATERSHED MANAGEMENT IN TAMPA BAY

Ed Sherwood

The Tampa Bay estuary has undergone a remarkable recovery since the 1980s. Current management practices have been highly effective, but new challenges are anticipated in the future. Particularly for those regions in the Bay where multiple stakeholder pressures and interests may conflict in discrete portions of the watershed. This presentation will introduce a case study example to spur conversation for future Bay management practices. At 109,262 hectares, the Alafia River watershed is the second largest basin draining to Tampa Bay. Several regionally significant activities occur within the watershed, including: extractive phosphate mining, domestic consumptive and industrial fresh water use, isolated agriculture operations including fruit and vegetable row crops and cattle ranching, and extensive and expanding suburban development. As intensification of each of these activities is possible in the near future, there is potential risk of user conflict among entities represented in each of these sectors. For example, future gypsum stack closures from phosphate mining activities have the potential to modify future water quality conditions in the Alafia River, potentially impacting consumptive water use practices and the aesthetic qualities of the watershed that are attractive to continuing suburban development. Likewise, the cumulative effects of the combined intensification of these land use activities in the watershed may pose downstream risks in the estuary – reversing the progress made to date to restore seagrass in Tampa Bay. Therefore, an integrated approach to managing the Alafia River watershed is warranted. The proposed approach will consider future nutrient, water, and land management policy in the watershed.

4:00 PM POSTER SOCIAL

DINNER
FEATURING JEFF KLINKENBERG

BASIS 6
Bay Area Scientific Information Symposium

POSTER PRESENTATIONS

September 29, 2015
4:00 PM

Comparison of Otolith Microchemistry in Gulf of Mexico Lesioned and Healthy Fish Following the Deepwater Horizon Oil Spill	Jennifer E. Granneman[S]
Long-Term Observations in Tampa Bay Reveal New Hydrodynamic Behavior	Steven Meyers
High Resolution Tampa Bay and Vicinity Model	Robert Weisberg
Tampa Bay Community-Based Seagrass Transplanting	Serra Herndon
Towards Trash Free Waters in the Hillsborough River Watershed	Max Krause[S]
Watershed Audio Tour	Jennifer Shafer
Social Marketing: There Is No Poop Fairy, Pick It Up!	David Shafer
Removing Nutrients from Stormwater Retention Ponds	Ernie Franke
Juvenile Snook Habitat Use and Movement Patterns within the Little Manatee River	Holly J. Rolls
Management of Colonial Waterbirds in the Tampa Bay Watershed: Challenge and Opportunity	Mark Rachal
Migratory Bird Protection Partnership	Chris Cooley
Pinellas County's Biological Monitoring Program	Peggy Morgan
Assessing Pinellas County Surface Water Quality from 2003-2013	Rob Burnes
Current Risks Impacting the Coastal Wetlands of Tampa Bay: Recommendations for the Management of Local Salt Marshes and Mangroves	Kara Radabaugh
Unifying Coastal Wetland Monitoring Methods: A Comparison of Protocols in a Tampa Bay Pilot Study	Christina Powell
US Clean Water Act Sections 316(A) & (B). A Brief History of the Rules and an Examination of Affected Facilities and Resources in Tampa Bay and the Gulf Coast	Brandon Johnson
Evaluation of 40 Year Water Quality Trends in Tampa Bay	David Karlen
Fix 'In A Hole: Post-Restoration Recovery of the Benthic Macrofaunal Community at the Filled Mckay Bay Dredge Hole	David Karlen
The Distribution of Resting Cysts of the Toxic Dinoflagellate Pyrodinium Bahamense in Old Tampa Bay Sediments	David Karlen
Improved Coastal Wetland Mapping Using Very-High Spatial Resolution Imagery	Matthew McCarthy[S]
New Forensic Methods for Describing the Histories of Individual Fish	A. Wallace[S]
In Situ Validation of Dissolved Organic Carbon (DOC) and pH between Measurements by Autonomous Sensors and of Discreet Samples in the Clam Bayou Estuary, Boca Ciega Bay, FL	Ryan Moyer
Temperature of Tampa Bay and the Eastern Gulf of Mexico	Lianyuan Zheng
Simulated Wind Driven Anomalies in Tampa Bay, FL 1975-2006	Monica Wilson
Examining Organic Carbon Burial in Charlotte Harbor Mangrove Forests	Megan Burford[S]
Climate Engagement: An Assessment of Local Climate Change Perceptions	Ramona Madhosingh-Hector
Regional Sea Level Rise Adaptation Planning in Tampa Bay, FL	Libby Carnahan

BASIS 6
Bay Area Scientific Information Symposium

AGENDA

DAY 3 (September 30, 2015)

Start	Session	Presenter	Title
8:30 AM	Daily Registration Opens		
8:30 AM	BREAKFAST		
8:45 AM			
9:00 AM	Opening Remarks		
9:15 AM	Coastal Connections: Bay Resources & Community Nexus (15minP) *Karen Langbehn*	Kathryn Jeakle *kjeakle@shorecrest.org*	Coastal Awareness Program
9:30 AM		Martha Gruber *mgruber@tampabaywatch.org*	Stewardship in Action
9:45 AM		Brandt Henningsen *Brandt.Henningsen@watermatters.org*	The Rock Ponds Ecosystem Restoration Project – A True Mosaic of Coastal Habitats for Tampa Bay
10:00 AM		Jason Kirkpatrick *jason.kirkpatrick.2.ctr@us.af.mil*	Community-Based Program of Shoreline Stabilization and Restoration at MacDill Air Force Base
10:15 AM		Q&A	
10:30 AM	BREAK		
10:45 AM	Climate Change: Mitigating Climate Change Impacts in Tampa Bay (15minP) *Dave Karlen*	Steve Emmett-Mattox *sem@estuaries.org*	Blue Carbon: A New Tool for Coastal Conservation / Extended Time Slot for Additional Presentations/Panel Discussion
11:00 AM		Doug Robison *drobison@esassoc.com*	Quantifying Mangrove and Salt Marsh Climate Mitigation Benefits for Tampa Bay
11:15 AM		Amanda Chappel *amanda.chappel@myfwc.com*	Organic Burial and Accretion Rates in Tampa Bay's Coastal Wetlands[S]
11:30 AM		Dave Tomasko *dtomasko@esassoc.com*	Multiple Pathways: A study of Tampa Bay Seagrass Climate Mitigation
11:45 AM		Kim Yates *kyates@usgs.gov*	Ocean acidification buffering effects of seagrass in Tampa Bay
12:00 PM		Q&A	
12:15 PM	LUNCH		
12:30 PM	Special Topic Presentation *Maya Burke*	Misty Cladas *misty@tbep.org*	Community Connections Create Bay Improvement & Student Awards
12:45 PM		George Heinrich george@heinrichecologicalservices.com	
1:00 PM		Ernie Franke *eafranke@tampabay.rr.com* Nestor B. Ortiz, Jr.	
1:15 PM	BREAK		
1:30 PM	Climate Change: Management Implications Presentations (15minP) *Libby Carnahan*	Lindsay Cross *lcross@tbep.org*	Helping Habitats get a Hand up for Climate Change
1:45 PM		Chris Anastasiou *chris.anastasiou@watermatters.org*	The Rising Seas: Managing Expectations for Habitat Restoration along Florida's Springs Coast
2:00 PM		Cynthia Meyer *Cynthia.Meyer@noaa.gov*	Habitat Vulnerability and Sustainability of Urban Seagrass Resources to Sea Level Rise
2:15 PM		Tirusew Asefa *tasefa@tampabaywater.org*	Actionable science in practice: Co-producing climate change and sea level rise information for decision making
2:30 PM		Q&A	
2:45 PM	Climate Change Panel: Communicating the Science Rebcca Zarger *rzarger@usf.edu*	Ramona Madhosingh-Hector *ramona.m.hector@ufl.edu* Libby Carnahan *lcarnahan@ufl.edu* Lara Milligan *lmilligan@ufl.edu*	Changing the Conversation: Communicating About Local Climate Change Impacts and Scenarios for the Tampa Bay Region
3:00 PM			
3:15 PM			
3:30 PM	BREAK		
3:45 PM	BASIS 6 Synthesis *Maya Burke maya@tbrpc.org Ed Sherwood esherwood@tbep.org*	Ernie Estevez *estevez@mote.org* Susan Bell *sbell@usf.edu* Holly Greening *hgreening@tbep.org* Shawn Landry *landry@usf.edu* Aaron Brown *atbrown@mail.usf.edu* Lindsay Cross *lcross@tbep.org*	BASIS 6 Synthesis
4:00 PM			
4:15 PM	Symposium Ends		

9:15 AM

COASTAL AWARENESS PROGRAM

Kathryn Jeakle

The objective of the Coastal Awareness Program was to provide opportunities for students to become more knowledgeable about the environment in which they live. All activities / projects were intentionally designed to develop environmentally educated citizens. During the August 2014-May 2015 time frame, students at Shorecrest Preparatory School spent a total of 25 hours in the field learning about the environment around them. Fieldwork consisted of weeding, transplanting, and recycling Spartina alterniflora, collecting water samples at the 54th Ave Channel to test for pH, salinity, temperature, turbidity, dissolved oxygen, and nitrates, as well as acting as naturalist to identify local plant and animal species. Most of the work was completed on campus but some was completed off campus at Coffee Pot Park and Rocks Pond in Manatee County. In addition to fieldwork, students completed a project of choice: Science Investigation or Marine Issue Project. Working in the field stimulated several students to complete projects such as eradication of Australian Pines leading to the replacement of the invasive species with 450 native plants, an iBook on ocean acidification and iMovies on topics such as plastic in our backyard, sea level rise, and the importance of bay grasses. In total, 83 students were directly part of the program. These 83 students impacted our entire school and the surrounding community by sharing their projects with a guided naturalist tour for kindergarten, reading their stories to different grade levels, and sharing their iBooks and iMovies. Parents as well as friends of students were impacted by the projects as well as by a water bottle challenge that was initiated with the original 83 students but extended to other grade levels as well as families outside of school. The Coastal Awareness Program has been a great success at stimulating students to understand and care about the environment in which they live.

9:30 AM

STEWARDSHIP IN ACTION

Martha Gruber, Melinda Spall

Tampa Bay Watch's Bay Grasses in Classes program (BGIC) gives students the opportunity to maintain and grow Spartina alterniflora at their school in a Tampa Bay Watch sponsored salt marsh nurseries. The BGIC program has been involved with the Pinellas, Hillsborough, and Manatee County school districts since 1995. This on-going program at Tampa Bay Watch has restored more than 148 acres at more than 30 different sites throughout Tampa Bay, and coordinates over 1,500 students a year to perform this restoration work. The BGIC program has 17 active salt marsh nurseries at 15 middle and high schools in Tampa Bay. Each on-campus nursery provides hands-on opportunities for students to realize the importance of salt marsh vegetation to the estuarine ecosystem. The salt marsh plants are installed along the newly created tidal shoreline similar to natural marsh communities found along the wetland habitats throughout Tampa Bay. The program provides middle and high school students with an educational resource to learn about ecological and agricultural practices, while enhancing the science-based curriculums at their schools. The students see first-hand when they participate in restoration efforts the importance of wetland habitats and the web networks it provides to a variety of species that depend of this type of habitat. Currently, students have participated in salt marsh plantings at the Rock Ponds Ecosystem Restoration project. Partnerships with SWFWMD-SWIM and Hillsborough County have allowed students to play an active role in the bay's problems and solutions.

9:45 AM

THE ROCK PONDS ECOSYSTEM RESTORATION PROJECT – A TRUE MOSAIC OF COASTAL HABITATS FOR TAMPA BAY

Brandt Henningsen, Ph.D., Nancy T. Norton, P.E., Brad E. Young, M.S.

The Rock Ponds Ecosystem Restoration Project is the largest coastal restoration project ever performed for Tampa Bay, a cooperative effort between the Surface Water Improvement and Management (SWIM) Program of the Southwest Florida Water Management District (SWFWMD) and Hillsborough County. This project was identified as part of the Tampa Bay SWIM Plan as well as the Tampa Bay Estuary Program's Comprehensive Conservation and Management Plan for Tampa Bay. Located on three public parcels in the southeastern reaches of Tampa Bay, the project involves sites that historically were coastal pine flatwoods, scattered hardwood hammocks, and various estuarine and freshwater wetlands. Use of the tracts for agricultural purposes and sand/shell mining removed the majority of the historic plant communities and habitat values from these parcels; historic habitats were replaced by open mine pits, ditching/diking, and non-native vegetation. Accordingly, the project involves the restoration/enhancement of approximately 1043 acres of various coastal habitats (habitat mosaics): 645 acres of uplands (pine flatwoods, hardwood hammocks) and 398 acres of various estuarine and freshwater habitats. In addition, the project helps restore the area's hydrology, improves the bay's water quality via some stormwater polishing, creates fisheries habitats including salinity gradients and low salinity habitats, and supplements important bird nesting and feeding habitats. The project design will help accommodate projected sea level rise, allowing habitat migration upslope. Lastly, the project complements the SWIM/Hillsborough County Cockroach Bay Ecosystem Restoration Project located on the north side of Cockroach Bay, a multi-phase 500 acre restoration project completed during 2012.

10:00 AM

COMMUNITY-BASED PROGRAM OF SHORELINE STABILIZATION AND RESTORATION AT MACDILL AIR FORCE BASE

Jason Kirkpatrick, Peter Clark

MacDill's shoreline stabilization and restoration program is a multi-year project initiated by the Air Force and supported by Federal and local partners as well as hundreds of community volunteers. The project was developed as an alternative to the installation of traditional 'hardened' shoreline protection. This dynamic stabilization approach uses marine-friendly materials to create a 'living' system that restores natural shoreline stabilizers. The creation of a near shore reef allows salt marsh to re-establish along the shoreline further stabilizing the coastal system and also increasing habitat diversity. Considered innovative in 2004, oyster reef shoreline stabilization has proven to be a successful, cost-effective method for stabilizing coastal systems, one which also expands essential fish habitat.

But what makes the MacDill project truly special is the community-based approach to construction. The reef-building materials are installed exclusively by volunteers. MacDill AFB partners with Tampa Bay Watch to host community reef building events throughout

the year where civilian and military volunteers install the reef building materials. To date more than 600 volunteers have installed 9,300 marine-friendly concrete oyster domes and 18,000 oyster shell bags to create more than a mile of oyster reef along MacDill's southeastern shoreline. Once the reef is in place, students and community volunteers once again step in to plant marsh grass which historically existed along the coastline.
The Air Force has contributed $475,000 to support this community-based conservation project, but partnerships with multiple organization including USFWS, NOAA, and others have provided an additional $360,000 in funding to support construction of the reef.

10:45 AM
BLUE CARBON: A NEW TOOL FOR COASTAL CONSERVATION
Steve Emmett-Mattox, Steve Crooks, Stefanie Simpson
Coastal wetlands – salt marsh, seagrass and mangroves – have the ability to sequester and store significant amounts of carbon dioxide, while their destruction can result in the emission of CO2 and other greenhouse gases. We refer to this flux of GHGs into and out of coastal wetlands as "coastal blue carbon". This newly recognized ecosystem service has the potential to elevate prioritization of coastal restoration and conservation and influence management of these ecosystems to mitigate the impacts of climate change. An ongoing project in Tampa Bay has brought together scientists and managers working together in coastal blue carbon ecosystems to quantify the carbon storage and sequestration of these habitats and explore application of this knowledge to restoration and conservation efforts. Tampa Bay provides a unique setting for this study as it includes all three coastal habitats and has shown signs of increasing carbon sequestration abilities over the last decade.

This presentation will include an overview of blue carbon science and opportunities by national leaders in the field, as well as local perspectives on the role blue carbon has for management of Tampa Bay coastal habitats. Panelists will also present on the carbon sequestration and storage abilities of mangrove, salt marsh and seagrass habitats in Tampa Bay. This innovative project is a unique partnership of national and local agencies and the private sector, including the Tampa Bay Estuary Program, Tampa Bay Watch, Restore America's Estuaries, The Tampa Bay Environmental Restoration Fund, NOAA, U.S. EPA, U.S. FWS, ESA and Scotts Miracle Gro.

11:15 AM
ORGANIC CARBON BURIAL AND ACCRETION RATES IN TAMPA BAY'S COASTAL WETLANDS[S]
Amanda R. Chappel, Ryan P. Moyer, Joseph M. Smoak, Megan P. Burford, Simon E. Engelhart, Joshua L. Breithaupt, Andrew C. Kemp, Thomas J Smith III
Mangroves and salt marsh are the predominate terrestrial-to-marine transitional ecosystems along the Florida coast. These systems have historically been underestimated in terms of their role in the global carbon cycle. Climate change and sea-level rise (SLR) disrupt the wetland hydrologic cycle, compromising sediment accumulation and the rate of organic carbon (OC) burial, a direct measure of ecological integrity and viability of these systems. This study evaluates and compares the organic carbon content, sediment accumulation, and carbon burial rates in salt marsh and mangrove ecosystems of Southwest Florida. Tampa Bay has been a focus, as its natural shorelines are co-dominated by both marsh and mangrove habitats. Peat cores have been collected from marsh and mangrove sites in the Little Manatee River (LMR) basin of Tampa Bay and are compared to those from Charlotte Harbor estuary. Loss-on-ignition (LOI) analysis was used to estimate the OC content at these sites. Burial rates of organic carbon were assessed using constant rate of supply age models using measurements of excess 210Pb for short (centennial) time scales and 14C for longer (millennial) time scales. Preliminary results indicate that mangroves may have the ability to sequester carbon more efficiently than salt marsh, with deposition rates in marshes not keeping pace with SLR, thus furthering marsh-to-mangrove conversion. Additionally, wetlands in Tampa Bay tend to have a lower rate of carbon burial, demonstrating the need for proper mitigation and adaptation strategies to be established in the greater Tampa Bay area relative to future projections of SLR.

11:30 AM
MULTIPLE PATHWAYS: A STUDY OF TAMPA BAY SEAGRASS CLIMATE MITIGATION
David Tomasko, Ph.D.
For over 100 years, researchers have documented high rates of primary production in seagrass meadows. Primary production involves the assimilation of dissolved inorganic carbon (DIC) which could offset some of the increased availability of CO2 that helps to drive ocean acidification. Theoretically, uptake of DIC by expanded seagrass meadows could result in the mitigation of enrichment of coastal waters with CO2. However, reduced phytoplankton abundance, a result of management actions that have allowed for seagrass expansion, would be expected to act in the opposite direction, with lower levels of phytoplankton assimilating smaller quantities of DIC. As well, diurnal influences on pH would be more strongly manifested in waters with higher levels of primary production, which may or may not be occurring in areas that are transitioning from phytoplankton dominated shallow water environments to areas increasingly dominated by seagrass. This paper will present results of an assessment of rates of carbon assimilation in shallow, mid-depth and deep edges of turtle grass meadows in Old Tampa Bay and offshore of Fort DeSoto. The impact of these uptake rates on DIC and pH will be discussed in context of the expanded seagrass coverage seen in both Tampa Bay and Sarasota Bay. The combined influences of reduced phytoplankton and increased seagrass coverage will be discussed in terms of their potential impacts on ocean acidification.

11:45 AM
OCEAN ACIDIFICATION BUFFERING EFFECTS OF SEAGRASS IN TAMPA BAY
Kimberly K. Yates, Ryan P. Moyer, Christopher Moore, David Tomasko, Nathan Smiley, Legna Torres-Garcia, Christina E. Powell, Amanda R. Chappel and Ioana Bociu
The Intergovernmental Panel on Climate Change has identified ocean acidification as a critical threat to marine and estuarine species in ocean and coastal ecosystems around the world. However, seagrasses are projected to benefit from elevated atmospheric pCO2, are capable of increasing seawater pH and carbonate mineral saturation states through photosynthesis, and may help buffer against the chemical impacts of ocean acidification. Additionally, dissolution of carbonate sediments may also provide a mechanism for buffering seawater pH. Long-term water quality

monitoring data from the Environmental Protection Commission of Hillsborough County indicates that seawater pH has risen since the 1980's as seagrass beds have continued to recover since that time. We examined the role of seagrass beds in maintaining and elevating pH and carbonate mineral saturation state in northern and southern Tampa Bay where the percent of carbonate sediments is low (<3%) and high (>40%), respectively. Basic water quality and carbonate system parameters (including pH, total alkalinity, dissolved inorganic and organic carbon, partial pressure of CO2, and carbonate mineral saturation state) were measured over diurnal time periods along transects (50-100m) including dense and sparse Thalassia sp. seagrass beds, deep edge seagrass, and adjacent bare sand bottom. Seagrass density and productivity, sediment composition and hydrodynamic parameters were also measured, concurrently. Results indicate that seagrass beds locally elevate pH by up to 0.5 pH unit and double carbonate mineral saturation states relative to bare sand habitats. Thus, seagrass beds in Tampa Bay may provide refuge for marine organisms from the impacts of ocean acidification.

LUNCH + STUDENT AWARDS

12:30 PM

COMMUNITY CONNECTIONS CREATE BAY IMPROVEMENT

Misty Cladas, Ernie Franke, George Heinrich, Nestor B. Ortiz, Jr.

The Tampa Bay Estuary Program (TBEP) involves the public in the restoration and education of Tampa Bay using the Bay Mini-Grant and Give-A-Day for the Bay Programs. TBEP started the Bay Mini-Grant program in 1993 to empower the local community to become Bay stewards. Since 2000, funding has come from sales of the Tampa Bay Estuary specialty license plate and in 2014 had awarded $1.5 million to 292 different recipients. Grant projects recommended for funding by TBEP's Community Advisory Committee, include creating the popular Boating and Angling Guides, environmental programs for children, and lake and pond restorations by homeowner associations. TBEP brings the community into the environmental arena through volunteer workdays. Give-A-Day for the Bay workdays are held six times a year on Saturday mornings at parks and preserves within the watershed. Volunteer activities include removing invasive plants, planting native plants and trash and debris removal. Since 2010, 1,308 volunteers have worked 5,232 hours on 107.5 acres around Tampa Bay. This volunteer force, calculated into actual dollars represents $118,064.10 worth of time donated to improving Tampa Bay over a five-year period. A healthy Bay is important and involving the local community in protecting and restoring Tampa Bay will continue to be a top priority.

1:30 PM

HELPING HABITATS GET A HAND UP FOR CLIMATE CHANGE

Lindsay M. Cross

Climate change is anticipated to have significant impacts on habitats in the Tampa Bay region and scientists are exploring ways to improve their resiliency and to share pertinent messages with community members. The Tampa Bay Estuary Program has implemented several initiatives to research potential impacts, explore what habitats may be most vulnerable, and collaboratively develop appropriate management strategies for making them more resilient. Examples include the Critical Coastal Habitat Assessment - a long-term monitoring program to detect climate change impacts to coastal habitats; a blue carbon study that will examine how protecting or restoring estuarine habitats can assimilate carbon; and the "Chasing the Waves" photo exhibit that shows community members what sea level rise may look like in the future, using real-world examples of high, "King" tide events.

1:45 PM

THE RISING SEAS: MANAGING EXPECTATIONS FOR HABITAT RESTORATION ALONG FLORIDA'S SPRINGS COAST

Chris J Anastasiou, Ph.D

Sea-level rise along Florida's Springs Coast is a reality. How to protect and restore the spring-fed tidal habitats that make this region so unique must be placed within the context of a rising sea. So too must the public's expectations of restoration success also be placed within the same context. Fifty years ago, many of the spring-fed rivers and bays along Florida's Springs Coast, just north of Tampa Bay, were fresher than they are today. In only a few decades, these systems have become more marine and the ecological impacts have been profound. For example, today there is evidence of a greater abundance of saltwater fish, the presence of barnacles in traditionally freshwater areas, and loss of freshwater submerged aquatic vegetation. Ultimately systems like Kings Bay and the Homosassa River will look very different in the future than they did 50 years ago, or even as they look today. Stakeholders and citizens must work together to re-define what these systems can, and should, look like in a world with higher sea-level. Terms like "habitat creation" or even "ecological engineering" more accurately describe the necessary actions that must be undertaken to ensure these systems are the best they can be. Introducing salt-tolerant species of SAV through novel re-vegetation techniques is one example of how improving these systems may be accomplished in the face of what will undoubtedly be a much saltier world.

2:00 PM

HABITAT VULNERABILITY AND SUSTAINABILITY OF URBAN SEAGRASS RESOURCES TO SEA LEVEL RISE

Cynthia Meyer, Ph.D and Ruiliang Pu, Ph.D

The seagrass resource, an essential habitat in the marine ecosystem, may be quite vulnerable to impacts of sea level rise (SLR). We developed a spatial habitat suitability model (HSM) to evaluate the suitable habitat loss and gain from SLR impacts on the urban seagrass resource. High resolution bathymetry and field survey water quality data were used to develop the HSM from general additive models (GAM) for the seagrass resource in St. Joseph Sound (Adjusted R2= 0.72, n=134) and Clearwater Harbor North (Adjusted R2= 0.75, n=138) including salinity, chlorophyll-a concentration, total suspended solids, turbidity, and a light metric. The only significant variable was the light metric (logarithmic light attenuation) calculated from the water quality field survey transmittance (660nm) data and the high resolution bathymetry. Based on the predicted SLR scenarios (1ft-6ft: 2010 – 2100), the potential suitable seagrass habitat loss from the current 60 km2 of seagrass habitat ranged from 14 km2 (SLR 1ft) to 26 km2 (SLR 2ft) to the entire 60 km2 (SLR 6ft). The potential seagrass habitat gain ranged from 4 km2 (SLR 1ft) to 19 km2 (SLR 6ft). In this urbanized area, the current seawalls (47% of the shoreline) or further shoreline armoring could impede the inundation of the seawater and the seagrass colonization of these areas by creating a vertical boundary

for seagrass growth. While management of water quality would continue to benefit the seagrass resource, additional management strategies may be necessary to mitigate for potential decrease in suitable seagrass habitat related to the effects of SLR.

2:15 PM

ACTIONABLE SCIENCE IN PRACTICE: CO-PRODUCING CLIMATE CHANGE AND SEA LEVEL RISE INFORMATION FOR DECISION MAKING

Tirusew Asefa, Ph.D., P.E., D.WRE and Alison Adams, Ph.D., P.E.

The impact of climate variability, climate change and sea level rise on regional water supply availability and environmental sustainability has come to be a major concern for communities around the nation. Changes in precipitation patterns, increased temperature, and sea level rise pose significant risk in water supply reliability may alter demand patterns of a given region. One of the most challenging aspects of assessing and understanding these impacts, hence being able to be prepared for a climate hazard, is the lack of ready-to-use climate information that is consistent to a given locality's hydrological and climatological foot print at a spatial and time scale resolution that is meaningful. Often time production of such information does lack enough involvement of stakeholders who are better informed about their local challenges. This presentation highlights local, state, and national level ongoing collaborative efforts in co-producing actionable climate science data that is relevant to Tampa Bay area and demonstrates its application in understanding climate change impacts to the region. Efforts on making available "locally vetted" statistically and dynamically downscaled products that may be used for wide range of applications are underway.

2:45 PM

CHANGING THE CONVERSATION: COMMUNICATING ABOUT LOCAL CLIMATE CHANGE IMPACTS AND SCENARIOS FOR THE TAMPA BAY REGION

Rebecca Zarger, Libby Carnahan, Ramona Madhosingh-Hector, Lara Milligan

In this discussion the four panelists discuss key findings and insights from a two-year collaborative effort to understand how key stakeholders and local residents view climate change risk and vulnerability in the Tampa Bay region, and how to effectively translate this information for multiple public audiences. Jointly designed "Climate: Change the Conversation" community engagement programs were attended by 130 participants at four workshops between 2013 and 2015. Pre- and Post-program surveys were administered to participants. The public events are informed by findings from an NSF-funded study at USF, an interdisciplinary project that integrated global and regional climate science, local population demographics, and input from policy makers, planners, and scientists to develop visual climate change scenarios about potential impacts on linked social and ecological systems in Tampa Bay, with a particular emphasis on water resources. Interviews and development of spatial maps informed the public programs and facilitated dialogue on visualizing transformations linked to climate change on a relatable, localized scale. A 12 minute video describing three possible scenarios and additional visual materials will be available online to the public, other researchers, educators, and policymakers. The discussion will focus on lessons learned from the workshops about translating climate science from global or regional scales to local scales, communicating with decision makers, and gathering data about perceptions of climate change. We will discuss the opportunities and challenges of university/extension partnerships to conduct climate change education outreach that may be applicable to similar efforts taking place in the state of Florida and beyond.

3:45 PM

BASIS 6 SYNTHESIS

Susan Bell, Aaron Brown, Maya Burke, Lindsay Cross, Ernie Estevez, Holly Greening, Shawn Landry, Ed Sherwood

USFSP

CAMPUS MAP

USFSP BLDG | PARKING | NON-USFSP BLDG

EMERGENCY PHONE | USFSP POLICE (POL) | BICYCLE PARKING | RECYCLING BINS

PREFIX	BUILDING NAME
B&N	BARNES & NOBLE COLLEGE BOOKSELLERS
BAY	BAYBORO HALL
COQ	COQUINA HALL
COT	CENTER FOR OCEAN TECHNOLOGY
CRI	CHILDREN'S RESEARCH INSTITUTE
CUP	CENTRAL UTILITY PLANT
DAV	LOWELL E DAVIS MEMORIAL HALL
FPF	5TH AVE PARKING GARAGE FACILITY
HBR	HARBOR HALL
HNY	HANEY LANDING - SAILING CENTER
KRC	KNIGHT OCEANOGRAPHIC RESEARCH CENTER
MSL	MARINE SCIENCE LABORATORY
MSW	MARINE SHOP AND WAREHOUSE
ONE	ONE FIFTH AVENUE SOUTH BUILDING
PNM	PIANOMAN BUILDING
POL	UNIVERSITY POLICE (POL) SERVICES
POR	PLANT OPERATIONS/RECEIVING
POY	NELSON POYNTER MEMORIAL LIBRARY
PRW	PETER RUDY WALLACE FL CENTER FOR TEACHERS
RHO	RESIDENCE HALL ONE
SLC	STUDENT LIFE CENTER
SNL	SNELL HOUSE
STG	SCIENCE TECHNOLOGY
SVB	SPECIAL SERVICES BUILDING
TER	THE TERRACE
URL	USFSP RESEARCH LAB
USC	UNIVERSITY STUDENT CENTER
WEL	WELCOME EMERGENCY
WMS	WILLIAMS HOUSE
	POOL
	RECREATION FIELD
P2-P18	DECAL PARKING
V1-V2	VISITOR PARKING
1	THE GRIND/TAVERN AT BAYBORO
2	FISH AND WILDLIFE CONSERVATION COMMISSION
3	POYNTER INSTITUTE FOR MEDIA STUDIES
4	U.S. GEOLOGICAL SURVEY
5	YWCA/USF FAMILY VILLAGE
6	NATIONAL OCEANIC & ATMOSPHERIC ADM
7	USF FEDERAL CREDIT UNION

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9TH AVENUE SOUTH

10 AVENUE SOUTH

11TH AVENUE SOUTH

13TH AVENUE SOUTH

14TH AVENUE SOUTH

NATIONAL AIRLINES AVE SE

PENINSULA DR E

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