



**FAPMS**  
**41<sup>st</sup> Annual Training Conference**  
**October 17-19, 2017**  
**Lake Buena Vista, Florida**

**About the cover:**

This is one of the many bends on the Econlockhatchee River, a north-flowing blackwater tributary of the St. John’s River. It was taken on a chilly but sunny morning in November 2015 while surveying invasive grasses. *Photo courtesy Kris Campbell, Florida Fish and Wildlife Conservation Commission and FAPMS Program Chair*

This Program Has Been Approved for Continuing Education Units by  
the Florida Department of Agriculture and Consumer Services

**APPROVED CEUs (maximum per person: 17.5)**

<b>CORE (482 or 487)</b>	<b>2</b>
<b>Aquatic</b>	<b>15.5</b>
<b>Demo &amp; Research</b>	<b>15.5</b>
<b>Forestry</b>	<b>8.5</b>
<b>Natural Areas</b>	<b>8.5</b>
<b>Private</b>	<b>15.5</b>
<b>Right-of-Way</b>	<b>8.5</b>

**Program committee**

Chair: Kris Campbell

Lyn A. Gettys

Karen Brown

**Recommended format for citing abstracts from this program:**

*Author names. 2017. Title. Proceedings of the 41st Annual FAPMS Conference, page #.*  
Florida Aquatic Plant Management Society. Lake Buena Vista, FL. (abst.)

Visit us online! [www.fapms.org](http://www.fapms.org)

---

**Monday, October 16, 2017**

---

9:00 FAPMS Strategic Planning followed by Board of Directors Meeting – Sunburst 1 & 2

1:00 Exhibit/Vendor Setup – Citron Center until 6:00p

---

**Tuesday, October 17, 2017**

---

8:00-10:30 Past Presidents Meeting/FAPMS Research and Scholarship Foundation Meeting –  
Tangerine 3

**Session 1: Communication through Understanding (FDACS program # 24044)**

Moderator: Andy Fuhrman (*Citron East/West*)

10:00-10:30 Presidential Address, Local Arrangements, Announcements: **Andy Fuhrman**

10:30-11:20 Keynote: Improving Communication/Cooperation Among Aquatic Professionals  
Societies: **Mark Hoyer**

11:20-11:35 FISP and the UF/IFAS Invasive Species Extension Coordinator: **Rose Godfrey**

11:35-11:50 Game of Thorns: The Marriage of House FLEPPC to House FISP: **Sherry Williams**

11:50-12:10 APMS Update: **Jeremy Slade**

**12:10-1:20 LUNCH (on your own)**

**Session 2: Being a Responsible Applicator (FDACS program # 24045)**

Moderator: Stephen Montgomery (*Citron East/West*)

1:20-1:25 PRIZE DRAWING

1:25-2:15 The Art and Science of Pulling Out Spray Equipment: **Fred Whitford**

2:15-2:30 Label and Product Updates: **United Phosphorus Inc.**

- 2:30-2:45 Label and Product Updates: **Helena Chemical**
- 2:45-3:00 Label and Product Updates: **Syngenta**
- 3:00-3:05 Label and Product Updates: **Winfield United**
- 3:05-3:10 Label and Product Updates: **Blue Planet Environmental**
- 3:10-3:25** ***BREAK (Citron Center)***

**Session 3: Herbicides and Your Environment (FDACS program # 24046)**  
**Moderator: Scott Jackson (Citron East/West)**

- 3:25-3:30 PRIZE DRAWING
- 3:30-3:40 Label and Product Updates: **BioSafe Systems**
- 3:40-3:50 Label and Product Updates: **Crop Production Services**
- 3:50-4:00 Label and Product Updates: **Lake & Wetland Management**
- 4:00-4:10 Label and Product Updates: **Outdoor Water Solutions Inc.**
- 4:10-4:20 Label and Product Updates: **SePRO**
- 4:20-4:40 Where Does the Muck Come From???: **Bill Haller**
- 4:40-5:00 Littoral Sediment Accumulation Ten Years After Muck Removal in Lake Tohopekaliga, Florida: **Mark Hoyer**
- 5:00-5:20 Pesticide Toxicity Testing: **Fred Fishel**
- 5:20-5:50 Sun Safety (Dermatology): **Cheryl Campbell**

**END TUESDAY SESSIONS**

**6:00-8:00: Presidential Reception (Citron Center)**

---

**Wednesday, October 18, 2017**

---

**Session 4: Considerations when Working in Aquatic Environs (FDACS program # 24047)**

**Moderator: Matt Phillips** (*Citron East/West*)

- 8:00-8:05 PRIZE DRAWING
- 8:05-8:25 Investigating Risk and Management of Hydrilla/*Aetokthonos hydrillicola* Inducing Vacuolar Myelinopathy: **Susan Wilde**
- 8:25-8:45 Recent Trends in Snail Kite Monitoring: **Caroline Poli**
- 8:45-9:05 The Formation of Lakes in Florida and the Physical Limnologic Characteristics that Makes Them Unique and Explains Their Behavior: **Ron Hart**
- 9:05-9:25 Screening and Development of New Aquatic Herbicides: **Bill Haller**
- 9:25-9:45 Professionalism and Certified Applicators: **Carlton Layne**
- 9:45-10:00 BREAK** (*Citron Center*)

**Session 5: Plant Management for Managers (FDACS program # 24049)**

**Moderator: Kelli Gladding** (*Citron East/West*)

- 10:00-10:05 PRIZE DRAWING
- 10:05-10:30 Update on Aquatic Grass Control Work: **Stephen Enloe**
- 10:30-10:55 Life History of *Zizania aquatica*, Southern Wild Rice, in Tidal and Spring Charged Rivers and its Implication in Habitat Restoration: **Colette Jacono**
- 10:55-11:20 IPM in Aquatic Areas: **Lyn Gettys**
- 11:20-11:45 Technology for Mapping and Managing Florida's Aquatic Vegetation: **Alex Dew**
- 11:45-1:00 LUNCH** (*on your own*)

**Session 6: Plant Management for Managers Part Deux (FDACS program # 24048)**

**Moderator: Angie Huebner** (*Citron East/West*)

- 1:00-1:05 PRIZE DRAWING
- 1:05-1:30 Risks of Only Monitoring Versus Managing Noxious Cyanobacteria: **West Bishop**
- 1:30-1:55 Florida's Aquatic Plant Management Program: **Matt Phillips**
- 1:55-2:20 Florida Invasive Plant Education Initiative: **Dehlia Albrecht**
- 2:20-2:45 Maintenance Intervals for Invasive Plant Management: **Greg MacDonald**
- 2:45-3:10** **BREAK** (*Citron Center*)

**Session 7: More Tools in the Toolbox (FDACS program # 24050)**

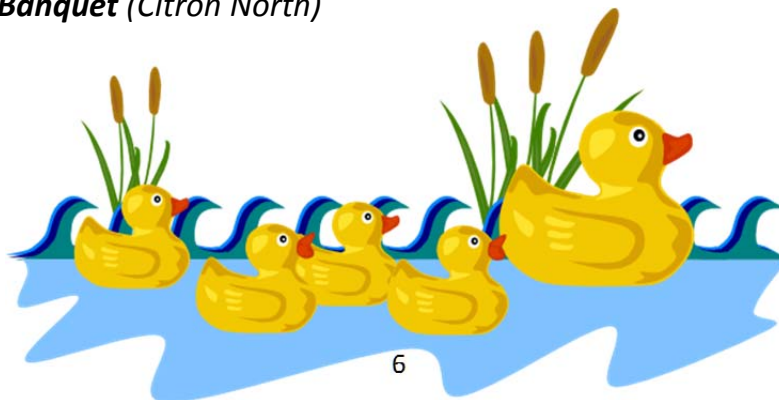
**Moderator: Andy Fuhrman** (*Citron East/West*)

- 3:10-3:15 PRIZE DRAWING
- 3:15-3:30 FAPMS Business Meeting: **Andy Fuhrman**
- 3:30-3:55 An Update from the UF/IFAS Assessment of Non-Native Plants in Florida's Natural Areas: **Deah Lieurance**
- 3:55-4:45 Equipment Demonstration (*Outside*)
- \*concurrent with equipment demo\*
- 3:55-4:25 Public Speaking Methods and Motivation: **Stephen Montgomery**

**END WEDNESDAY SESSIONS**

**5:30-6:30: Duck Races** (*Pool*)

**7:00-9:30: Awards Banquet** (*Citron North*)



---

**Thursday, October 19, 2017**

---

**Session 8: Herbicide Application and Procedures (FDACS program # 24051)**

**Moderator: Karen Brown** (*Citron East/West*)

- 8:00-8:05 PRIZE DRAWING
- 8:05-8:55 Glyphosate: Friend or Foe?: **Jay Ferrell**
- 8:55-9:05 What to Do When the Corps Dings You \*\*\*Applicator paper\*\*\*: **Marshall Snyder**
- 9:05-9:20 An Inside Look at Lee County Hyacinth Control District's Aquatic Plant Management Program \*\*\*Applicator paper\*\*\*: **Jeremy Ford**
- 9:20-9:35 *Salvinia molesta* Eradication Efforts in the Panhandle of Florida \*\*\*Applicator paper\*\*\*: **Jamie Marler**
- 9:35-9:50 Johnsongrass Control in *Spartina* Planting \*\*\*Applicator paper\*\*\*: **Shawn Moore**
- 9:50-10:20 BREAK** (*Citron Center*)

**Session 9: Weed Problems and Solutions (FDACS program # 24052)**

**Moderator: Ed Harris** (*Citron East/West*)

- 10:20-10:25 PRIZE DRAWING
- 10:25-10:50 Selective Herbicides for Control of Coral Ardisia in Natural Areas: **Pat Minogue**
- 10:50-11:10 Factors Affecting Catch Rates and Apparent Community Composition for Two Central Florida Lakes: **Earl Lundy**
- 11:10-11:35 Indian River Lagoon: Perfect Storm or New Norm: **Charles Jacoby**
- 11:35-12:00 *Scleria microcarpa*: A Newly Discovered Invasive Species: **Alex Onisko**
- 12:00-12:15 Converting Non-natives to Living Shorelines to Control Nonpoint Pollution and Used as a Tool for Public Education: **Mallory Brooks and Andrea Orozco**

**END OF CONFERENCE**

## VOTING SLATE FOR PRESIDENT-ELECT AND BOARD OF DIRECTORS

### **President-Elect: Kelli Gladding**

Over the past 13 years, Ms. Gladding has been involved in the protection of water resources throughout the State of Florida. Upon receiving her B.A. in Environmental Science from Rollins College, Ms. Gladding was responsible for the development and implementation of invasive aquatic plant management programs as a Regional Biologist with Florida Fish and Wildlife Conservation Commission (FWC). After a decade with FWC, Ms. Gladding joined SePRO Corporation as the Florida Field Development and Technical Support Specialist. Ms. Gladding is currently responsible for leading field development projects focused on assessing new treatment approach and technologies to enhance algae, water quality and plant management programs.

Affiliations: Aquatic Plant Management Society, Florida APMS (Director and Scholarship Committee), South Florida APMS, Florida Exotic Plant Pest Council, ECF CISMA (Co-Chair) & Florida and Central Florida Lake Management Societies.

### **Board of Directors: Lyn Gettys**

Dr. Lyn Gettys (UF-IFAS FLREC and CAIP) is an Assistant Professor of Agronomy and is based at the Fort Lauderdale Research and Education Center in Davie. She has been working with aquatic plants since 1996 and has worked closely with FWC biologists to develop methods that can improve the success rate of lake restoration and aquatic habitat enhancement projects. Dr. Gettys was appointed to her current position in 2012. Prior to that, she worked as a post-doctoral researcher and a research assistant scientist under the direction of Dr. Bill Haller at the UF-IFAS CAIP. She holds a bachelor's degree in horticulture from the University of Florida, a master's degree in plant breeding from North Carolina State University and a Ph.D. in plant genetics from the University of Florida.

Dr. Gettys' research is focused on the biology and ecology of native and introduced aquatic and wetland plants and evaluation of control methods for managing invasive species. She coordinates the UF-IFAS Aquatic Weed Control Short Course, which draws over 400 attendees annually. She also has statewide Extension responsibilities for aquatic weed control, including serving as a speaker and provider of Continuing Education Units. Dr. Gettys has authored or co-authored over 160 publications, including 60 abstracts, and was lead editor for the 2<sup>nd</sup> and 3<sup>rd</sup> editions of the Aquatic Ecosystem Restoration Foundation's Best Management Practices Manual. She also serves on the supervisory committees of five graduate students at UF.

### **Board of Directors: Jim Harris**

James Harris has been an employee of the USACE Invasive Species Management Branch for the last eight years. Jim was an applicator/watercraft operator for three years before accepting a biologist position in 2012. His position at the North Florida Aquatic Plant Control Unit primarily focuses on operations on the middle and lower St. Johns River although he participates in projects throughout the state. Prior to that he owned and operated an environmental consulting business in central Florida for eight years after working as an Environmental Specialist with the FDOH for five years. Jim received a BS in Soil & Water Science from UF in 1996. While at UF he completed course work allowing certification in several disciplines including biology. Prior work experience includes biological surveys, stormwater management, wastewater system design, groundwater monitoring, and wildland fire fighting. Jim served four years with the Army's 82d Airborne Division prior to attending college. Jim currently resides in Deland, Florida and enjoys spending time with his children and going fishing or hunting. His memberships in professional organizations include the Florida Aquatic Plant Management Society and the Society of Wetland Scientists.

### **Board of Directors: Thomas Calhoun**

Mr. Calhoun is a Senior Environmental Scientist for Seminole County in the Lake Management Program (Public Works, Watershed Management Division), where he has worked for 14 years. He is involved in all aspects of watershed management, from assessment to implementation of management plans. His work involves providing biological and water quality diagnoses to assess the extent of eutrophication, and conducting watershed assessments to identify active or potential sources of pollution. Mr. Calhoun is responsible for utilizing water quality data to develop lake management plans, including shoreline vegetation management, treatment of invasive aquatic plants such as hydrilla, and stormwater management. He is further involved in overseeing the implementation of technologies to execute lake management plans, including sediment dredging, weed harvesting, artificial aeration, grass carp fish, and aquatic herbicide treatments. Mr. Calhoun works closely with lake residents and community volunteers in shoreline restoration activities designed to help achieve whole-lake improvements in water and habitat quality. Mr. Calhoun graduated with B.S. in Environmental Science from the University of Central Florida in 2006.



## FAPMS OFFICERS 2016-2017

### PRESIDENT

Andy Fuhrman

### PRESIDENT-ELECT

Keith Mangus

### PAST-PRESIDENT

Angie Huebner

### SECRETARY

Stephanie Walters

### TREASURER

Jennifer Myers

### EDITOR

Karen Brown

### DIRECTORS

Jeremy Slade	Bill Kurth	Randy Snyder
Linda Defee	Joyce Hertel	Jeff Holland
Kelli Gladding	Scott Jackson	Robbie Lovestrand

### FAPMS PAST PRESIDENTS

<b>1977</b> Leslie Bitting Sr.	<b>1991</b> Dan Thayer	<b>2005</b> Keshav Setaram
<b>1978</b> Leslie Bitting Sr.	<b>1992</b> Ken Langeland	<b>2006</b> Bill Moore
<b>1979</b> Harold Brown	<b>1993</b> Wayne Corbin	<b>2007</b> Vicki Pontius
<b>1980</b> Bill Haller	<b>1994</b> Wendy Andrew	<b>2008</b> Chance DuBose
<b>1981</b> Joe Joyce	<b>1995</b> Mike Hulon	<b>2009</b> Mike Netherland
<b>1982</b> William Maier	<b>1996</b> Don Doggett	<b>2010</b> Mike Bodle
<b>1983</b> Carlton Layne	<b>1997</b> Ernie Feller	<b>2011</b> Vernon Vandiver
<b>1984</b> Paul Myers	<b>1998</b> Francois Laroche	<b>2012</b> Jerry Renney
<b>1985</b> Clarke Hudson	<b>1999</b> Jim Brewer	<b>2013</b> Tim Harris
<b>1986</b> David Tarver	<b>2000</b> Jeff Schardt	<b>2014</b> James Boggs Jr.
<b>1987</b> Michael Mahler	<b>2001</b> Nancy Allen	<b>2015</b> Ed Harris
<b>1988</b> Eddie Knight	<b>2002</b> John Rodgers	<b>2016</b> Angie Huebner
<b>1989</b> Bill Moore	<b>2003</b> P.J. Myers	
<b>1990</b> Brian Nelson	<b>2004</b> Steve Weinsier	

## HONORARY LIFETIME MEMBERS

<p><b>1996</b> Leslie E. Bitting, Sr.  <b>1997</b> Edward D. Knight  <b>2006</b> William T. Haller  <b>2006</b> Andy L. Price, Sr.  <b>2006</b> Vernon V. Vandiver, Jr.  <b>2011</b> William H. Moore</p>	<p><b>2012</b> Carlton Layne  <b>2013</b> Ken Langeland  <b>2013</b> Don Doggett  <b>2014</b> Stephanie McCarty  <b>2014</b> Jeff Schardt  <b>2016</b> Joe Joyce</p>
---	--

## FAPMS CHARTER MEMBERS

Abramson, Stanley	Day, Ronald L.	Hudson, Clarke	Moore, William H.	Steward, Kerry K.
Adams, John	Deets, Paul	Jenkins, James P.	Mosier, Greg	Stokes, Glenn M.
Almand, C. William	Deets, Peter J.	Jenus, Joseph, Jr.	Mullens, Thomas C.	Stoll, Richard H.
Anderson, Paul	Dequine, John F.	Johnston, Donald C.	Murningham, Jack	Sutton, David L
Arnold, Wendell	Dilmore, R. W.	Jones, Dan	Myers, Vernon W.	Sweat, Harry
Baird, Douglas D.	Dinagan, F. J.	Joyce, Joe	Nichols, Gary D.	Szymborski, Richard A.
Baker, Gordon	Downing, Kevin	Karby, Steven	Orsenigo, J. R.	Tarver, David P.
Barnette, William	Drda, Thomas F.	Kawaguchi, Paul	Parham, Carl A.	Taylor, Thomas M.
Bay, P. A. M.	Edwards, William G.	Kelso, John T.	Pederson, Pete	Temples, Glenn C.
Beasley, Larry	Flavin, James P.	King, Paul C.	Perryman, Jerry M.	Thomas, Paul A.
Betz, George	Flori, Carl Dr.	Lambert, Porter	Phillippy, Clayton L.	Tomasello, Rudolph P.
Bitting, Les	Flowers, Charles J.	Land, Rex E.	Phillips, P. W.	Trent, Lowell L.
Blackburn, Candy	Fredell Sr., Oran	Land, W. E.	Pieroni, Alfi M.	Tucker, Sr., Marvin R.
Blackburn, Robert	Friedman, Herbert J.	Lawson, Walter R.	Price, Andy L.	Tye, Carl
Blakely, Robert	Frizzell, Johnie	Layer, John L.	Pruitt, Gary W.	Vance, Grady
Boykin, R. Ken	Gardner, John W.	Layne, Carlton	Raimondo, Paul	Vandiver, Jr., Vernon V.
Brewer, Paul	Garrard, Leon A.	Leasure, A. D.	Ranson, James H.	Vowell, James E.
Brightwell, R. E.	Gates, Robert J.	Lee, Donald V.	Rapp, James B.	Walker, Billy Joe
Brooks, Thomas	German, Louis	Lee, Russell C.	Raulerson, Edgar W.	Waters, Donald B.
Brown, Deanna	Glenn Jr., John E.	Lowder, Edward C.	Rivelli, Thomas A.	Weber, Richard Lee
Brown, Donald W.	Grote, J. C.	Lowe, Glen L	Rushing, William N.	Weedon, J. Stanley
Brown, Harold F.	Hale, Lee	Maddox, Larry L.	Sassic, Nicholas	Widmann, Donald C.
Brown, Martin	Hall, B. Lamar	Madison, Edward, Jr.	Scherer, Lester E.	Williams, James L.
Burkhalter, Alva P.	Haller, Bill	Mahler, Michael J.	Schweigart, Joe	Wilson, Frank
Campbell, Edward	Hardy, Paul E.	Maier, Bill	Sconyers, Max C.	Woodman, William J.
Carson, Webster B.	Hargrove, Chuck	McCarty, William A.	Seaver, Harry R.	Worsham, W. A.
Carter, Chris C.	Harp, Jean B.	McDonald, Eugene E.	Sheppardson, Terry	Wright, Lewis
Chandler, Lawrence	Harper, George L.	McKinney, Larry M.	Shinholser, James F	Wunderlich, William E.
Christian, Donald G.	Hestand, Rue S.	McMillian, William H.	Smith, Robert W.	Yager, J. L.
Clark, James E.	Hinkle, Joe C.	Merritt, Ralph	Sparkman, Perry L.	Yoder, Philip J.
Clark, Roy P.	Hogan, William D.	Mickler, Hampton J.	Spirnock, Ray A.	Young, Phillip
Cook, Jon	Holmes, Pennie	Miller, Edward J.	Stafford, Jr., Frank S.	
Cool, Carl	Hope, Donald E.	Minter, Tom	Stanley, J. G.	
Cribbs, Benjamin	Hopkins, Jr., Sam B.	Moherek, Emil A.	Steward, Charles W.	
Cummings, Herb	Huckabee, Alvin B.	Monahan, William T.	Steward, Frank E.	



## **Abstracts: Tuesday, October 17, 2017**

### ***Improving Communication/Cooperation Among Aquatic Professionals Societies***

**Mark Hoyer** (UF/IFAS; mvhoyer@ufl.edu)

At the North American Lake Management Society (NALMS) 34th International Symposium (2014) in Tampa, Florida, a session was held to discuss how NALMS, the American Fisheries Society (AFS), and the Aquatic Plant Management Society (APMS) could better communicate/cooperate using the strengths of each society to help better manage aquatic resources. While the societies maintain varying membership sizes (AFS ~ 6,000, NALMS ~ 1,000, and APMS ~ 500), working together should increase the impact of managing the same natural resources. Representatives of each society gave the following presentations followed by an open discussion with approximately 70 participants. The consensus was clear that more collaboration and communication among our societies would improve the value to our collective members. Presentations included:

- Introduction on the Overlap among Three International Aquatic Professional Societies NALMS, AFS, APMS (Mark Hoyer, NALMS President 2010)
- Improving Communication Between All Lake Management Interests, the NALMS Perspective (Terry McNabb, NALMS President 2013 and APMS President 1997)
- Benefits of Cooperation Between Aquatic Professional Societies AFS, NALMS, and APMS (Mike Allen, AFS Representative)
- Common Interests That Link the Aquatic Plant Management Society with NALMS and AFS (Michael Netherland, Immediate Past President of APMS)



### ***FISP and the UF/IFAS Invasive Species Extension Coordinator***

**Rose Godfrey** (UF/IFAS; Rosa23@ufl.edu)

Non-native invasive species are a constant challenge to the management of Florida environments. The Florida Invasive Species Partnership (FISP) was created to help landowners and managers take on the endeavor of managing the landscapes of Florida from non-native invasive species. FISP is a collaboration of many agencies and organizations, formed to link efforts in invasive species prevention and management across agency and property boundaries in Florida. UF/IFAS Extension has supplemented FISP efforts by creating an Invasive Species Extension Coordinator position. Find out more about how invasive species management can benefit from partnerships.



**Game of Thorns: The Marriage of House FLEPPC to House FISP**

**Sherry Williams** (Seminole County Natural Lands Program; Swilliams02@seminolecountyfl.gov)

The Florida Exotic Pest Plant Council (FLEPPC) has been around (officially) since 1984. Two of their main functions are to create a list of Florida’s most invasive exotic plants and provided an annual forum where public land managers and researchers can share information. The Florida Invasive Species Partnership (FISP) was formed in 2008 to meet the needs of both private and public sectors by facilitating partnerships across boundaries to manage invasive exotic species. FISP also assisted with (and supports) the formation of the 17 Cooperative Invasive Species Management Areas covering the entire state of Florida. The resulting partnership that has developed between these two organizations illustrates how important it is to work together for a common cause.



**APMS Update**

**Jeremy Slade** (United Phosphorus, Inc.; jeremy.slade@uniphos.com)

Originally the Hyacinth Control Society when founded in 1961, The Aquatic Plant Management Society, is a respected source of expertise in the field of biological, mechanical and chemical aquatic plant and algae management. The Society has grown to include seven regional chapters. Through these affiliates, annual meetings, newsletters, and the Journal of Aquatic Plant Management, members are kept abreast of the latest developments in the aquatic plant and algae management field. APMS undertook Strategic Planning exercises in 2017, inviting key participants from Regional Chapters. This effort resulted in adding algae management to the Society’s Vision and Mission Statements as well as developing comprehensive financial, outreach, and sustainability plans. The results as well as the planning process relevant to FAPMS will be discussed. This presentation will provide a summary of scientific, operational and educational materials provided by APMS for aquatic plant managers as well as FAPMS and Chapter members. A brief update will be provided on the 2017 Annual Meeting held in Daytona Beach, FL.



**The Art and Science of Pulling Out Spray Equipment**

**Fred Whitford** (Purdue University; fwhitford@purdue.edu)

The truth is that for every story of a successful vehicle extraction, there is usually a story about something that has gone wrong — sometimes very wrong. It is essential that equipment operators recognize the real dangers associated with pulling application equipment, tractors, or trucks out of mud, sand, or snow. Extracting equipment is anything but routine, and owners and operators need to understand the potential repercussions of unsafe practices (such as of using a cut towing strap, undersized clevis or chain, or a weak attachment point). Such shortcuts can lead to expensive repairs, injuries that last a lifetime, or worse, a person’s death. This presentation examines the ratings of towing devices, factors to consider before you pull out stuck equipment or vehicles, and when calling a professional wrecker service is warranted. Our goal is that equipment operators will be better

equipped with the knowledge to safely and effectively extract stuck vehicles without injuring the drivers, bystanders, equipment, or the environment.



**Where Does the Muck Come From???**

**Bill Haller** (UF/IFAS; whaller@ufl.edu)

How many times have you heard stakeholders say to “stop spraying, you are filling the lake with muck”!!!! And your response should be that “ yes, “we have considered this and research has shown that the maintenance control of both submersed and floating aquatic weeds actually results in less organic matter production that would occur if the plants were not controlled.” This paper will review the data conducted on water hyacinth and hydrilla organic matter deposition under various management scenarios and clearly shows that organic matter deposition is much less, and nearly insignificant, compared to that produced by the no control option.



**Littoral Sediment Accumulation Ten Years After Muck Removal in Lake Tohopekaliga, Florida**

**Mark Hoyer** (UF/IFAS; mvhoyer@ufl.edu), Michael D. Netherland (USACE) and Dean Jones (UF/IFAS)

In 2004, a multimillion dollar muck removal program was completed that targeted an estimated average 46 cm of muck in 1,420 ha of littoral area in Lake Tohopekaliga, FL. In 2005 sediment cores were taken from 145 sites located throughout the scraped littoral area, showing an estimated 1.6 cm of organic sediment after the removal program. To address concerns about the longevity of this management activity, sediment cores were taken again at 130 of the original sites in August 2008 and January 2015 to estimate sediment accumulation rates. From 2005 to 2015 there was a whole-lake average of 2.2 cm of organic sediment accumulated, yielding a rate of 0.22 (0.18 to 0.24, 95% confidence interval) cm yr<sup>-1</sup> for the decade. At that accumulation rate, it would take approximately 210 years (191 to 238, 95% confidence interval) to reach the original 46 cm of littoral muck, and these data suggest that the muck removal program will not have to be repeated for many years. Additionally, aquatic plants were identified at coring sites sampled in 2015 to determine if sediment accumulation rates were different in areas dominated by specific plant types and/or species, and no significant differences were found.



**Pesticide Toxicity Testing**

**Fred Fishel** (UF/IFAS; weeddr@ufl.edu)

How toxicity is determined, assumptions of testing, comparing acute with chronic toxicity, and the associated label signal words – what do they really mean? Early pesticide use events framed the

registration process that an innovative product must meet to be EPA-approved in modern times. An air monitoring study conducted in Florida during the 1990's with aquatic applicators will be presented.



**Sun Safety (Dermatology)**

**Cheryl Campbell** (Florida Dermatology and Skin Care Center; cccampbell33@gmail.com)

Why it's important to protect yourself and how to do it properly.



**Abstracts: Wednesday, October 18, 2017**

***Investigating Risk and Management of Hydrilla/Aetokthonos hydrillicola Inducing Vacuolar Myelinopathy***

**Susan Wilde** (University of Georgia; swilde@uga.edu), Brigitte Haram, Wesley Gerrin, (University of Georgia), Dean Jones (UF/IFAS) and Michael Netherland (USACE)

We monitored Florida lakes to determine locations/seasons at highest risk for avian vacuolar myelinopathy (AVM) disease using density of *Aetokthonos hydrillicola* (*Ah*) and relative toxicity of plant and snail extracts. We detected moderate levels of *Ah* in Lake Tohopekaliga (Toho) at 9/13 sites during December 2016 and found higher densities of *Ah* (50-70% leaf area) during January 2017 and low density *Ah* on two new sites. We also detected low densities of *Ah* on *Potamogeton illinoensis*, *Bacopa caroliniana*, and *Nitella* sp in locations with high density of *Ah* on hydrilla. We observed bald eagles, snail kites, limpkin, ring-necked ducks, coots, and moorhen in dense hydrilla locations. We also found dense colonies of *Ah* on hydrilla in Lake Istokpoga (2/6 sites), and at lower densities on *Utricularia* sp. No *Ah* was found on hydrilla, *Ceratophyllum*, *Utricularia*, *Najas*, or *Vallisneria* in Okeechobee, (0/11 sites). We will use *Ah* prevalence and toxicity using *Ceriodaphnia*, and zebrafish (*Danio rerio*) bioassays to construct a risk map based on conditions at existing locations.



***Recent Trends in Snail Kite Monitoring***

**Caroline Poli** (cpoli@ufl.edu), Robert Fletcher, Brian Jeffery, Ellen Robertson, and Sarah Dudek (UF/IFAS)

Understanding population biology is essential for management and conservation of species of interest, as well as interpreting effects of changing environments on the distribution and abundance of species. Scientists, managers and conservationists have emphasized the need for long-term population monitoring, particularly in the context of endangered species conservation and understanding effects of habitat management and restoration. The snail kite (*Rostrhamus sociabilis plumbeus*) is a highly endangered, wetland-dependent raptor whose population has fluctuated greatly over the past 20

years. Snail kites display an extreme form of dietary specialization, feeding almost exclusively on a single genus of freshwater apple snail (*Pomacea* spp.). We will present the current status of snail kite monitoring in Florida and provide information regarding how this knowledge is being used for species recovery and wetland management. We provide information on changes in survival and reproduction and how these parameters vary with wetland conditions and exotic prey. During the 2016 breeding season, snail kite breeding activity was high, where we monitored more nests and observed more young fledged than in previous years. In particular, nesting activity was very high at Lake Okeechobee, where recent habitat management occurred. Population size was estimated as being relatively stable to the prior year. This information is currently informing management activities across central and south Florida.



***The Formation of Lakes in Florida and the Physical Limnologic Characteristics that Makes Them Unique and Explains Their Behavior***

**Ron Hart** (Lake County Water Authority; ronh@lcwa.org)

The formation of Florida's lakes began prior to the creation of Florida and continues today. Multiple processes have combined over millions of years to shape the aquatic landscape we see today. In this presentation, the author will attempt to explain these processes and why they are important to the formation of our lakes and waterways. He will also attempt to explain the physical parameters of lakes and demonstrate how these affect different responses in each waterbody. The author will also provide essential information that every professional who responds to citizen inquiries should know.



***Screening and Development of New Aquatic Herbicides***

**Bill Haller** (whaller@ufl.edu) and Lyn A. Gettys (UF/IFAS)

Screening aquatic herbicides for possible registration was historically and is currently not undertaken by the major agricultural companies. Largely due to the invasion of TVA reservoirs by *E. watermilfoil* and the expansion of aquaculture programs in farm ponds, the USDA and US Corps of Engineers developed screening programs before the formation of the USEPA (1970) which continued until the early 1980's. The requirements for many new and expensive studies of pesticide impact on human health and the environment resulted in even less financial incentive for industry to register aquatic herbicides. From 1977 to 2002, only two herbicides received full EPA registration for aquatic use, glyphosate and fluridone. By 2000, only 6 herbicides were widely used for aquatic weed control and there was no concern for development of herbicide resistant weed populations, and the widespread belief among weed managers and scientists was that it very unlikely any new aquatic registrations would be sought or approved in the near future. Widespread use of these few herbicides, with little opportunity to alternate modes of action resulted in the development of resistant aquatic weed populations to fluridone, diquat and endothall, all in the early 2000's, at about the same time many weeds developed resistance populations in roundup ready crops. Following many meetings and discussions, a major multi-agency effort was begun to develop and register new modes of herbicide

action for aquatic use. This meant rapidly screening and conducting selectivity studies on environmentally acceptable herbicides registered for terrestrial use since about 1980. The result of this effort resulted in the development of new herbicides for aquatic use. The methods used to initially rapidly screen and evaluate selectivity as well the work conducted under Experimental Use Permits will be reviewed.



### **Professionalism and Certified Applicators**

**Carlton Layne** (Aquatic Ecosystem Restoration Foundation; clayne@aquatics.org)

Federal legislative update; information regarding label comprehension, pesticide safety and legal requirements.



### **Update on Aquatic Grass Control Work**

**Stephen Enloe** (UF/IFAS; sfenloe@ufl.edu)

Invasive grasses are problematic in many aquatic, riparian, and upland areas throughout Florida. For many years, managers have been largely limited to nonselective glyphosate and imazapyr treatments for grass control. There is clearly a need for more selective options as retreatments with nonselective herbicides can severely impact desirable plant species. Sethoxydim and fluazifop-p-butyl are grass specific herbicides (graminicides) that have been used in agricultural, horticultural, and noncrop settings for decades. Sethoxydim and fluazifop-p-butyl received experimental use permits in Florida for aquatic use in 2015 and 2016, respectively. This presentation will summarize three years of Florida research on the use of these herbicides for upland, riparian and aquatic grass control. Audience members will gain a strong grasp of how these herbicides work and how to interpret current 24(c) label language for sethoxydim.



### **Life History of *Zizania aquatica*, Southern Wild Rice, in Tidal and Spring Charged Rivers and its Implication in Habitat Restoration**

**Colette Jacono** (UF/IFAS; colettej@ufl.edu) and Richard Moyroud (Mesozoic Landscapes, Inc.)

Two species of wild rice are widely distributed in North America, *Zizania palustris*, mainly found in mid-land lakes, and *Z. aquatica*, southern wild rice, known from rivers and tributaries of the eastern coastal plain. Both species are considered annual in habit, except in Florida where plants are described as both annual and perennial. A 1994 study involving several Florida river regions distinguished plants from tidally influenced tributaries as few stemmed annuals while inland, spring charged rivers were found to harbor large, multi-stemmed perennial plants. Our interest in incorporating southern wild rice into the horticultural field as a component in habitat enrichment and restoration necessitated a better



understanding of this anomaly in life cycle. We collected juvenile plants from distinct riparian sites and followed their life history after transplantation into common aquatic garden culture. From the original material seed was produced, collected, and its subsequent life history traced. After three consecutive years all individuals, regardless of their origin from annual or perennial populations, were found to display an annual life cycle. Rhizomes or other persisting structures were absent in culture as they were in situ. Field populations continued to be monitored during the study. Their integrity and endemism will be discussed in the context of biodiversity and climate change induced shifts in coastal floristics.



### ***IPM in Aquatic Areas***

**Lyn Gettys** (UF/IFAS; lgettys@ufl.edu)

IPM (integrated pest management) is the strategy of using “all the tools in the toolbox” for control of invasive species. Dr. Gettys will outline the philosophy of IPM and discuss the four main types of management strategies that can be used in IPM programs in aquatic areas. She will also cover detailed case studies that highlight the benefits of using an integrated approach and will provide examples of how IPM is being used for control of a number of invasive plant species.



### ***Technology for Mapping and Managing Florida's Aquatic Vegetation***

**Alex Dew** (FFWCC; Alex.Dew@myfwc.com)

In recent years, new technology for mapping vegetation has become available for managers to collect data to monitor resources. The Invasive Plant Management Section (IPM) of the Florida Fish & Wildlife Conservation Commission (FWC) began exploring techniques in conjunction with the University of Florida in the early 2000's to monitor changes in vegetation over time by gathering hydro-acoustic and species point-intercept data. A short time thereafter, ciBiobase developed a platform to automate the processing of hydro-acoustic data, which reduced turn-around times and made the data more useful for resource managers. This data is now used regularly by IPM biologists to monitor changes in species composition and submersed vegetation biovolume, which helps them to manage public waters and interact with stakeholders. In 2015, FWC's Freshwater Fisheries, together with IPM, incorporated sonar mapping and species point sampling into their Long-Term Monitoring program that had been established in 2006. Protocols for sampling were put in place and approximately 40 lakes are sampled annually. Also in 2015, the European Space Agency (ESA) launched their Sentinel 2 satellite, which provides free 10-meter resolution imagery at 13 bands. Using the species point-intercept data from the monitoring program to inform models, an estimation of dominant emergent species composition can be performed. Using similar techniques, ciBiobase is working with EOMaps to develop a user interface to optimize emergent species modelling for FWC. Improving the quality of emergent vegetation data to that of our submersed vegetation mapping helps complete the picture of plant composition on Florida's public waterbodies and will aid in monitoring changes to the plant communities over time.



### **Risks of Only Monitoring Versus Managing Noxious Cyanobacteria**

**West Bishop** (SePRO Corporation; westb@sepro.com)

Cyanobacteria are increasing threats to water resource uses. Better understanding of cyanobacterial toxins and exposure routes reinforces the need for effective management. Recreational contact, inhalation, fish/crop consumption are toxin exposure routes that are difficult to mitigate through monitoring. Fish and wildlife impacts from toxins cannot be offset by closing affected systems. Allowing cyanobacteria to exist allows for a chronic toxin exposure, potential hot spot accumulations and can alter the system to promote continued blooms. This presentation comparatively assesses risks of allowing cyanobacterial infestations to persist versus risks of implementing management programs. Case studies will be presented showing regimented copper or peroxide based algacide programs to control chronic cyanobacterial blooms and restore designated water uses. Allowing blooms to continue unabated is not without risk; effectively controlling blooms is needed to ensure safety and usability of water resources.



### **Florida's Aquatic Plant Management Program**

**Matt Phillips** (FFWCC; Mattv.phillips@myfwc.com)

Florida has had to adapt to many changing and challenging conditions in order to combat the invasive plant issues in the state. This presentation will highlight the new and innovative approaches Florida has used to address new management issues. From detecting new infestations to using new control options, Florida has used new technologies to increase effectiveness and efficiency through every step of the management process including how we are handling new infestations of *Salvinia molesta*, *Luziola subintegra*, exotic grasses and *Azolla pinnata*. Discussions will include a database and accountability tracking system, advances and standardization of plant mapping and identification protocol, new formulations for herbicide management, as well as new stakeholder engagements. One highlighted stakeholder engagement is a new outreach effort called “What’s Happening on My Lake” geared towards educating, encouraging participation and gaining a better rapport with interested members of the public.



### **Florida Invasive Plant Education Initiative**

**Dehli Albrecht** (UF/IFAS; dehliadee@ufl.edu)

For the past 11 years, the University of Florida/IFAS Center for Aquatic and Invasive Plants has been collaborating with teachers throughout the state of Florida to develop educational curricula for grades 2 through 12 on the topic of invasive plants and plant management. Two key components of these outreach efforts are a 5-day teacher training workshop, Plant Camp, and on-site classroom

demonstrations of Lakeville – A Natural Resource Management Activity. FAPMS has generously supported both activities. These activities were developed with the goal of motivating educators and outreach specialists to learn more about invasive species and then bring their new knowledge back to classrooms, workshops, associations, or other venues serving current and future citizens. This presentation will provide an overview on CAIP, Plant Camp and Lakeville and present key findings from our pre- and post-test results and evaluations from both Plant Camp and Lakeville from July 2016-June 2017.



### ***Maintenance Intervals for Invasive Plant Management***

**Greg MacDonald** (UF/IFAS; pineacre@ufl.edu)

The Fish and Wildlife Conservation Commission manage invasive species across a wide range of public lands, encompassing diverse ecosystems. The goal of invasive plant management is complete control/eradication of the nuisance species; however this is often not economically or logistically feasible for many species and situations. Our objective was to develop a procedure that constitutes “maintenance control” which seeks to keep the population of invasive plants at the “lowest level feasible” to prevent damage to the natural environment. We focused on annual and short-lived perennial species, including grasses, ferns, broadleaf forbs, and vines. For each species we are: 1) determining threshold levels that would constitute control; 2) determining the effectiveness of control methods and frequency to maintain thresholds; and 3) developing a framework to construct integrated management plans/best management practices for multiple invasive species. We realize individual areas and managers must choose what species to focus efforts based on the desired outcome and long term impact and there is not one method that can be developed to address all questions and different approaches. The goal is to provide managers with the tools to develop more long-term, step-wise approaches to management, focusing not only on the elimination/maintenance of invasive species, but also integrating practices to allow for the transition/restoration of the system to provide the desired output that best fits the needs of their clientele.



### ***An Update from the UF/IFAS Assessment of Non-Native Plants in Florida's Natural Areas***

**Deah Lieurance** (UF/IFAS; dmlieurance@ufl.edu)

To reduce the introduction, spread, and impacts of invasive plants, the UF/IFAS Assessment is used to evaluate the invasion risk of non-native plants in Florida that are 1) already present in the state, 2) proposed for introduction, or 3) new cultivars proposed for release. The results of the UF/IFAS Assessment and outreach efforts help to ensure that plant species with invasive characteristics are not recommended for use by the University of Florida (UF), state and federal agencies, or the general public. This, in turn, decreases the potential for invasions into natural areas and croplands throughout the Southeast region. Recommendations made by the UF/IFAS Assessment are transparent and available at [assessment.ifas.ufl.edu](http://assessment.ifas.ufl.edu). Since the Assessment was first implemented, over 860 non-native plant species have been evaluated. This past year 237 species were re-assessed with the Status

Assessment, 17 species were evaluated with the Predictive Tool, 4 cultivars were evaluated with the Intraspecific Taxon Protocol (ITP), and 7 new species were added to the database. The process of adding new species and updating the conclusions for assessments on the UF/IFAS Assessment web site is ongoing and is one of our primary missions. We conduct re-assessments for species when new information becomes available so the most up-to-date data is included in our evaluations. Ultimately, the UF/IFAS Assessment informs faculty, state and federal agencies, and the public about non-native species that are low invasion risk and safe to use, thereby protecting Florida's natural areas.



**Public Speaking Methods and Motivation**

**Stephen Montgomery** (Allstate Resource Management, Inc.;  
Smontgomery@allstatemanagement.com)

Public speaking is typically something many people avoid at all costs. Fear of embarrassment or being judged often keeps people from sharing the knowledge and expertise they have gained during their careers. Speaking is a learned skill that can help an individual advance within a company and help them when dealing with the public on the job. Getting over that first experience is the first step to becoming more comfortable with presenting to a group. This talk will discuss how to select a topic, organize ideas into a presentation, and tips for dealing with anxiety associated with being in front of a crowd. The presentation will be casual and share things I have learned personally from my own public speaking experiences.



**Abstracts: Thursday, October 19, 2017**

**Glyphosate: Friend or Foe?**

**Jay Ferrell** (UF/IFAS; jferrell@ufl.edu)

Reports about the harmful effects of glyphosate continue to be in the news every couple of years. Whether it is toxicity to frogs, cancer in rats, or potentially carcinogenic effects in humans, this world leading herbicide is commonly discussed. In this presentation we will review the science behind these claims and debunk some of the myths. We will also frame these claims in a proper context to help us understand whether glyphosate is harmful or a useful product for our industry.



**What to Do When the Corps Dings You \*\*\*Applicator paper\*\*\***

**Marshall Snyder** (St. Johns River Water Management District; msnyder@sjrwmd.com)

Vegetation management, on and around Upper St. Johns River Basin USACOE levee's following inspection.



**An Inside Look at Lee County Hyacinth Control District's Aquatic Plant Management Program**

**\*\*\*Applicator paper\*\*\***

**Jeremy Ford** (ford@lchcd.org) and Jason Cull (Lee County Hyacinth Control District)

We have a specialized unique program that was designed specifically for aquatic plant management. The computer database allows applicators to receive service requests, create/inspect waterbodies, search history, enter treatment data and much more. We will simulate a field application scenario with a new service request, draw a waterbody polygon and do a mock treatment for the audience.



**Salvinia molesta Eradication Efforts in the Panhandle of Florida \*\*\*Applicator paper\*\*\***

**Jamie Marler** (james.marler@myfwc.com) and Derek Fussell (FFWCC)

An overview of the discovery and subsequent efforts to survey, map out and treat as necessary to eradicate *Salvinia molesta* in the Florida Panhandle.



**Johnsongrass Control in Spartina Planting \*\*\*Applicator paper\*\*\***

**Shawn Moore** (St. Johns River Water Management District; smoore@sjrwmd.com)

This was test work to control Johnsongrass in a spartina planting, with an over the top application of TIGR herbicide to reduce the competition, with minimal damage to the spartina, thus allowing the spartina to establish a solid root ball to produce a healthy plant.



**Selective Herbicides for Control of Coral Ardisia in Natural Areas**

**Pat Minogue** (pminogue@ufl.edu), Stephen Enloe, Richard Cristan and Brent Sellers (UF/IFAS)

Coral ardisia (*Ardisia crenata*) is a shade-tolerant shrub that is highly invasive in Florida forests and natural areas. It alters native plant communities, sometimes forming dense continuous stands in the forest understory, suppressing forest tree regeneration and many understory plants. A uniform study

compared eight herbicide treatments to a non-treated control at three study locations in north and central Florida. Across study sites, triclopyr acid and ester formulations provided better cover reduction of established coral ardisia than choline or amine triclopyr formulations. Triclopyr ester resulted in more than twice the cover reduction (67%) than the same acid equivalent rate per acre of the more commonly used amine formulation (30%). Imazamox at the high rate resulted in 65% coral ardisia cover reduction, greater than the 37% reduction obtained with the low rate, but herbicide phytotoxicity was observed in native vegetation with both rates. All treatments except flumioxazin reduced established (>8 cm height) coral ardisia cover at 12 MAT compared to the non-treated control, but across locations the degree of control obtained with the most effective treatments was only 60 to 67% cover reduction, indicating the need for retreatment.



**Factors Affecting Catch Rates and Apparent Community Composition for Two Central Florida Lakes**  
**Earl Lundy** (FFWCC FWRI; Earl.lundy@myFWC.com)

Community composition is often used by managers as an index of overall lake health. While numbers of sportfishes such as Largemouth Bass *Micropterus salmoides*, Black Crappie *Pomoxis nigromaculatus*, and Sunfishes *Lepomis spp.* are commonly examined, preponderance of other species is also critical in assessing a fish community's health. Relatively high numbers of "rough fish" such as Gizzard Shad *Dorosoma cepedianum*, Bowfin *Amia calva*, and Gar *Lepisosteus spp.* are seen as indicative of a poor fish community and possibly system in poor health. Likewise the indices of forage fishes is often used in comparison with indices of predatory species to determine if a system has a surplus or deficit of prey for desirable fishes. However, vulnerability of various species to the sampling method can skew the results, leading to erroneous conclusions.



**Indian River Lagoon: Perfect Storm or New Norm**  
**Charles Jacoby** (St. Johns River Water Management District; cjacoby@sjrwmd.com)

The Indian River Lagoon is shallow and microtidal, without flow from a major river. These characteristics support the lagoon's diversity and make it vulnerable to people's activities. In fact, the system is impaired by excess loads of nutrients. Stakeholders are reducing loads, but they are concerned that recent events indicate a shift in the ability of the lagoon to cope with nutrients. For example, the intensity, duration and composition of phytoplankton blooms have changed since 2011, with blooms leading to fish kills and loss of seagrasses. As we implement projects that reduce nutrient loads, restore natural cycling of nutrients and increase consumption of phytoplankton, we also are improving our understanding of the lagoon's nutrient budget and the factors that initiate and control phytoplankton blooms. Bottom-up drivers of increased phytoplankton production include nutrients delivered in surface water runoff, injected via submarine groundwater and released from accumulated "muck." Changes in the abundance of macroalgae and seagrasses alter storage and cycling of nutrients, which affects the availability of nutrients for phytoplankton. Environmental conditions influence the

composition of blooms, and blooms of certain taxa may escape top-down control by filter feeders. Overall, the situation points to a need to consider the effects of events when managing nutrient inputs.



***Scleria microcarpa: A Newly Discovered Invasive Species***

**Alex Onisko** (South Florida Water Management District; [aonisko@sfwmd.gov](mailto:aonisko@sfwmd.gov))

A newly discovered non-native invasive species has been found on the Kissimmee Chain of Lakes. *Scleria microcarpa*, a sedge commonly called Tropical Nutrush has been discovered infesting shaded areas in the littoral zones of lakes and canals. Conference attendees will be provided the skills to identify this species in the field. Biologists are currently tracking this species to learn what habitats it prefers and what environmental constraints may help to contain its population expansion. This presentation will include information about how *S. microcarpa* is being managed and what questions about this species are still left unanswered.



***Converting Non-natives to Living Shorelines to Control Nonpoint Pollution and Used as a Tool for Public Education***

**Mallory Brooks** ([Mallory.d.brooks@students.cookman.edu](mailto:Mallory.d.brooks@students.cookman.edu)), **Andrea Orozco** ([Orozcorojodelavega@students.cookman.edu](mailto:Orozcorojodelavega@students.cookman.edu)), Adeljean Ho and Hyun J. Cho (Bethune-Cookman University)

Surface runoff is caused by rainfall or flooding that can transfer pollutants from land into nearby waterbodies. Based on the surrounding land-use pollutants, such as nutrients from agriculture, and synthetic chemicals from urban areas, are deposited into the water column. Non-point source pollution stemming from surfaces causes cascading effects impacting animals, water quality, and the growth of vital wetland plants. Mass mortality events of marine mammals, birds, and fish, Harmful Algal Blooms (HABs), decreased levels of dissolved oxygen, and increased levels of nutrients, and dissolved and suspended solids have all been associated with increasing amounts of surface runoff. The objective of the study is to convert residential turf grass and non-natives in the littoral zone of retention ponds and the Mosquito Lagoon (ML) into native wetland vegetation to allow for more efficient absorption of nutrients entering the water body from surface runoff. The study site will be located within the ML watershed, in the cities of New Smyrna Beach, Edgewater, and Oak Hill, FL. The estuary is surrounded by an urban environment composed of impervious and disturbed surfaces, and residential communities primarily dominated by dense turf grass and ornamental non-natives with poor absorption of nutrients. The emergent vegetation was planted on the property of ten homes located along the bank of the lagoon, with ten other homes selected as controls. Five coastal retention ponds within the watershed of the ML were selected to convert the dominant turf grass into living shorelines. The water quality of the modified sites will be monitored over a three-year period, and will include public outreach and education to raise awareness of surface runoff and its effects on aquatic ecosystems. Statistical analysis will be performed to test for a significant difference in water quality between replanted and control sites.

## Notes

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---



## **Notes**

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

## Notes

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

## Notes

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

Be sure to thank our sponsors!



**syngenta**



**Bi Safe Systems**



**Lonza**



**WINFIELD UNITED**

