Florida Lake Management Society

29th Annual Technical Symposium

August 28-31, 2018

Fort Lauderdale Florida

Managing Impacts to Our Water Resources

Florida Lake Management Society
FLMS

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Florida Lake Management Society

29th Annual Technical Symposium

August 28-31, 2018

Westin Fort Lauderdale Beach Resort

Program Theme:

Managing Impacts to Our Water Resources

SYMPOSIUM PROGRAM

TABLE OF CONTENTS

TUESDAY – August 28, 2018- WORKSHOPS

8:00 AM-5:00 PM	**Check-In and Registration** (Atlantic Foyer)

8:15 AM – 12:15 PM **Workshop 1: Freshwater Fish of Florida Identification.** Rob Robins, Collections Manager, Florida Museum of Natural History and Co-Author of *Fishes in the Fresh Waters of Florida, An Identification Guide and Atlas* 2018
Room: Bonnet II, Mezzanine Level South Tower

8:15 AM – 12:15 PM **Workshop 2: Algal Identification in the Environment.** Dr. Dail Laughinghouse, Assistant Professor and Mr. David Berthold, M.S., Biological Scientist – Applied Phycology, University of Florida/IFAS, Fort Lauderdale Research and Education Center This workshop has 4.0 DACS applicator CEUs in aquatic weed control available.
Room: Bonnet I, Mezzanine Level South Tower

8:15 AM – 12:15 PM **Workshop 3: Using Drones in Environmental Applications.** Dr. Serge Thomas, Associate Professor for Environmental Studies, Florida Gulf Coast University, John Troutt, Regional Sales Representative, Xylem Analytics, and Joe Pitti, M.A., GISP, and Certified Drone Pilot, ESciences, Inc.
Room: Rio Vista, Mezzanine Level South Tower

10:00 – 10:15 AM	**MORNING BREAK -** Rio Vista Foyer
12:15 – 1:00 PM	**LUNCH** (*provided with full-day Workshop registration*) Rio Vista Foyer
2:45 – 3:00 PM	**AFTERNOON BREAK -** Rio Vista Foyer

1:00 PM –5:00 PM **Workshop 4: Invasive Plant Identification and Management.** Dr. Lyn Gettys, Assistant Professor – Aquatic and Wetland Plant Science, University of Florida Fort Lauderdale Research and Education Center *(Workshop will be held at UF/IFAS FLREC Facility, 3205 College Ave., Davie, FL 33314)* This workshop has 4.0 DACS applicator CEUs in aquatic weed control available.

1:00 PM–5:00 PM **Workshop 5: Stormwater BMP Selection to Maximize Removal of Target Pollutants-**Harvey H. Harper, Ph.D., P.E. – President, Environmental Research & Design, Inc.
Room: Rio Vista, Mezzanine Level South Tower

WEDNESDAY – August 29, 2018 – SYMPOSIUM

(* - Denotes student paper)

8:00 AM-5:00 PM	**Check-In and Registration** (Atlantic Foyer)
7:00 AM-8:30 AM	**Breakfast** (Atlantic Ballroom I-III)

Opening Program (Atlantic Ballroom IV-VI)

8:30-8:45 AM **Welcome & Opening Remarks: Sergio Duarte, Outgoing FLMS President**

8:45-10:00 AM **Keynote Speaker:** Lyn Gettys, Ph.D- Assistant Professor of Aquatic and Wetland Plant Science, University of Florida Center for Aquatic and Invasive Plants

Dr. Gettys will discuss introduction pathways for invasive aquatic plants. She will focus on how these plants got into our waters and the problems they can cause. This session has 1.5 DACS applicator CEUs in aquatic weed control available.

10:00-10:30 AM	**MORNING BREAK** (Exhibit Hall-Atlantic Ballroom I-III)

Program Track A: Water Resources Science and Technology (Atlantic Ballroom IV-VI)

Session A1: Restoration Science and Management

Moderator: Sergio Duarte

10:30-10:35 AM	*Session Introduction*
10:35-10:50 AM	Estimating Lake Okeechobee's Temporally Changing Marsh Extent using Remote Sensed Data-*Richard Botta*
10:50-11:05 AM	The SJRWMD Springs Protection Initiative-Linking Science and Restoration-*Rob Mattson*
11:05-11:20 AM	History of Gizzard Shad Harvesting as a Restoration Tool in St. Johns River Basin Lakes-*Steven Miller*
11:20-11:35 AM	Passive Steps Towards Floodplain Restoration - The Story Continues -*Danielle Honour/Shannon Wetzel*
11:35-11:50 AM	Elements of an Effective Lake Monitoring Program-*Harvey Harper*
11:50-12:00 PM	*Session Q&A*

12:00-1:30 PM	Annual Business Luncheon (Sky Terrace, Rooftop)

WEDNESDAY – August 29, 2018 AFTERNOON

Program Track B: Watershed and Water Resources Management (Atlantic Ballroom IV-VI)

Session B1: NPDES

Moderator: Shannon Carter Wetzel

1:30-1:35 PM	*Session Introduction*
1:35-1:50 PM	Demonstrating MS4 Effectiveness-*Steve Cioccia*
1:50-2:05 PM	Incorporating Pollutant Loading Data into MS4 Assessment Program-*Robert Potts*
2:05-2:20 PM	TMDL and MS4 Compliance-*Shannon Carter Wetzel*
2:20-2:35 PM	4E Plan Development and Implementation-*Rob Burnes*
2:35-2:50 PM	Improving Watersheds through Citizen and Industry Outreach-*Ryan Ryczek*
2:50-3:00 PM	*Session Q&A*

Program Track B: Watershed and Water Resources Management (Atlantic Ballroom IV-VI)

Session B2: Restoration Science and Management

Session Sponsor: Xylem, Inc.

Moderator: Ron Hart

3:00-3:05 PM	*Session Introduction*
3:05-3:20 PM	Evaluating Different Salt Sources as Seawater Proxies to Facilitate Greenhouse-Based Sea Level Rise Research-*Mohsen Tootoonchi**
3:20-3:35 PM	Cyanotoxin Patterns in The St. Johns River Estuary-*Tiffany Trent*
3:35-3:50 PM	To dredge or cap… That is the question when performing a nutrient management alternatives analysis using Sediment Flux -*Mary Szafraniec*
3:50-4:05 PM	Science before Projects: Decision-Tree Support Tool to Drive Lake Management-*Emily Keenan*
4:05-4:15 PM	*Session Q&A*

4:15-4:45 PM	**AFTERNOON BREAK** (Exhibit Hall- Atlantic Ballroom I-III)

WEDNESDAY – August 29, 2018 AFTERNOON (Cont.)

Program Track B: Watershed and Water Resources Management (Atlantic Ballroom IV-VI)

Session B3: Hurricane Management Response

Moderator: Gary Russ

4:45-4:50 PM	*Session Introduction*
4:50-5:20 PM	U.S. Army Corps of Engineer's pre and post actions regarding Hurricane Irma- *Gary Russ/Almur Whiting IV, P.E.*
5:20-5:35 PM	Private Sector Hurricane Response-*Robbin Huffines*
5:35-5:50 PM	Title to be Determined-*Mitch Smeykal*
5:50-6:00 PM	*Session Q&A*

WEDNESDAY - August 29, 2018 EVENING

6:00-8:00 PM	**EXHIBITORS' SOCIAL** (Exhibit Hall – Atlantic Ballroom I-III)

6:00-8:00 PM	**Session 4: Poster Session** (Exhibit Hall – Atlantic Ballroom I-III) Session Lead: April Verpoorten

THURSDAY - August 30, 2018 MORNING

(* - Denotes student paper)

8:00 AM-5:00 PM	**Check-In and Registration** (Atlantic Foyer)
7:00 AM-8:30 AM	**Breakfast** (Atlantic Ballroom I-III)

Morning Program (Atlantic Ballroom IV-VI)

8:45-9:00 AM	**Announcements:** Rob Burnes, Incoming FLMS President
9:00 -10:00 AM	**Keynote Speaker**: Karl Havens Ph.D, Professor, University of Florida IFAS, Director Florida Sea Grant College Program Dr. Havens will discuss the potential effects that climate change could have on shallow Florida lakes, due to such factors as increased temperature, increased ET, and greater extremes in wet / dry periods.

10:00-10:30 AM	**MORNING BREAK** (Exhibit Hall – Atlantic Ballroom I-III)

Program Track A: Water Resources Science and Technology (Atlantic Ballroom IV-VI)

Session A2: Lake Apopka-Restoration Science and Management

This session has 1.5 DACS applicator CEUs in aquatic weed control available.

Moderator: Erich Marzolf

10:30-10:35 AM	*Session Introduction*
10:35-10:50 AM	Results of Innovative Restoration Techniques at Lake Apopka, Florida -*Erich Marzolf Ph.D*
10:50-11:05 AM	Let there be light: light extinction, water quality, and SAV in Lakes Apopka and Griffin-*Rolland Fulton*
11:05-11:20 AM	Deconstructing Underwater Light Extinction In Lake Apopka, FL-*Michael Coveney*
11:20-11:35 AM	The Role of Gizzard Shad Harvesting in the Restoration of Lake Apopka --*Dean Dobberfuhl Ph.D*
11:35-11:50 AM	What has Limited SAV Colonization in Lake Apopka, FL-*Michael Coveney*
11:50-12:00 PM	*Session Q&A*

12:00-1:30 PM	**FLMS Annual Awards Luncheon** (Sky Terrace, Rooftop)

THURSDAY – August 30, 2018 AFTERNOON

Program Track A: Water Resources Science and Technology (Atlantic Ballroom IV-VI)

Session A3: Water Resources Innovation and Technology

Moderator: Harvey Harper

1:30-1:35 PM	*Session Introduction*
1:35-1:50 PM	Making Water Quality Data More Accessible and More Useful-*John Maxted*
1:50-2:05 PM	An Innovative In-Lake Alum Addition System to Improve Lake Water Quality and Enhance Effectiveness of Wet Detention Ponds-*Harvey Harper*
2:05-2:20 PM	Using Integrated Software Applications and GIS Solutions to Collect, Analyze and Present Long-Term Monitoring Data-*Arte Roman*
2:20-2:35 PM	Using Machine Learning and Geostatistics to Overcome Lack of Data in Assessing Hydrologic Recovery of Unmonitored Lakes and Wetlands-*Dan Schmutz*
2:35-2:50 PM	An Assessment of The Lowerance Sonar Data Collection and Biobase Data Processing System for Detecting Submerged Aquatic Vegetation in a Soft Bottom Central Florida Lake-*John Stenberg*
2:50-3:00 PM	*Session Q&A*

3:00-3:25 PM	**AFTERNOON BREAK** (Exhibit Hall –Atlantic Ballroom I-III)

THURSDAY – August 30, 2018 AFTERNOON (cont.)

Program Track B: Watershed and Water Resources Management (Atlantic Ballroom IV-VI)

Session B4: Aquatic Plants Assessments and Harmful Algae

Session Sponsor: UPI Aquatics

This session has 2.0 DACS applicator CEUs in aquatic weed control available.

Moderator: Robbin Huffines

3:25-3:30 PM	*Session Introduction*
3:30-3:45 PM	Can Herbicide Usage be Reduced with Herbivory Pressure from Biocontrol Agents?-*Sam Sardes*
3:45-4:00 PM	Rotala turns 22- What we Know Now-*Kyle Thayer*
4:00-4:15 PM	Aeration for Algae Control: The Importance of Design and Mixing Depth-*Patrick Goodwin*
4:15-4:30 PM	Crested Floatingheart Reproductive Biology-*Ian Markovich**
4:30-5:10 PM	Field Identification of Algae-*H. Dail Laughinghouse IV, Ph.D/David Berthold*
5:10-5:20 PM	*Session Q&A*

5:30-6:00 PM	FLMS Board Meeting – Seabreeze, Mezzanine Level South Tower

FRIDAY – August 31, 2018 MORNING

8:00 AM-12:00 PM	**Check-In and Registration** (Atlantic Foyer)
8:00 AM-9:00 AM	**Breakfast** (Atlantic Ballroom I-III)
8:45-8:55 AM	Announcements: Rob Burnes, Incoming FLMS President

Program Track B: Watershed and Water Resources Management (Atlantic Ballroom IV-VI)

Session A4: Nutrient Reduction and Management

Moderator: Rob Burnes

8:55-9:00 AM	*Session Introduction*
9:00-9:15 AM	The use of UAVs to help improve our understanding of the limnology of urban stormwater ponds-*Serge Thomas Ph.D*
9:15-9:30 AM	It's not Just the Mercury-Contaminants in Fish and Critters Traditionally Consumed by Seminole Tribe Members-*Charles Fellows*
9:30-9:45 AM	Canal Sediment Contaminants on Seminole Reservations-What's in your Sediment?-*Bryan Cotter*
9:45-10:00 AM	Monitoring the response of Sunshine Lake to implementation of identified projects in the water quality management plan: Did it work? - *Dave Tomasko*
10:00-10:15 AM	Polymer BMP Use in Florida-*Eddie Snell*
10:15-10:25 AM	*Session Q&A*
10:25-10:40 AM	**MORNING BREAK** (Exhibit Hall – Atlantic Foyer)

Program Track B: Watershed and Water Resources Management (Atlantic Ballroom IV-VI)

Session B5: Outreach and Volunteer Programs

Moderator: Dan Schmutz

10:40-10:45 AM	*Session Introduction*
10:45-11:00 AM	Lake County Adopt-a-Lake Program-Volunteer Monitoring-*Cathie Catasus*
11:00-11:15 AM	Restoration of Show-Case Stormwater Ponds - A Community Effort-*Ernie Franke*
11:15-11:30 AM	The Member Owned Inlet Beach Water System, The Walton County Owned Regional Utilities, The Outstanding Florida Water Lake Powell And The Conflict and Dilemma.-*Richard Bryan*
11:30-11:40 AM	*Session Q&A*
11:40 -12:00 PM	Student Awards and Closing Remarks – Rob Burnes, FLMS President

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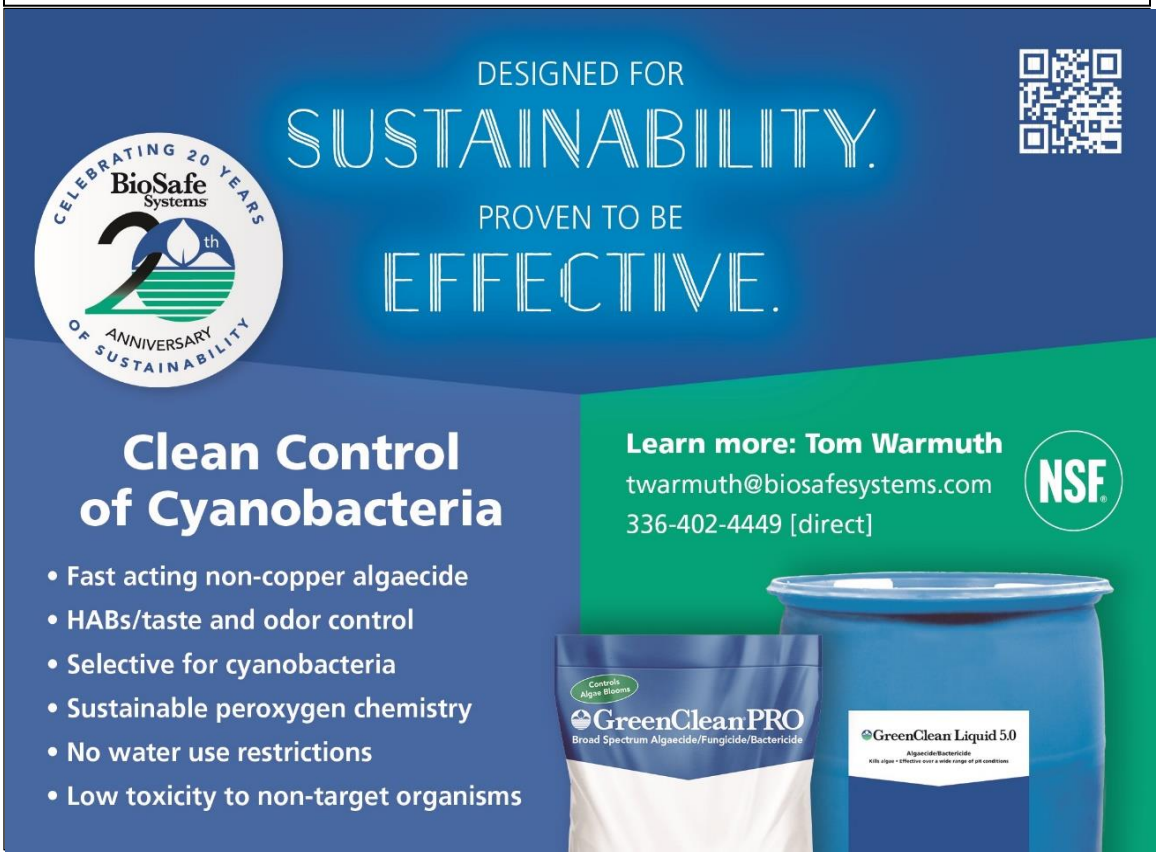

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Keynote Speakers

Dr. Lyn Gettys

Dr. Lyn Gettys is an Assistant Professor at the University of Florida IFAS Ft. Lauderdale Research and Education Center in Davie, Florida USA. She has a Ph.D. in plant genetics from the University of Florida with extensive experience in plant propagation, herbicide resistance, weed science and wetland/aquatic plant biology and identification. She began her current position in January 2012; prior to that, she worked as a Research Assistant Scientist at the UF/IFAS Center for Aquatic and Invasive Plants in Gainesville, Florida USA. Her research on invasive plants focuses on the biology, ecology and control of introduced exotic species. Her native plant research includes propagation, nursery production, habitat restoration techniques, and using plants for phytoremediation. She also maintains a collection of native and exotic plants for teaching and demonstration purposes. Dr. Gettys is this year's recipient of the Edward Deevey, Jr. Award from the Florida Lake Management Society for her work in invasive aquatic plants.

Dr. Karl Havens

Dr. Karl Havens has 35 years of professional experience in aquatic research, education and outreach, and has worked with Florida aquatic ecosystems and the use of objective science in their management for the past 23 years. His area of research specialty is the response of aquatic ecosystems to natural and human-caused stressors, including hurricanes, drought, climate change, eutrophication, invasive species and toxic materials. Dr. Havens is a Professor in the UF/IFAS School of Forest Resources and Conservation, Program for Fisheries and Aquatic Sciences, where he serves on graduate committees, is conducting collaborative research related to effects of toxic algae blooms on river and estuary zooplankton, and teaches a course in plankton ecology.

Dr. Havens has published over 150 peer-reviewed journal articles in his area of expertise, several book chapters, several invited review papers, an edited book with colleagues in the P.R. China and a book on the Global Water Crisis. Most recently he and his international colleagues have written papers about the expected synergistic effects of climate change and eutrophication on lakes and estuaries, long-term changes in water temperatures of lakes around the world, patterns of aquatic animal body size across a large latitudinal gradient, and the future of controlling harmful algal blooms in the face of climate change. He is the founding editor of the electronic journal *Freshwater Systems*, is Associate Editor for the Journal of Plankton Research and the journal *Hydrobiologia*, and is a member of the Editorial Board of *Nature Scientific Reports*.

He is a recipient of the Edward Deevey, Jr. Award from the Florida Lake Management Society for his research dealing with Florida lake ecosystems.

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FLMS 2018 AWARDS OF EXCELLENCE

The Board of Directors is pleased to announce this year's award winners!

THE MARJORIE CARR AWARD

Mark Hoyer

The Marjorie Carr Award *is the Society's highest award and is given for lifetime work on behalf of Florida's aquatic resources. This award is named in honor of Marjorie Carr who, among other things, organized citizens and brought to an end the proposed Cross Florida Barge Canal.*

THE EDWARD DEEVEY, JR. AWARD

Dr. Lyn Gettys

The Edward Deevey, Jr. Award *is given to an individual for contributing to our scientific understanding of Florida's water bodies. Edward Deevey was an internationally recognized limnologist and affiliated with the State Museum of Florida at the time of his death.*

THE MARJORY STONEMAN DOUGLAS AWARD

Tom Fitz

The Marjory Stoneman Douglas Award *is given to individuals who report on aquatic resource issues. This award is named in honor of Marjory Stoneman Douglas who authored the book "Everglades: River of Grass", founded the Friends of the Everglades and who has been environmentally active in south Florida.*

THE SCOTT DRIVER AWARD

Carlton Lane

The Scott Driver Award *is given to an environmental advocate who has promoted the restoration, protection and/or appreciation of Florida's aquatic resources. Scott was a well know activist on behalf of Lake Okeechobee and a member of the steering committee that founded the FLMS.*

THE RICHARD COLEMAN AWARD

Tom Morris

The Richard Coleman Aquatic Resources Award *is given to a professional who has worked to restore, protect and/or advance our understanding of Florida's aquatic resources*

THE DR. DANIEL E. CANFIELD, JR. VOLUNTEERISM AWARD

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The Dr. Daniel E. Canfield, Jr. Volunteerism Award *is given to a volunteer organization or outstanding volunteer for significant contributions to the research, restoration and/or preservation of our water resources. The award is named after Dr. Daniel Canfield, founder of Florida LAKEWATCH, the pioneering citizen-volunteer water quality monitoring program involving over 1,200 lakes statewide, and now being emulated across the United States.*

Session Abstracts

Session A1: Restoration Science and Management

Moderator: Sergio Duarte
Wednesday, August 29, 2018. 10:35 am to 12:00 pm

ESTIMATING LAKE OKEECHOBEE'S TEMPORALLY CHANGING MARSH EXTENT USING REMOTE SENSED DATA

Richard A. Botta
South Florida Water Management District, West Palm Beach, FL

The NASA legacy Landsat missions have provided data for over 40 years and with the addition of ESA's Sentinel missions a depth of knowledge that was once unattainable is now not only available but is also free for all to use. Data resolution has also increased and provides an impressive quantitative documentation through time. With increased availability, frequency and resolution of satellite data, it has become increasingly possible to use this wealth of information for environmental research.

Lake Okeechobee, a 1116 km^2 (431 mi^2) subtropical lake located in Florida, has a large littoral zone covering approximately one fourth of its area. With the construction of a large earthen levee surrounding the lake, the natural hydrology has been extremely modified. Research indicates that maintaining proper lake stages between approximately 3.8 m and 4.7 m (12.5 ft to 15.5 ft) NGVD can lead to the best overall ecological health for the littoral marsh. Evaluating the littoral zone with aerial photography leads to highly detailed vegetation maps but acquisition and analysis of imagery is costly and time consuming. This limits full lake analysis to no more than once every 3-5 years.

Lake management and stochastic events, including hurricanes and droughts, have affected the spatial distribution and extent of the littoral vegetation on Lake Okeechobee. Herein we use this free and readily available satellite data to look at the change in extent of the marsh as well as decadal differences. For this initial analysis, a normalized differential vegetation index (NDVI) was calculated to distinguish open water areas from emergent vegetation in GIS. In addition, we employed this technique to estimate changes before and after Hurricane Irma. With data being collected every several weeks, we were able to conduct a rapid assessment of the emergent edge of the marsh; approximately 2,100 hectares (5,200 acres) may have been directly displaced by the storm.

Using satellite data within Lake Okeechobee puts a wealth of data at our fingertips. This legacy knowledge only continues to improve and can be a robust aid in making sound environmental and management decisions. In addition, this same technique can be applied to countless other lakes throughout Florida and beyond.

THE SJRWMD SPRINGS PROTECTION INITIATIVE – LINKING SCIENCE AND RESTORATION

Robert A. Mattson, CEP, CSE, Casey Fitzgerald, Dean Dobberfuhl, PhD
St. Johns River Water Management District, Palatka, FL

Spring-run stream ecosystems in Florida have exhibited changes in physicochemistry and ecology over the last 50 years. In an effort to better understand these changes, generate the data to guide restoration efforts, and initiate projects to improve spring flow and water quality, the St. Johns River Water Management District (District) began a Springs Protection Initiative (SPI) in 2013. The program had two main components:

1) A science element that had as a main goal better understanding of the factors/drivers affecting primary producer community structure (vascular plants and algae), and
2) A projects element that provided funding to local governments, utilities, and communities to implement projects that reduce groundwater withdrawal and/or reduce nutrient loading to the landscape

The primary science project was a 3-year, ~$3 million study contracted with the University of Florida. This study involved multiple principal investigators from several colleges and departments in the University. Two other elements of the science component of the SPI were a short term (1-year) intensive biological survey of 14 spring-run stream ecosystems in central and north Florida (via a contract with Amec Foster Wheeler) and the deployment of continuous monitoring sensors in many springs in the St. Johns River basin.

The main findings of the springshed research were that land use is a strong influence on nitrate concentrations in soils; that much of the water and nitrate delivered to the Silver Springs group is via flow through conduits in the limestone of the Floridan Aquifer System, and that denitrification in the aquifer has the potential to remove a substantial fraction of nitrate in the groundwater before it reaches the springs group. Major findings of the spring ecosystem group were that ecosystem primary production does not appear to be nitrogen-limited, rather the main controls were temperature and light, high concentrations of nitrate do not inhibit macrophyte growth, current velocity strongly influences epiphyte burdens on submerged macrophytes, and that algal abundance in the Silver River is not influenced by grazing.

The projects component of the SPI utilized funding from the District, the State of Florida, and local cooperators to implement projects that either or both reduced groundwater withdrawal and reduced nitrogen loading to the landscape. Priority was given to projects located in the springsheds of the "Outstanding Florida Springs" designated in the Florida Springs and Aquifer Protection Act passed by the Florida Legislature in 2016. Since 2014 the District has provided cost-share funding to 76 projects with a total expenditure (District, State, and local partner funding) of more than $127 million. Selection of many of these projects was based on a combination of existing knowledge and best professional judgement. District staff are now working on integrating the scientific findings and conclusions with the project selection process and evaluating implications for amendments to District rules and regulations

THE HISTORY OF GIZZARD SHAD HARVESTING IN REMOVING NUTRIENTS AND ATTEMPTING TO RESTORE EUTROPHIC FLORIDA LAKES

Steven J. Miller, John Higman, Walter F. Godwin, Roland S. Fulton III
St. Johns River Water Management District, Palatka, FL

Since 1990, the St. Johns River Water Management District (SJRWMD) has been commercially harvesting Gizzard Shad (*Dorosoma cepedianum*) from St. Johns River Basin lakes as part of a multifaceted effort to remove nutrients, improve water quality, and restore lake health. Lakes from which shad have been harvested include Denham (1990-1992), Apopka (1993-2018), Griffin (2002-2008), Dora (2005-2006), Newnans (2010), and George (2012-2018). To date, nearly 36,000,000 lbs. of Gizzard Shad have been commercially harvested by the program. This harvest equates to a direct removal of nearly 297,000 lbs. of total phosphorous and 791,000 lbs. of total nitrogen from District lakes. There are also additional indirect nutrient removal benefits of the shad harvest derived from removing fish that partially feed on benthic sediments and release nutrients bound in those sediments back to the water column in a readily bioavailable form. Gizzard Shad harvesting is conducted primarily with commercial gill nets up to 300 yards in length having 4.0 to 5.0 inch stretched mesh webbing. This large mesh size minimizes the catch of non-target species but limits our ability to exploit all but the largest individuals of the shad population. Harvested fish are processed through a commercial fish house and sold to crayfish farms and crab fisherman which helps subsidize harvest cost. In this paper we provide a history and overview of the SJRWMD commercial harvest program and results observed. Effects of the commercial harvest on Gizzard Shad populations, sport fishes and other non-target species, along with monitoring requirements to prevent adverse impacts, are discussed. Results indicate that the commercial harvest of Gizzard Shad can provide a valuable cost-effective tool for removing nutrients from tropical eutrophic lakes in Florida and aid in their restoration.

PASSIVE STEPS TOWARDS THE RESTORATION OF THE LAKE JESUP FLOODPLAIN

Shannon Carter Wetzel[1], Danielle Honour, P.E., D.WRE[2] Gloria Eby[1], and Kim Ornberg, P.E.[1]
[1]Seminole County Watershed Management Division, Sanford, FL
[2]CDM Smith, Maitland, FL

The Black Hammock is an agricultural and rural residential community located on the southeast shore of Lake Jesup in Seminole County, Florida. Lake Jesup is an impaired water body with an adopted total maximum daily load (TMDL) and basin management action plan (BMAP). Black Hammock was identified in the 2008 Lake Jesup Interagency Restoration Strategy as an area with potential sources of high nutrient loading to the lake. Stormwater runoff in the southeastern watershed is generally conveyed through the Black Hammock and ultimately discharge to Lake Jesup through Shortcut Canal, Sweetwater Creek and Salt Creek. During the 1920's, portions of Salt and Sweetwater Creeks were dredged and channelized to support agricultural activities in the area. Much of the excavated fill was deposited along the straightened banks of the creeks, effectively cutting off the connection to the historical floodplain. Today, both Sweetwater and Salt Creeks convey storm flows to Lake Jesup for flood control purposes and there are currently very few best management practices (BMPs) in place to control nutrients or other pollutants. In early 2013, Seminole County received a grant from FDEP to rehabilitate the Salt and Sweetwater Creek systems. A design effort was initiated to identify feasible options to passively re-connect the channelized streamflow with the historic floodplain areas of Salt Creek. Concurrently, the restoration effort for Sweetwater Creek includes aerial herbicide spraying and subsequent harvesting of existing invasive vegetation, replanting native vegetation and muck removal from the creek. Execution of this project has

been a cooperative partnership between FDEP, SJRWMD, Seminole County and the local community. The presentation will provide a historical perspective on water quality issues in the watershed, an overview of the challenges encountered during design and implementation and the anticipated benefits of the restoration to Salt and Sweetwater Creeks.

ELEMENTS OF AN EFFECTIVE LAKE MONITORING PROGRAM

Harvey H. Harper, Ph.D., P.E.
Environmental Research & Design, Inc. (ERD), Orlando, FL

Current lake monitoring programs vary widely in terms of the parameters measured and data collected. Many programs do collect the minimum data necessary to verify compliance with Numeric Nutrient Criteria (NNC) or State water quality criteria, while other programs collect unnecessary data with questionable value. Recommended elements of an effective lake monitoring program will be discussed. Recent revisions to water quality criteria related to dissolved oxygen, bacteriological contamination, and organic compounds will be addressed with emphasis on how these changes impact lake water quality protection and lake monitoring program.

Session B1: NPDES
Moderator: Shannon Carter Wetzel
Wednesday, August 29, 2018. 1:35 pm to 3:00 pm

DEMONSTRATING MS4 EFFECTIVENESS

Stephen Cioccia
Florida Department of Environmental Protection, Tallahassee, FL

The Clean Water Act (40 CFR 122.26(d)(2)(v)) requires 'Assessment of Controls', the intent of which is to estimate reductions of pollutants discharged from MS4s. To satisfy this intent, the Department has incorporated a new requirement in its Phase I MS4 permits. Each MS4 permittee must develop an 'Assessment Program', initiated with permit re-issuances in May 2016. The intent of this activity for each MS4 permittee to evaluate existing permit activity requirements, or propose additional activities, which produce information to be used to evaluate the effectiveness of the MS4's program. This effectiveness is in terms of reduction of pollutants discharged, improvements to receiving waters' quality and the overall effectiveness of the MS4's Storm Water Management Plan (SWMP). This presentation will describe several of the innovative approaches MS4 permittee's have developed to accomplish the assessment of MS4 stormwater systems' pollutant reduction control mechanisms.

INCORPORATING POLLUTANT LOADING DATA INTO AN MS4 ASSESSMENT PROGRAM

Robert J. Potts
E Sciences, Incorporated, Orlando FL

The NPDES Municipal Separate Storm Sewer System (MS4) permit regulates stormwater discharges from certain storm drainage systems to waters of the state. Operators of medium and large MS4s (those serving populations greater than 100,000 and 250,000 respectively) are regulated under the Phase I MS4 permit. Phase I MS4 permittees are required to develop a stormwater management program (SWMP) that reduces pollutant loads from the MS4 to waters of the state to the maximum extent practicable (MEP).
Under Part V.B.2 of the Phase I MS4 permit, permittees are required to develop an Assessment Program that evaluates the overall effectiveness of their SWMP in reducing pollutant loadings from the MS4 to waters of the state and identifies portions of the MS4 that can be targeted for pollutant load reduction. This presentation will discuss the methods and benefits of incorporating pollutant loading data into the MS4 Assessment Program.

TMDL AND MS4 COMPLIANCE

Shannon Carter Wetzel
Seminole County Public Works, Watershed Management Division, Sanford, FL

Municipalities have to meet certain regulatory requirements stemming from the Clean Water Act (CWA). One of the major programs to come out of the CWA is the National Pollution Discharge Elimination System (NPDES) stormwater program. The NPDES program regulates discharges from three (3) potential sources: Municipal Separate Storm Sewer Systems (MS4s), construction activities and industrial activities. Most municipalities, depending on their population, are considered either a Phase I or Phase II MS4. The Watershed Management Division of Seminole County has been responsible for the oversight and annual reporting of Seminole County's Phase I NPDES MS4 stormwater permit since 1998. Since that time, the Division has also been involved with the development and implementation of federal and state Total Maximum Daily Loads (TMDLs) and Basin Management Action Plans (BMAPs). In the past, the regulatory oversight groups have not always collaborated with the watershed assessment groups within state and local government, but that is beginning to change. During the last NPDES permit cycle several of the TMDL and BMAP reporting requirements have been incorporated into the County's Phase I NPDES MS4 permit requirements.
Understanding the crossover between the NPDES and TMDL programs is beneficial if you are part of an ambient surface water monitoring program or part of a NPDES stormwater program. Often times, these two (2) programs are not part of the same division or department and may be unaware of each other's activities. For example, Phase I NPDES MS4 permits require applicants to prepare and submit a TMDL Prioritization Plan for all waterbodies that have a TMDL but are not part of a BMAP. In order to accurately and efficiently prioritize these waterbodies, it is imperative that the NPDES, watershed monitoring and lake management groups collaborate. There are several other annual NPDES reporting requirements that also require collaboration between a variety of stakeholders. The Watershed Management Division of Seminole County is responsible for surface water monitoring and assessment as well as NPDES permit oversight and annual reporting. Having both programs within the same division allows a collaborative effort to effectively meet multiple regulatory compliance goals.

4E PLAN DEVELOPMENT AND IMPLEMENTATION

Rob Burnes[1], *Stacey Day PhD*[1], *Kelli Hammer Levy*[1] *Anthony Manello*[2]
[1]Pinellas County Environmental Management, Clearwater, FL
[2]City of Tarpon Springs, Tarpon Springs, FL

The Florida Department of Environmental Protection created the 4e category for waterbodies that indicate impairment but are undergoing or recently completed restoration activities. The water body is still included on the 303 (d) list but the 4e classification allows for the postponement of placing the waterbody on the Verified List for one five-year assessment cycle. Once developed, the goal of a 4e plan is to implement appropriate restoration activities and, if necessary, additional studies so that by the next assessment cycle either a 4b Reasonable Assurance Plan (RAP) can be approved or the waterbody is determined to attain water quality standards.

Pinellas County has developed and is in the process of implementing several 4e plans. The benefits to implementing these plans three-fold. The first benefit is that the plan is developed and controlled by the local stakeholders. Second, an approved plan defers TMDL development by immediately moving into restoration activities and subsequent evaluation of restoration progress. Third, this category allows the stakeholders put their energy into fixing the problems and implementing projects and best management practices. This presentation will cover development, coordination, and implementation aspects of using a 4e plan for a waterbody.

IMPROVING WATERSHEDS THROUGH CITIZEN AND INDUSTRY OUTREACH

Ryan Ryczek
Pinellas County Environmental Management, Clearwater, FL

Pinellas County Environmental Management has an extensive pollution prevention-based approach to improving water quality through outreach. Because Pinellas County is highly urbanized and has high transient population from a tourism-based economy, diverse sources of nonpoint source pollution are difficult to address which is why broad education of the general public is critical. By utilizing an array of outreach and education opportunities, including some new techniques, we are able to address a variety of sources of pollution. We will explore the factors that determine how the outreach opportunities are chosen each year and how funding sources may restrict how moneys are spent. Recent trends in water quality indicate sweeping nutrient reductions throughout several watersheds, across jurisdictional boundaries. This potentially indicates that the implementation of a countywide fertilizer and landscape ordinance and broad education programs for watershed protection are likely significant factors in the observed water quality improvements.

Session B2: Restoration Science and Management
Moderator: Ron Hart
Wednesday, August 29, 2018. 3:05 pm to 4:15 pm
Sponsored by Xylem, Inc.

EVALUATING DIFFERENT SALT SOURCES AS SEAWATER PROXIES TO FACILITATE GREENHOUSE-BASED SEA LEVEL RISE RESEARCH

Mohsen Tootoonchi and Lyn A Gettys
University of Florida Institute of Food and Agricultural Sciences, Fort Lauderdale Research and Education Center, FL

Climate change and sea level rise can alter vegetation composition in aquatic ecosystems. Using actual seawater to study salinity effects in laboratory and greenhouse experiments is not always feasible, hence commercially available salts might be viable substitutes to mimic natural saltwater-freshwater systems. In this study, we evaluated growth of *Vallisneria americana* and *Hydrilla verticillata* under four salinity levels (0.5, 1.0, 2.5 and 5.0 ppt) induced by four salt sources (seawater, Instant Ocean Aquarium Mix, laboratory-grade NaCl and Morton Sea Salt). Plants were grown in separate fertilized pots filled with one of two substrates (builders' sand or field soil) and were submersed in 60-L mesocosms filled with pond water. Salinity levels were increased gradually and water level, salinity and pH were monitored every week. After 13 weeks exposure to target salinity levels, plants were visually evaluated on a 0 to 10 scale and harvested to record wet and dry weights. Substrate had no effect on plant biomass or visual quality. Hydrilla cultured with Morton or NaCl had significant damage and reductions in biomass at 2.5 ppt and was eradicated after exposure to 5.0 ppt salinity. In contrast, hydrilla was less damaged when salinities of 2.5 and 5.0 ppt were induced using Instant Ocean or seawater and eradication did not occur. Vallisneria was not affected by different salt sources or salinity levels. These results suggest that Instant Ocean Aquarium Mix is an appropriate proxy for inducing salinity in mesocosm experiments as its effects on plant biomass were similar to those in seawater.

CYANOTOXIN PATTERNS IN THE ST. JOHNS RIVER ESTUARY

Tiffany Trent, Rolland Fulton, John Hendrickson
St. Johns River Water Management District, Palatka, FL

Phytoplankton and the cyanotoxins microcystin and cylindrospermopsin collected throughout the St. Johns River Estuary from Lake George to Jacksonville from 2005-2017 were divided and analyzed according to river section and morphology. Results relate algal toxins to dominant phytoplankton species, and identifies relationships between cyanotoxin concentration, phytoplankton taxa, and water quality.

TO DREDGE OR CAP…THAT IS THE QUESTION WHEN PERFORMING A NUTRIENT MANAGEMENT ALTERNATIVES ANALYSIS USING SEDIMENT FLUX

Mary Szafraniec, PhD, PWS
Wood Group, Tampa, FL

There is a general lack of data tracking improvements from sediment nutrient management. Prior to conducting a large scale and costly restoration project that may include sediment removal or chemical inactivation to improve water quality in a waterbody, it is important to understand how the action may affect the overlying water column and downstream waterbodies after implementation. Results from a few alternatives analysis case studies that used Wood's (previously Amec Foster Wheeler) field and laboratory Standard Operating Procedures to collect and incubate intact sediment cores will be presented. The case studies estimated flux rates from highly eutrophic lakes and waterbodies built on lands previously mined for phosphate in Central Florida. Sediment cores were incubated in the laboratory to evaluate several alternatives such as sediment capping by applying chemical, physical or biological treatments to the cores to answer the question as to what extent the alternatives would reduce the rate of nutrients (orthophosphate and ammonia-nitrogen) releasing into the water column. The magnitude and variability of internal nutrient flux rates and loads from the sediments to the water column were compared across a multitude of alternatives that included capping with clean fill, organic material, Phoslock ©, alum, and biological amendments. In addition to the laboratory bench scale assessments, the case studies assessed each alternative to compare the technical feasibility, costs, potential water quality improvement and regulatory compliance. The results of these case studies can be used to assist with watershed restoration planning as sediment nutrient removal or chemical/biological amendments can be compared against other aquatic system restoration BMPs along with costs to develop long-term plans. More specifically, the results can be used in the prioritization of removal or chemical inactivation of sediment types, and to quantify the potential beneficial impacts of sediment nutrient management on water quality.

SCIENCE BEFORE PROJECTS: DECISION-TREE SUPPORT TOOL TO DRIVE LAKE MANAGEMENT

Emily Keenan[1], Dave Tomasko[1], Laurie Smith[2], David Loy[3] and Renee Price[3]
[1]ESA, Tampa, FL
[2]City of Lakeland, Lakes and Stormwater Division, Lakeland, FL
[3]WS ATKINS subsidiary to SNC_Lavalin, Tampa, FL

In Florida, the typical regulatory approach to lake management is to focus on reducing external nutrient loads, particularly those from stormwater, as a way to obtain in-lake water quality goals. Based on the assimilation of the information derived from site visits and data analysis efforts a data-driven decision key was developed for project selection to inform the City of Lakeland about the types of projects that make the most sense for each lake. To determine the most appropriate management approach for each of the City of Lakeland's priority lakes, a three-step process was developed.

Session B3: Hurricane Management Response
Moderator: Gary Russ
Wednesday, August 29, 2018. 4:50 pm to 5:50 pm

KEEPING THE PUBLIC SAFE – HERBERT HOOVER DAM

Gary R. Russ
Chief, South Florida Operations Office, U.S. Army Corps of Engineers, Jacksonville, FL

South Florida Operations Office (SFOO) prepares, withstands and responds to emergency events, namely hurricanes, similarly every year. The purpose is to ensure public safety surrounding the dam and the adjacent waterway extensions (approximately 143 miles). The responsibility for this protection was given to the U.S. Army Corps of Engineers (USACE) in 1930 after San Felipe Segundo hurricane which landed near West Palm Beach September 17, 1928. The storm surge caused water to pour out of the southern edge of the lake, flooding hundreds of square miles as high as 20 feet above ground. Numerous houses and buildings were swept away in the cities of Belle Glade, Canal Point, Chosen, Pahokee, and South Bay. At least 2,500 people drowned, while damage was estimated at $25 million. Congress approved the Rivers and Harbors Act of 1930. As a result of another major hurricane in 1947, Congress passed the Flood Control Act of 1948 authorizing the first phase of the Central and South Florida (C&SF) Project, a comprehensive plan to provide flood and storm damage reduction and other water control benefits in central & south Florida. Throughout history USACE has improved the construction standards of the dam including a current $1.8 billion effort. SFOO's annual response cycle is below. Each stage will be elaborated on so that everyone understands the full process.

- Pre-hurricane
- Immediate hurricane prep
- Hurricane
- Post-hurricane
- Normal operations

SFOO conducts inspections of the dam, with variation of frequency commensurate to water levels, to identify dam safety risks that may require improvement or repair. Required repairs above existing funding levels are scoped and submitted to headquarters for additional funding and project authorization.

USACE JACKSONVILLE DISTRICT DAM SAFETY PROGRAM AND THE HERBERT HOOVER DIKE AT LAKE OKEECHOBEE

Almur S. Whiting IV, P.E.
Dam Safety Program Manager, U.S. Army Corps of Engineers, Jacksonville, FL

This presentation will provide an overview of the Herbert Hoover Dike and the HHD embankments and structures that the Jacksonville District Dam Safety Program oversees. The presentation will review relevant history regarding the design, construction, operation, and rehabilitation of Herbert Hoover Dike as it relates to dam safety.

It will discuss the evolution of the USACE Dam Safety Program and the guidelines on which it is based. Both routine and periodic activities that are performed by the dam safety program will be reviewed. The presentation will discuss preparedness activities such as tabletop and functional exercises, dam safety training, and Emergency Action Plans.

The protocols and actions taken to ensure dam safety at Herbert Hoover Dike during high water events and onset and passing of tropical storms and hurricanes will be discussed. Pre- and post-storm inspections, assessments, and the Herbert Hoover Dike surveillance plan for dam safety will be detailed. Hurricane Irma's effect on the Lake Okeechobee and the coordination between federal, state, county, municipal, and tribal emergency management that took place will be presented.

CHALLENGES OF MANAGING STORMWATER PONDS BEFORE AND AFTER THE STORM

Robbin Huffines
Aquatic Systems Inc. Fort Myers, FL

Trying to ensure storm water ponds function as designed during hurricanes and extreme rain events can be very challenging. Ensuring proper maintenance before and after the storm can be the difference between keeping the water in the pond and having it in someone's living room. Logistically for a private company, with a large customer base and limited resources, this can be challenging. When you are faced with a statewide impact, like we saw with Irma, prior planning is vital to success before, during, and after the storm. Each storm teaches us lessons that makes us better equipped for the next challenges and ensures that these storm water ponds function as designed and protect the communities from flooding and further storm damage.

Session A2: Lake Apopka-Restoration Science and Management
Moderator: Erich Marzolf
Thursday, August 30, 2018. 10:35 am to 12:00 pm

RESULTS OF INNOVATIVE RESTORATION TECHNIQUES AT LAKE APOPKA, FLORIDA

Erich R Marzolf
Div. of Water and Lands Resources, St. Johns River Water Management District, Palatka, FL, North American Lake Management Society Region 4 Director

Lake Apopka is a shallow, 30,800-acre eutrophic lake northwest of Orlando Florida. The lake's health is threatened by three conditions: eutrophication due to excessive phosphorus (P) loading; wildlife effects of residual organochlorine pesticides (OCPs); and severe multi-year droughts which significantly impact water quality and critical habitat health. In response to these threats, the St. Johns River Water Management District (District) has been implementing a multi-part restoration program which incorporates a variety of innovative techniques addressing each threat. To reduce excessive P loading and availability the District is operating a 760-acre recirculating filter marsh which between 2003 and 2016 removed 110,663,475 pounds of suspended solids and 69,646 pounds of P as it annually filters approximately 40% of the lake's volume. The District also implemented a rough fish harvest program that from 1994 to 2016 removed 25.4 million pounds of rough fish (equivalent to 209,000 pounds of P). Wildlife exposure to OCPs was reduced by

implementing a novel soil inversion technique which buried the contaminated top foot of soil under feet of cleaner underlying soil. This inversion was applied over 4,000 acres, and reduced the remediation cost by >95% when compared to traditional remediation techniques like landfill disposal. With restoration well underway, the District is planning two water availability projects, one to increase water storage on the North Shore for subsequent lake level augmentation and second, a large solar panel farm, which in addition to reducing electricity costs, will increase water yield by reducing evapotranspiration losses from a project area that drains to the lake.

LET THERE BE LIGHT: LIGHT EXTINCTION, WATER QUALITY, AND SAV IN LAKES APOPKA AND GRIFFIN

Rolland S. Fulton, James Peterson, and Pam Bowen
St. Johns River Water Management District, Palatka, FL

St. Johns River Water Management District has had major restoration projects to reduce nutrient levels in Lakes Apopka and Griffin in the Ocklawaha River basin. This presentation will examine trends in light extinction in these two lakes, including relationships with other water quality measures and with SAV development in the lakes. Light extinction in Lake Apopka has been strongly influenced by a series of severe droughts since the year 2000, deteriorating during those periods. Light extinction in Lake Griffin has been less influenced by the droughts and shows a clear decreasing trend. Light extinction is influenced by both chlorophyll and non-living algal suspended solids (NSS) in Lake Apopka, but by only chlorophyll in Lake Griffin. Other factors, such as water color, water depths, and wind speeds have only minor influences as predictors in multiple regression analyses on light extinction in both lakes. However, in Lake Apopka water depths do appear to strongly influence concentrations of chlorophyll and NSS, the major influences on light extinction. In Lake Apopka, depths of submersed aquatic vegetation are consistent with that expected from light availability, but areas of SAV colonization are much less than expected from light availability. In Lake Griffin, areas of SAV colonization are more consistent with that expected from light availability.

DECONSTRUCTING UNDERWATER LIGHT EXTINCTION IN LAKE APOPKA, FL

Michael F. Coveney[1], Rolland S. Fulton[2], James Peterson[2]
[1]Wood Environment & Infrastructure Solutions, Newberry, FL
[2]St. Johns River Water Management District, Palatka, FL

St. Johns River Water Management District (SJRWMD) has worked since the 1980s to restore Lake Apopka and its extensive floodplain wetlands. Key water quality indicators, total phosphorus (TP), chlorophyll-a (chl-a), and Secchi depth, have improved. Native submersed aquatic vegetation (SAV) has begun to recolonize the littoral zone, but evidence indicates that light availability limits its depth distribution. SJRWMD was interested in better understanding the components of light extinction in Lake Apopka to guide restoration efforts.

SJRWMD data included diffuse vertical attenuation coefficients (Kpar) for photosynthetically active radiation (PAR) starting in 1999. We analyzed water quality factors that are responsible for adsorption and

scattering of PAR: phytoplankton (chl-a), non-living suspended matter (tripton), and dissolved color. Tripton was highly correlated with chl-a, which made statistical separation of the effects of these components difficult. Instead, we started with a linear regression of Kpar as a function of chl-a. This model is a simplified but useful representation of reality and provided a slope Kpar:chl-a and a y-intercept.

Kpar:chl-a in Lake Apopka was substantially higher than other published values. We used this difference in slopes, together with published values for specific attenuation of PAR by pure water and dissolved color, to partition light extinction in Lake Apopka into four categories: phytoplankton, tripton that covaries with phytoplankton, background tripton, and background dissolved color and pure water. Phytoplankton and tripton were the primary components of PAR attenuation, with their relative proportions changing as a function of phytoplankton density. Tripton showed a variable component proportional to phytoplankton density and a constant portion. Attenuation by tripton (variable plus constant) was 59% to 70% of total attenuation at levels of chl-a varying from 150 to 25 mg m-3.

Phytoplankton have been the dominant primary producers in Lake Apopka since the 1940s. Tripton in Lake Apopka likely originates as algal detritus. We hypothesize that resuspension of surficial flocculent sediments contributes tripton to the water column. Projects likely to have the greatest positive effects on increased water clarity in Lake Apopka would be projects that continue to control P loading to the lake, projects that remove P or suspended solids from lake water, and projects that reduce wind-driven resuspension of surficial flocculent sediments.

THE LAKE APOPKA GIZZARD SHAD HARVEST PROGRAM

Dean R. Dobberfuhl, Steven J. Miller, John Higman, Walter F. Godwin, and Roland S. Fulton III
St. Johns River Water Management District , Palatka, FL

Since 1993, the St. Johns River Water Management District (SJRWMD) has commercially harvested about 26.3 million pounds of Gizzard Shad (*Dorosoma cepedianum*) from Lake Apopka as part of an integrated nutrient management program to restore the lake. Based on fish nutrient concentrations (0.824%), this equates nearly 217,000 lbs. of total phosphorous (TP) directly removed from the lake. A subsidized gill net fishery on Lake Apopka generally runs between October and April. Over the past 5 years, the cost of direct TP removal from the lake due to this seasonal fishery alone, is $74.28 per pound. The FFWCC permit to commercially fish the lake however, allows fishing throughout the year. In response, the SJRWMD oversees a smaller unsubsidized fishery, (generally fish caught are sold locally as crab bait) that during the past 5 years has increased the total Gizzard Shad harvest from the lake an average of 11%. This has decreased the average cost of TP removal to $67.07 per pound. Effects of the gill net fishery on Gizzard Shad population in Lake Apopka are analyzed using Leslie Depletion Curves plotted over the subsidized fishing season. Results of these analyses indicate the commercial gill net fishery can substantially reduce the biomass of large Gizzard Shad in Lake Apopka. However, recruitment into size classes that are vulnerable to the gill nets during the spring tends can deflate depletion estimates. In this presentation we will discuss the historical harvest of Gizzard Shad from Lake Apopka, what the catch rates are telling us, and discuss options and constraints for maximizing stock exploitation in the future.

WHAT HAS LIMITED SAV COLONIZATION IN LAKE APOPKA, FL?

Michael F. Coveney[1], Lori McCloud[2], Pam Bowen[2], Rolland S. Fulton[2], James Peterson[2]
[1]Wood Environment & Infrastructure Solutions, Newberry, FL
[2]St. Johns River Water Management District, Palatka, FL

St. Johns River Water Management District (SJRWMD) has worked since the 1980s to restore Lake Apopka and its extensive floodplain wetlands. Key water quality indicators, total phosphorus, chlorophyll-a, and Secchi depth, have improved. Native submersed aquatic vegetation (SAV) has begun to recolonize the littoral zone, but current SAV coverage is less than the restoration target of 30%. SJRWMD implemented a project to better understand the factors that limit expansion of SAV. We utilized existing data from Lake Apopka to assess two potential limiting factors: light availability and sediment type. In particular, the surficial unconsolidated floc (UCF) sediment was hypothesized to be unsuitable for plant growth.

We analyzed multi-year SJRWMD data sets on photosynthetically active radiation (PAR), SAV cover, and sediment composition in SAV beds. Our analyses showed good support for light limitation on the vertical extent of SAV colonization. We found little support for a limiting effect of sediment type.

In support of light limitation, we found that the fraction of surface PAR at the deep edge of SAV patches was relatively constant despite significant changes in water levels. The sediment elevation at the deep edge of SAV patches varied with the elevation of 1% of surface PAR. The sediment elevation at 1% of surface PAR was a useful index of the submersed light climate that accounted for counterbalancing effects of changes in lake level and in attenuation of PAR. Evidence against sediment limitation included our finding that SAV growth was robust even in thick UCF sediments. SAV in thick UCF had higher densities and similar patch areas compared with SAV growing in sand. Numbers of SAV patches increased in UCF sediments in recent years, but patches in sand showed no trend.

We found no directly limiting effects of sediment on SAV growth in Lake Apopka. Sediments also can play an indirect role through wind-driven resuspension of fine sediment fractions that contribute to the non-living portion of suspended solids (tripton). Tripton makes up more than 50% of light attenuation in Lake Apopka. SJRWMD is considering projects to remove UCF sediment in select areas to help reduce suspended solids and improve light conditions for SAV.

Session A3: Water Resources Innovation and Technology
Moderator: Harvey Harper
Thursday, August 30, 2018. 1:35 pm to 3:00 pm

MAKING WATER QUALITY DATA MORE ACCESIBLE AND MORE USEFUL

John R. Maxted
City of West Palm Beach, West Palm Beach, FL

The City of West Palm Beach produces 30-35 million gallons per day (MGD) of drinking water for 100,000 residents, treats the wastewater from 500,000 residents, and manages the water quality and ecological conditions of canals, lakes, and wetlands including the 23 square mile Grassy Waters Preserve (GWP). Management of these aquatic resources is particularly important because many provide the source water for the City's water treatment plant located on Clear Lake. The City has been monitoring the WQ of these

systems for many years, and the data over the last 7 years have been stored in a Laboratory Information Management System (LIMS). The LIMS data have recently been compiled into data summaries and a Baseline Report as platforms for access to the data. The presentation will describe the steps taken to produce the data summaries and report. Steps include checking the data, development of data summaries to illustrate the extent of the data using maps, time series plots, and tables. This compilation of data is designed to promote a general understanding of the extent of the data available, provide a comparison between sites of the same resource type (e.g., 5 lakes), and allow for easy access to the data to address key management questions. Looking ahead, the data compilation will be used for many applications including development of a "scorecard" or "dashboard" for the public, export of the data to other entities (e.g., FDEP), and development of a comprehensive ecological assessment of our source water lakes in 2019.

AN INNOVATIVE IN-LAKE ALUM ADDITION SYSTEM TO IMPROVE LAKE WATER QUALITY AND ENHANCE EFFECTIVENESS OF WET DETENTION PONDS

Harvey H. Harper, Ph.D., P.E.
Environmental Research & Design, Inc. (ERD), Orlando, FL

An innovative, low maintenance in-lake alum addition system was developed to improve the performance efficiency of an existing wet pond which provides treatment for a large residential watershed prior to discharging into a small 12.7 acre lake. The pond is substantially undersized and provides poor removal efficiencies for nutrients. A system was designed which injects liquid alum into a lake water carrier system that discharges through educator nozzles mounted on the bottom of the pond. The educators inject recirculated lake water into a vertical structure which carries the floc to the pond surface and provides substantial water column mixing. Air is also added into the water/alum mixture in the piping system through a venturi to entrain bubbles in the floc, causing it to remain suspended in the water column for an extended time which it scrubs phosphorus, particles, bacteria, and algae from the water column. Operation of the system is based on the biological relationship between algal productivity and pH. As algae absorb available nutrients and productivity increases, the pH of the water also increases so elevated pH values are used as a surrogate for nutrient inputs. When the system starts, the carrier water pump is energized and the pH of water recirculated from the pond is sampled. If the pH of the pond water is greater than a pre-set value (typically 7), then alum is added to the carrier water feed, and the generated alum floc is distributed throughout the water column before settling into the bottom sediments. When the pH decreases to less than the target value, the system turns off until the next pre-set pH measurement. The system can be used to improve water quality in wet ponds as well as lakes.

USING INTEGRATED SOFTWARE APPLICATIONS AND GIS SOLUTIONS TO COLLECT, ANALYZE AND PRESENT LONG-TERM MONITORING DATA

Arte Roman and Gary Serviss
Vanasse Hangen Brustlin, Inc., Orlando, FL

In the late 1990's the Southwest Florida Water Management District initiated a scientific study to examine the effects of groundwater withdrawals on regional wetland health in the Northern Tampa Bay Area (NTBA). Following reductions in groundwater withdrawals, a wetland health study has been conducted approximately every five years. Individual wetland health assessment (WHA) scores have been determined

for about 400 impacted wetlands and reference wetlands. Prior to 2016, the five-year assessments were conducted using paper data sheets, small-scale maps, and extensive databases not fully integrated in a GIS.

During 2016, Vanasse Hangen Brustlin, Inc (VHB) coordinated the data collection in an accelerated time frame by implementing GIS tools in every phase of the project. Network Analyst identified locations and routes for daily workloads (deployed via smart-tablets), and a VHB custom-developed, Android-compatible, form-based application was used for data collection. Field staff could navigate to wetlands, identify wetland indicators, collect spatial data, and see wetland scores update in real-time as they submitted evaluations. The 2016 assessment technology improvements included 1) developing a modified, streamlined WHA monitoring protocol; 2) creating and implementing an electronic quality-control program for data collection; 3) conducting GIS and statistical analyses on wetland health changes; and 4) cataloguing all previously collected data and creating a web interface for easy access to previous and current WHA data.

For the reporting phase, VHB configured a web interface using Esri's Web AppBuilder. Symbolized data points include wetland health scores throughout the years, with links to full historic data forms and photographs. Analysis tools allow users to visualize comparisons between assessment years and filter the dataset for specific spatial and non-spatial analyses. Finally, VHB used Esri's Story Map Journal template, with interactive links to tables, figures, and map extents, to construct an intuitive evolution of the traditional scientific report.

USING MACHINE LEARNING AND GEOSTATISTICS TO OVERCOME LACK OF DATA IN ASSESSING HYDROLOGIC RECOVERY OF UNMONITORED LAKES AND WETLANDS

Dan Schmutz
Greenman-Pedersen, Inc. (GPI), Orlando, FL

Tampa Bay Water, Florida's largest wholesale water supplier, is assessing environmental recovery of lakes and wetlands in the Northern Tampa Bay area in response to regional groundwater production cutbacks initiated in September 2002. State law provides guidance for the establishment of hydrologic regimes appropriate to maintain specific types of wetlands and lakes, and these regimes are being used to assess hydrological recovery of more than 500 monitored sites. However, water level data are unavailable for 749 unmonitored sites (8,307 acres) near groundwater wellfields, causing uncertainty regarding the extent to which these areas have recovered. Using R, we investigated various machine-learning algorithms and best practices to estimate median water levels at the unmonitored sites for two time periods—prior to and after the production cutbacks. Accuracy of estimates was evaluated using hold-out samples and leave-one-out cross validation. Algorithms investigated included random forest and regression kriging. Predictive variables evaluated and found to be important included modeled Surficial Aquifer System drawdown, modeled Upper Floridan Aquifer (UFA) drawdown, xeric ratio (a description of the soils surrounding the site), elevation difference between the wetland edge and the potentiometric surface of the UFA, pre-development UFA potentiometric surface, and site depth. Surprisingly, the type of site (e.g., wetland or lake) and degree of connectivity (i.e., whether connected to a larger riparian system) were relatively unimportant in predicting recovery. Median water levels for cross-validated sites were predicted for the pre-cutback and post-cutback time periods, with R^2 values of 50% (pre-cutback) and 51% (post-cutback), and with 55% of residuals within one foot of the actual data for the pre-cutback period and 65% of residuals within one foot for the post-cutback data. Although machine learning techniques have been criticized as "black box" approaches suitable for prediction but not explanation, most provide a means of identifying variable importance and may, therefore, inspire revisions to our conceptual models of what factors are most important in managing surface water resources. Absolute values of estimated median water levels as well

as changes in the water levels between the two time periods provide support for classification of unmonitored lakes and wetlands into recovery assessment categories, identifying recovered sites, those with substantial improvements, and those requiring further study and potential mitigation.

AN ASSESSMENT OF THE LOWRANCE SONAR DATA COLLECTION AND BIOBASE DATA PROCESSING SYSTEM FOR DETECTING SUBMERSED AQUATIC VEGETATION IN A SOFT BOTTOM CENTRAL FLORIDA LAKE

John Stenberg[1], *Gene Medley*[2], *Jim Peterson*[1]
[1]St. Johns River Water Management District, Mt. Dora, FL, [2]Medley Environmental Services Inc., Hobe Sound, FL

This project assessed the use of Lowrance SONAR data and the Biobase data processing service to detect submersed aquatic vegetation (SAV) in Lake Griffin Florida. Interpreting and classifying the SONAR signatures is confounded by the lake's soft, organic sediments. Lake Griffin, a large, eutrophic lake located in central Florida near Leesburg has had a history of extensive SAV coverage followed by a shift to water column dominance by phytoplankton. Recently, as projects have improved water quality, a resurgence of SAV coverage is occurring. Regular, inexpensive accounting for the extent of SAV coverage is necessary for lake management. During the spring and summer of 2016 the study was conducted on three 148 ha (365 acre) rectangular plots located near-shore, in northern Lake Griffin. Within each plot, regularly spaced SONAR data transects were collected using consumer grade SONAR units (Lowrance HDS-7 Gen 3 and Humminbird 1198c). SONAR data collection consisted of side-scan data for synoptic coverages to show site context and down-scan for processing by Biobase Inc., a commercial subscription data processing service. Ground-truth data were collected for use in interpreting and evaluating the two SONAR datasets. Vegetated versus non-vegetated sites with soft bottom affected the SONAR signature as represented by SAV biovolume data derived from the commercial subscription service. The Biobase system provided a means to eliminate a step in the SAV map generation process, at the expense of control of the dataset. Without control of the SONAR signal a conservative interpretation of SAV biovolume would probably be favorable when creating map products. A conservative biovolume interpretation would result in an underestimate of SAV coverage. The use of product and vendor names is not an endorsement by the St. Johns River Water Management District.

Session B4: Aquatic Plants Assessments and Harmful Algae
Moderator: Robbin Huffines
Thursday, August 30, 2018. 3:30 pm to 5:20 pm
Sponsored by UPI Aquatics

CAN HERBICIDE USAGE BE REDUCED WITH HERBIVORY PRESSURE FROM BIOCONTROL AGENTS?

Sam Sardes
Aquatic Systems, Inc. Pompano Beach, FL

Waterhyacinth (Pontederiaceae: *Eichhornia crassipes*) is one of the world's worst invasive plants. According to the Invasive Species Specialist Group, a part of the IUCN (International Union for Conservation of Nature), waterhyacinth ranks number 32 on their list of top 100 invasive species (including

animals and fungi), globally. Integrated pest management (IPM) has been applied to waterhyacinth through a variety of control measures, including - but not limited to - chemical and biological control. Diquat, 2,4-D, glyphosate, and carfentrazone are four herbicides used for chemical control of waterhyacinth. Two weevils that are considered moderately successful biocontrol agents are *Neochetina eichhorniae* and *N. bruchi* (Coleoptera: Curculionidae). Both species were released in the 1970s by the USDA. A more recently discovered waterhyacinth biocontrol agent is the planthopper *Megamelus scutellaris* (Hemiptera: Delphacidae), which was released in 2010. Two studies show that with at least two different herbicides, treatment rates can be reduced with the herbivory pressure from biocontrol agents. Weevil presence increased efficacy of carfentrazone on waterhyacinth at half the maximum labeled rate, but no insect effect was noted in other herbicides evaluated. These experiments reveal that biocontrol agents may influence herbicide efficacy on waterhyacinth.

ROTALA TURNS 22: WHAT WE KNOW NOW

Kyle Thayer
Aquatic and Wetland Plants Lab, University of Florida IFAS, Ft Lauderdale, FL

Rotala rotundifolia, or roundleaf toothcup, is an aquatic invasive plant that has been crowding out south Florida canals since 1996. This aquarium plant is sought after for its ease of use in water gardens. *R. rotundifolia* has the ability to proliferate by vegetative fragments in both aquatic and moist terrestrial zones, which raises the severity of its invasiveness. In conjunction with the South Florida Water Management District, the Aquatic and Wetland plants lab at the University of Florida have tested explorative management practices to help mitigate the spread of *R. rotundifolia* within Florida's waterways. This talk will discuss results found from both field studies and greenhouse trials that have been completed over the past four years.

AERATION FOR ALGAE CONTROL: THE IMPORTANCE OF DESIGN AND MIXING DEPTH

Patrick Goodwin, CLM
Vertex Water Features, Pompano Beach, FL

Bottom aeration is a restoration tool commonly used for improving multiple aspects of lake health, including the occurrence of algal blooms and the quality of algal assemblages.
The intense mixing brought about by artificially aerating a lake can affect an algal community by: (i) increasing dissolved oxygen concentrations and changing the lake's water chemistry (pH, carbon dioxide and alkalinity), which can lead to a more desirable shift in an algal community; (ii) reducing levels of internal nutrient cycling within a lake, which reduces the large amount of nutrients used to sustain algal blooms; (iii) decreasing the amount of solar energy available for photosynthesis; (iv) favoring algal species that tend to sink quickly and need mixing currents to remain suspended in the upper water column (e.g. diatoms); and (v) mixing algae-eating zooplankton into deeper, darker waters, thereby reducing their predation by sight-feeding fish, and increasing their ability to graze on algae cells.
This presentation discusses the requirements needed for each of the mechanisms listed above to be met and outlines successes and failures associated with this lake management approach.

RAMET VIABILITY AND MANAGEMENT OF CRESTED FLOATINGHEART (*Nymphoides cristata*)

Ian J. Markovich, Dr. Lyn Gettys, Kyle Thayer
University of Florida FLREC, Davie, FL

Crested floatingheart is a highly productive water garden plant which has escaped and invaded Florida, South Carolina and other southern states in the US. This plant can produce as many as vegetative ramets during a – month period. Ramets seem to be the primary mode of reproduction, we have investigated effects of burial depths, burial duration, and desiccation on sprouting and becoming self-sufficient plants. Also we evaluated herbicides that are labeled for aquatic use to determine their efficacy for crested floatingheart. We determined that ramets covered for 1 week were not viable, ramets exposed to just a single day of desiccation were rendered inviable. Several herbicides were identified that showed a reduced biomass to this noxious weed. These methods could be useful for management of crested floatingheart.

FIELD IDENTIFICATION OF ALGAE

H. Dail Laughinghouse IV and David E. Berthold
Fort Lauderdale Research and Education Center, University of Florida/IFAS, Davie, FL

Algae are a polyphyletic group of mostly photosynthetic organisms. They can be microscopic or macroscopic and can inhabit diverse habitats, including terrestrial and aquatic. Algae can occur in large-scale growth where nutrient discharges and runoff from agriculture or urban areas are released. These changes in landscape and watershed use impact our waters, consequently increasing algal growth through eutrophication. An increase in algal growth can lead to harmful algal blooms (HABs), affecting aquatic and human health. Besides blooms, other nuisance freshwater macroalgae can deplete the oxygen in the environment. Further, HABs and nuisance macroalgae can affect leisure activities, fisheries, and tourism, negatively impacting local economies. Although proper identification of algal species requires a microscope and expert knowledge, there are certain characteristics that can indicate the type or groups of algae that are present in the field. Here we present methods to identify algae blooms and other nuisance algae in the field.

Session A4: Nutrient Reduction and Management

Moderator: Rob Burnes
Friday, August 31, 2018. 9:00 am to 10:25 am

THE USE OF UAVS TO HELP IMPROVE OUR UNDERSTANDING OF THE LIMNOLOGY OF URBAN STORMWATER PONDS

Serge Thomas PhD
Assistant Professor, Florida Gulf Coast University, Fort Myers, FL

Natural landscapes have increasingly been altered and fragmented by humans so that often, manmade systems are integrated within urban developments. This is particularly the case for manmade waterbodies such as stormwater ponds which are used as a means to control the delivery of nutrients as well as other pollutants ranging from metals to suspended solids and overall freshwater to downstream hydrosystems

such as coastal wetlands, estuaries and the coast. Further, such ponds are also used for aesthetic as they greatly enhance the values of properties surrounding them. As such, they are prized not only for their ecological filtering function but also by their owners. Conventional limnology is often used to assess how well these ponds perform. However, often, such limnological surveys are limited to a handful of ponds which are likely not representative of the true situation as ponds having issues are often the ones being investigated (e.g. eutrophication as well as bank erosion problems). Unmanned Aerial Vehicles can then be very useful to gather a more realistic situation of the current degree of eutrophication and erosion of the shoreline. A description of the methods used to assess the limnology and the topography of the watershed and banks surrounding the ponds is presented as well as their associated generated data.

IT'S NOT JUST THE MERCURY – CONTAMINANTS IN FISH AND CRITTERS TRADITIONALLY CONSUMED BY SEMINOLE TRIBE MEMBERS

Charles R. Fellows, *Douglas G. Strom*, and *Bryan F. Cotter*
Water & Air Research, Inc., Gainesville, FL

In May 2015 Water & Air Research, Inc. was tasked to assess contaminants in fish and other wildlife traditionally consumed by members of the Seminole Tribe of Florida (Tribe). This screening investigation was to provide guidance regarding human health risks posed by the contaminants. Samples were analyzed for mercury, methylmercury, dioxins/furans, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), other metals, and organic pesticides and herbicides. Funding and project-specific Quality Assurance Project Plan approval was provided by both the Tribe and the U.S. Environmental Protection Agency (USEPA).

Eight types of fish were collected in major canals on the Brighton (BR) and the Big Cypress (BC) Reservations. Other samples, including turtle, alligator, and bear, were provided by the Tribe.

Total mercury and methylmercury were analyzed on all 44 samples and 21 samples were selected for testing of 24 additional types of contaminants. Tissue contaminant concentrations were compared to 26 Screening Values (SVs) used by USEPA to assess potential for adverse health effects to occur to subsistence fishers (i.e., 70 kg adults, eating an average of 142.4 g/day).

All species, except the Peninsula Cooter (a turtle) had at least one contaminant exceeding its SV. The greatest number of exceedances occurred for methymercury for which there were 35 exceedances out of 44 samples. Inorganic arsenic exceeded its SV in five of 21 samples. Dioxin/furans and dioxin-like PCBs had 13 exceedances out of 19 samples tested. Exceedances also occurred for PCBs, Dieldrin, DDT-residues, and PAHs. Cadmium, lead, selenium, and tributyltin did not exceed their SVs in any sample.

One investigation finding was that the two reservations have distinctive differences and should not be grouped together but considered as separate ecological systems. Another tentative finding (due to the small sample size) was that as fish age and grow larger the contaminant concentrations increase. For example, methylmercury concentrations can double or triple between 11-inch and 13- or 14-inch bass. BC black crappie displayed a strong correlation ($r^2 = 1.0$; $n = 4$) between fish weight (i.e., 231 to 413 g) and methylmercury concentration (i.e., 198 to 626 µg/kg).

Interim consumption advisories for adults were developed for each species at each reservation. Recommendations also were presented to gather sediment, soil and other data useful for assessing the possible reduction and/or elimination of contaminant sources with an ultimate goal of reducing contaminant levels in fish and wildlife.

CANAL SEDIMENT CONTAMINANTS ON SEMINOLE RESERVATIONS – WHAT'S IN YOUR SEDIMENT?

Bryan F. Cotter and Charles R. Fellows
Water & Air Research, Inc., Gainesville, FL

In May 2015 Water & Air Research, Inc. was tasked to assess contaminants in fish from canals and other wildlife traditionally consumed by members of the Seminole Tribe of Florida (Tribe). Tissue contaminant concentrations were compared to Screening Values (SVs) above which potentially detrimental human health effects can occur. All species except one had at least one contaminant exceeding its SV. Based on those SV exceedances, canal sediment samples were collected and analyzed for heavy metals, polychlorinated biphenyls (PCBs), dioxins/furans and dioxin-like PCBs (dioxins), polycyclic aromatic hydrocarbons (PAHs), chlorinated pesticides and herbicides to evaluate their potential as a contaminant source for fish and wildlife.

Sediment contaminant concentrations were compared to Sediment Quality Assessment Guidelines (SQAGs) and Soil Cleanup Target Levels (SCTLs) as measures of potentially detrimental impacts to aquatic organisms and human health. Sediment cores were collected to allow any upper sediment layer to be tested separately from deeper sediments that might have different physical and/or chemical characteristics. Because sampling locations were spread across both reservations, the vertical and horizontal extent or gradations of contaminant concentrations could be evaluated.

When evaluating all the data, there did not appear to be a unifying theme of existing concentration gradients which indicate a consistent sedimentation process, perhaps due to turbulent flow in the canals. There were no readily apparent relationships between land uses on the reservations and contaminants found in the canal sediments associated with those uses.

Tissue test results and this sediment assessment project strongly support the concept that sediment contaminants accumulate in fish, which is a risk to human health.

Findings regarding individual contaminants or groups of contaminants include:

- Dioxins were found to exceed human health SQAGs in every BC and BR sediment sample tested.
- More SQAG exceedances were found at BC than at Brighton and these included total arsenic, cadmium, copper, DDT residues, individual and total PAHs, and dioxins.
- Elevated PAH concentrations at a natural, undeveloped area at BC lead to the discovery that petroleum exploration wells had been drilled in the area and that one well near the sampling site had produced petroleum.
- Although there is no SQAG for inorganic arsenic, it was detected in every sediment sample from both reservations had detectable concentrations of inorganic arsenic.
- Methylmercury, for which there is no SQAG, was detected in slightly less than half of the samples from both BC and BR.

MONITORING THE RESPONSE OF SUNSHINE LAKE TO IMPLEMENTATION OF IDENTIFED PROJECTS IN THE WATER QUALITY MANAGEMENT PLAN: DID IT WORK

David Tomasko[1], Emily Keenan[1], Joanne Vernon[2], Sherri Ouimet[2], Ed Cronyn[3] and Jessica Hudson[3]
[1]Environmental Science Associates, Tampa, FL
[2]Charlotte County Public Works, Punta Gorda, FL
[3]WS ATKINS subsidiary to SNC_Lavalin, Tampa, FL

Sunshine Lake, in Charlotte County, had previously been impacted by an intense bloom of cyanobacteria that had caused aesthetic and public health concerns. An initial study recommended that prior to developing a suite of projects to pursue to address the concerns about the lake, an intensive data collection effort would be required. Informed by the results from the data collection effort, a series of projects was identified to restore the lake. Over the past several years, each of the identified projects has been implemented. The results of sampling both water quality and SAV communities will be described, and implications of the findings discussed.

POLYMER BMP USE IN FLORIDA

Eddie Snell
Applied Polymer Systems, Woodstock, GA

Project development in Florida is compelled to follow minimal use of sediment and erosion control guidelines to mitigate impacts to the environment. Post development requires entities to maintain channels and ponds to remove accumulated sediment and maintain hydraulic capacity. Equipment used during construction and maintenance often dislodges soil particles which can cause turbidity and travel distances downstream from the site. These sediments are regulated pollutants that can cause unintended negative impacts during these activities. Water soluble anionic polyacrylamide (PAM) technologies can be utilized to stabilize slopes, provide turbidity control, and allow for recycling of sediments removed from stormwater systems. Polymer BMPs have been in use in this state from the late 1990s to present day. Several case studies of Florida activities will be shown to illustrate the various ways that anionic PAMs can be included in routine maintenance activities to mitigate soil and water impacts.

Using water soluble polymer technologies to enhance current Best Management Practices (BMPs) we can greatly reduce the loss of sediment from a site as well as mitigate impacts of sediment and or nutrients to a given water body. Water treatment versions of PAM in the anionic form have shown very low to no aquatic toxicity potential to the environment. Through various research and tests using polymer enhancement in conjunction with known BMPs have achieved 70-95% reductions in phosphorus along with 95% reduction in turbidity NTUs.

As a proactive measure, Polymer Enhanced Best Management Practices (PEBMPs) can be used to stabilize soil at the source, preventing sediment discharges into our water and reducing turbidity within the water column. Once a pond or water channel has become turbid, polymers can be used to flocculate particulate from the water column and return clean water to the system. This can take various forms from a simple mixing ditch to turn-key in-pipe mixing devices that can treat several million-gallons-per-day of soil contaminated water. A final example of PEBMPs will be the application of granular polymer to fluidic clay or muck soils to change their physical composition to facilitate easier removal from the site.

The presentation will focus on Florida specific projects that include soil stabilization (including polymer enhanced soft armoring systems), de-watering systems, pond and lake clarification, de-mucking, and Sediment Retention Barriers (SRBs).

Session B5: Outreach and Volunteer Programs
Moderator: Dan Schmutz
Friday, August 31, 2018. 10:55 am to 11:45 am

LAKE COUNTY ADOPT-A-LAKE PROGRAM-VOLUNTEER MONITORING

Cathie Catasus
Lake County Public Works, Tavares, FL

The Lake County Adopt-a-Lake Program celebrated its 10th anniversary this year. The purpose of the program is to involve the public to assist with the effort of protecting, preserving and restoring Lake County's lakes. Volunteers may participate in a variety of activities including water quality monitoring, pollution prevention, education outreach and monofilament fishing line recycling. Information will be given about the water quality monitoring portion of the program.

RESTORATION OF SHOW-CASE STORMWATER PONDS: A COMMUNITY EFFORT

Ernie Franke
Chairman of Wetlands Committee**,** The Shores of Long Bayou Condominiums,
St Petersburg, FL

As you approach the Shores of Long Bayou Condominiums, you see Anhinga stormwater pond on your left, the algae so thick you can walk across, with twenty years of neglect. The Pool stormwater pond circles the clubhouse, where a concoction of invasive aquatic plants choked the very life from the native plants. You smell the pond before you see it. The viscous cycle of algae bloom: – resident calls the HOA manager – manager calls the professional pond maintainer – applicator applies copper sulfate – algae falls to the bottom muck – repeats every two weeks. What message does this send to visitors?

We can expect a doubling of developed land in Florida by 2060. One single person cannot solve our urban sprawl problems, but if we work together we can accomplish great things. Our cumulative effort can make a tremendous difference in the environmental health, beauty, safety and perceived value of our communities. The original need of stormwater ponds, for control of flood waters, has been superseded by the need to remove nutrients from rainwater run-off before entering the estuary.

The Wetlands Committee then wins a mini-grant from the Tampa Bay Estuary Program (TBEP) to remove invasive aquatic plants and replace them with Florida-native plants. The retired volunteers transformed these ponds into two low-maintenance, aesthetically pleasing, and nutrient-removing ponds. The "proof-of-the-pudding" was an algae-free pond indicating that the aquatics were indeed removing the nutrients washed into the pond from the lawn fertilizers and road contaminants. It satisfies the water management district's mandate that the water quality exiting the pond must be greater than that entering.

THE MEMBER OWNED INLET BEACH WATER SYSTEM, THE WALTON COUNTY REGIONAL UTILITIES, THE OUTSTANDING FLORIDA WATER LAKE POWELL AND THE CONFLICT AND DILEMMA

Richard Bryan
Lake Powell Community Alliance, Panama City Beach, FL

The oral presentation of text and graphic slides begins with the geographical location and the relationships and roles of the conflicting entities that present the threat to the water quality of Lake Powell. Further details of the organizational structures of the entities reveals the background of the conflict.

A description of Lake Powell and how it is managed will explain the importance for protection. Details of the element of protection indicates the level of importance to the resolution of the conflict. The social, governmental, and commercial aspects of the South Walton community will show the needed urgency for resolution of the conflict. The contractual and territorial elements set the stage for making decisions.

A presentation of the water quality data indicates the current health of the lake. A review of the volunteer efforts to maintain the health of the lake indicates the level of effectiveness. The various expertise exhibited by volunteers is listed.

The threats to water quality are enumerated using available shoreline surveys and Lakewatch data. Inlet Beach Water System data as well as engineers' reports on the environmental impact of a sewer plant within the watershed are displayed.

The conclusion includes the challenges and possibilities. The influences of the community on decision-makers and the positions of the conflicting entities will be analyzed. The status of the resolution will conclude the presentation.

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