



FAPMS
42nd Annual Training Conference
October 16-18, 2018
Daytona Beach, Florida

About the cover:

Another great day at the office for a Florida applicator. *Photo courtesy Kelli Gladding, SePRO Corporation and FAPMS President-elect.*

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

APPROVED CEUs (maximum per person: 18)

CORE (482 or 487)	1
Aquatic	15
Demo & Research	17
Natural Areas	5.5
Private	17
Right-of-Way	5.5

Program committee

Chair: Kris Campbell

Lyn A. Gettys

Recommended format for citing abstracts from this program:

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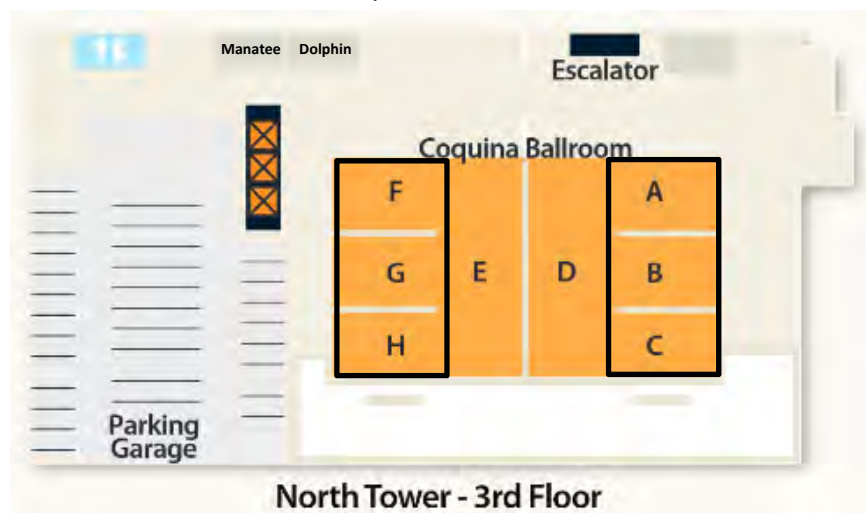
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Hotel and conference center map **Hilton Daytona Beach Oceanfront Resort** **100 N Atlantic Avenue, Daytona Beach, Florida 32118**

Overview of first floor:



FAPMS Conference: North Tower, third floor



Sponsor exhibits: Coquina D & E
Sessions: Coquina F, G & H
Awards banquet: Coquina A, B & C

Monday, October 15, 2018

2:00-3:00 FAPMS Board of Directors meeting – Coquina A

1:00-6:00 Exhibit/Vendor/Poster Setup – Coquina D & E

Tuesday, October 16, 2018

*8:00-10:00 Past Presidents Meeting/FAPMS Research and Scholarship
Foundation Meeting – Manatee*

Session 1: Where We Are and Where We're Going (FDACS program # 25934)

Moderator: Keith Mangus (*Coquina F, G & H*)

*10:00-10:15 Presidential address, local Arrangements, announcements:
Keith Mangus*

*10:15-10:40 Keynote: Five decades of progress (?) in aquatic weed control in
Florida: Bill Haller*

*10:40-11:00 Florida's aquatic invasive plant management: The sportsman's view:
Ryan Hamm*

*11:00-11:20 Assessing post-hurricane potential spread of aquatic non-native
plants in Florida: Ian Pfingsten*

*11:20-11:30 The history, present, and future of the FWC Invasive Plant
Management Section: Research and Outreach Program: Sam Yuan*

11:30-11:40 Florida's aquatic plant management program: Alex Dew

11:40-11:55 Aquatic Plant Management Society update: Craig Aguillard

11:55-1:20 LUNCH (on your own); also Women of Aquatics Luncheon

Session 2: Exciting Discoveries in Natural Areas (FDACS program #25935)

Moderator: Matt Phillips (*Coquina F, G & H*)

- 1:20-1:25 PRIZE DRAWING
- 1:25-1:50 Florida Exotic Pest Plant Council, what it's all about: **Sherry Williams**
- 1:50-2:15 Exciting test plots and treatment result with Method 240 SL in natural areas: **Mike Terry (Applicator presentation)**
- 2:15-2:40 Promising new herbicide technologies for the management of Old World climbing fern: **Jonathan Glueckert**
- 2:40-3:05 AERF updates: **Carlton Layne**
- 3:05-3:25 BREAK** (*Coquina D & E*)

Session 3: Much Ado About Aquatic Plants (FDACS program #25936)

Moderator: Scott Jackson (*Coquina F, G & H*)

- 3:25-3:30 PRIZE DRAWING
- 3:30-3:45 Label and product updates: **Syngenta**
- 3:45-4:05 Label and product updates: **United Phosphorus Inc.**
- 4:05-4:20 Label and product updates: **Helena**
- 4:20-4:40 The effects of ProcellaCOR SC on hygrophila, hydrilla, rotala and crested floating heart: **Kevin Damaso (Applicator presentation)**
- 4:40-5:00 Calcium substrates used to control plant growth and reduce water column phosphorus in wetlands treating agricultural runoff: **Kevin Grace**
- 5:00-5:15 New FWC waterbody data map: **Alex Dew**
- 5:15-5:25 ProcellaCOR study work: **Jim Godfrey (Applicator presentation)**

END TUESDAY REGULAR SESSIONS

- 5:25-6:00 Poster competition** (*Coquina D & E*)
- 6:00-8:00 Presidential Reception** (*Mai Tai at Bubba Gump's*)

Session 4: Herbicides and Their Targets (FDACS program #25937)

Moderator: Keshav Setaram (*Coquina F, G & H*)

8:00-8:05	PRIZE DRAWING
8:05-8:15	Label and product updates: Lake & Wetland Management
8:15-8:25	Label and product updates: BioSafe
8:25-8:40	Label and product updates: SePRO
8:40-9:45	The aquatic weed control herbicide challenge: Stephen Enloe and Greg MacDonald
9:45-10:10	Adjuvants - What you need to know: Jay Ferrell
10:10-10:30	BREAK (<i>Coquina D & E</i>)

Session 5: Plant Management for Plant Managers (FDACS program #25938)

Moderator: Angie Huebner (*Coquina F, G & H*)

10:30-10:35	PRIZE DRAWING
10:35-11:00	How much salt can kill hydrilla and eelgrass?!?: Mohsen Tootoonchi (Student presentation)
11:00-11:25	Early field application results using ProcellaCOR on various aquatic plants: Jason Cull (Applicator presentation)
11:25-11:50	Crested floatingheart ramet viability and management: Ian Markovich (Student presentation)
11:50-12:15	Distribution and mitigation of <i>Rotala rotundifolia</i> in South Florida: Kyle Thayer (Student presentation)
12:15-1:15	LUNCH (on your own)

Session 6: Safety and Invasives (FDACS program #25939)

Moderator: Lyn Gettys (*Coquina F, G & H*)

- 1:15-1:20 PRIZE DRAWING
- 1:20-1:45 The exotic island apple snail-Kissimmee Grass connection: **Bill Haller**
- 1:45-2:10 Working in the public eye: **Stephen Montgomery**
- 2:10-3:00 Boating law and responsibilities: **Art Morrow and Whitney Chase**
- 3:00-3:15 BREAK** (*Coquina D & E*)

Session 7: Tools in the Tool Box (FDACS program #25940)

Moderator: Keith Mangus (*Coquina F, G & H*)

- 3:15-3:20 PRIZE DRAWING
- 3:20-3:30 FAPMS Business Meeting: **Keith Mangus**
- 3:30-3:55 Pesky Natives: **Lyn Gettys**
- 3:55-4:20 Water: The smallest factor that makes the greatest difference: **Fred Fishel**
- 4:20-5:10 Equipment Demonstration (*Outside*)

END WEDNESDAY SESSIONS

5:30-6:30: Duck Races (*Sunset Pool, 5th floor, north tower*)

7:00-9:30: Awards Banquet (*Coquina A, B & C*)



Session 8: Aquatic Weeds, Friend or Foe (FDACS program #25941)

Moderator: Andy Fuhrman (*Coquina F, G & H*)

- 8:00-8:05 PRIZE DRAWING
- 8:05-8:25 Field and mesocosm evaluations of graminicides on *Hymenachne amplexicaulis*, West Indian marsh grass: control and non-target effects: **Kaitlyn Quincy (Student presentation)**
- 8:25-8:45 Construction of treatment wetland to reduce nutrient loading from stormwater runoff into coastal waters: **Samuel Mwenda (Student presentation)**
- 8:45-9:05 Fire in the wetlands: **Susanna Toledo**
- 9:05-9:25 Behavior invasive of local aquatic plants in a lagoon of the Colombian Caribbean: **Maria Isabel Pozzo (Student presentation)**
- 9:25-9:45 Autonomous technology for aquatic plant management: **Andrew Howell (Student presentation)**
- 9:45-10:10 BREAK** (*Coquina D & E*)

Session 9: What's on the Research Horizon (FDACS program #25942)

Moderator: Kelli Gladding (*Coquina F, G & H*)

- 10:10-10:15 PRIZE DRAWING
- 10:15-10:40 Lookalike aquatic plants: **Lyn Gettys**
- 10:40-11:05 Surveys for potential biological control agents for *Nymphaea mexicana* Zuccarini in South Africa: **Megan Reid (Student presentation)**
- 11:05-11:30 Red root floater (*Phyllanthus fluitans*) update: **Mike Sowinski**
- 11:30-11:55 Identification of common wetland sedges in Florida: **Alex Onisko (Student presentation)**

END OF CONFERENCE

VOTING SLATE FOR PRESIDENT-ELECT AND BOARD OF DIRECTORS

President-Elect: Scott Jackson

Scott brings over 20 years of experience in wetland and aquatic systems and represents Syngenta's line of aquatic invasive weed management products in the US Southeast. Prior to joining Syngenta in 2013 as the Southeast Aquatics Territory Manager, Scott worked for DB Environmental, Inc. beginning in 1998. As part of a company considered a recognized industry leader in wetland biogeochemistry while undertaking "the world's largest ecosystem restoration" in the Florida Everglades, he led a team of biologist as General Manager of South Florida Operations. Scott earned his Bachelor of Science from Delaware Valley College in Doylestown, PA and his Master of Science Degree from University of Florida Soil and Water Sciences. Scott has served since 2013 as Vendor Chair for Florida Aquatic Plant Management Society (FAPMS) and as a board member since 2015. He is currently president of South Florida Aquatic Plant Management Society (SFAPMS) and is president elect for Mid South Aquatic Plant Management Society (MSAPMS). Currently he resides in Palm Beach Gardens, Florida with his wife and two boys.

Board of Directors: Sam Yuan

Samantha Yuan joined FWC's Invasive Plant Management Section (IPMS) in 2016 as the Research and Outreach manager. She is responsible for administering and contracting all the research and outreach projects that IPMS oversees. She also serves as the Section's Early Detection & Rapid Response Coordinator and Public Waters Grass Carp Coordinator. In addition, she maintains the Section's website and responds to online inquiries from "AskFWC" and other social media platforms. In 2017, she joined FISP as one of the co-chairs. She holds bachelor's and master's degrees in Biology from University of Central Florida. Contact Samantha if you have a great idea for sharing invasive species information. She is always looking for new outreach ideas and opportunities.

Board of Directors: Todd Olson

Todd Olson has served the industry for 27 years providing lake management, wetland/upland restoration and vegetation management throughout the southeast. He has a Fisheries and Wildlife Biology degree from Iowa State University and is currently employed at Aquatic Vegetation Control, Inc. Todd has served the Florida Aquatic Plant Management Society as secretary (2000-2003) and board member (2003-2005).

Board of Directors: James Boggs Jr.

James Boggs Jr. graduated from Vincennes University and United States Warrant Officer Career College in 2002. James served in various commercial and technical roles since 1992 within the aquatics and agricultural industries and is currently Branch Manager of the Florida IVM Market of Helena Agri-Enterprise, LLC. James holds a commercial applicators license for Aquatics, Right-of-way, and Natural areas. James is currently serving as a board director for South Florida Aquatic Plant Management Society since 2006. Has been a member of Florida Exotic Pest Plant Council, Florida Vegetation Management Association, Florida Association of Special Districts, and Florida Lakes Management Society. James serves in the U.S. Army and Florida Army National Guard from 1985 to 2016 and retired as a Chief Warrant Officer as a Battalion Targeting Officer. James has served as a certified instructor for Training and Doctrine Command (TRADOC). TRADOC is responsible for all training in the U.S. Army.

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Abstracts: Tuesday, October 16, 2018

Five decades of progress (?) in aquatic weed control in Florida

Bill Haller (University of Florida; whaller@ufl.edu)

Pesticide regulations, research, extension and even state management programs have changed dramatically in the past 40 years. In the early 70's herbicide options for aquatic weed control were unlimited, but state funding was meager at best, which resulted in "crisis" management and some severe environmental impacts. The spread of hydrilla by the late 70's and 80's was a game changer and so was FIFRA which resulted in much greater emphasis for IFAS extension programs to offer certification and training. Meanwhile, research in cooperation with industry, developed a "cure" for hydrilla. However, the loss of aquatic registrations due to re-registration and the small market value of aquatics resulted in only 6 registered herbicides being available for use by the mid-90's. Funding for state operational programs increased and all was good until herbicide resistance appeared in the early 00's. A major effort was undertaken to screen and evaluate selectivity on both older and experimental compounds, particularly for activity on hydrilla. By the decade of 2010, 7 new herbicides were registered for aquatic use with potentially 2 new products in the queue. All seems well, but not the case. New introductions and a change in management philosophy on hydrilla has us in a bind for the moment!



Florida's aquatic invasive plant management: The sportsman's view

Ryan Hamm (Florida Fish & Wildlife Conservation Commission; Ryan.Hamm@myfwc.com)

With shallow, nutrient rich waterbodies and subtropical climate Florida has a long history of invasive aquatic plant infestation and management. Invasive floating plants water hyacinth and water lettuce have been present in Florida since at least the 1890's and hydrilla was first introduced in the early 1950's. In the aquatic systems where they occur they are a persistent issue, requiring consistent management to reduce impacts to infrastructure and access. These plants are also valued by many recreational anglers and hunters. Bass anglers often focus their effort on areas of hydrilla and floating plants and relate their angling success to a coverage of exotic plants that is very difficult to maintain over time. Many species of ducks consume hydrilla and research has shown it is a preferred food source for the most harvested duck in Florida; the Ring-necked Duck. As such, most Florida duck species will readily use hydrilla habitats in lieu of native ones. Therefore, many duck hunters in Florida want dense topped out hydrilla during waterfowl season and developed advocacy groups that champion that desire.

Managers are well-versed on the concerns of flood control, access and navigation, and quality habitat for a multitude of species, but may lack understanding of the benefits invasive plants can provide or sportsmen perceive they provide. I hope to highlight this aspect to further our collective ability to manage Florida's natural resources.



Assessing post-hurricane potential spread of aquatic non-native plants in Florida

Pam Fuller, Wesley Daniel, ***Ian Pfingsten***, Matt Neilson, and Cayla Morningstar (U.S. Geological Survey Wetland and Aquatic Research Center; ipfingsten@usgs.gov)

The Nonindigenous Aquatic Species (NAS) database contains occurrences of over 1,300 aquatic species that are either exotic to the U.S. or have moved outside of their native range within the U.S. The NAS Flood and Storm Tracker (FaST) is a new tool developed to assess the potential spread of current aquatic nonnative species to new drainages after a flood or major storm such as a hurricane. We use USGS flood gauges and high-water marks to infer inundation levels. We then match those water level heights to landscape contour heights in order to determine locations where drainage barriers were breached after a storm or flood. Users can assess the proximity of established population occurrences to those breach points and determine if actions are needed to address potential spread.



The history, present, and future of the FWC Invasive Plant Management Section: Research and Outreach Program

W. Samantha Yuan (Florida Fish & Wildlife Conservation Commission; Samantha.Yuan@fwc.com)

In the last 48 years, the 'State of Florida' Invasive Plant Management has supported over \$34M in contracted research and outreach projects. Research on the biology and management of invasive species (primarily aquatic nuisance species) was traditionally conducted by staff with the Florida Department of Natural Resources (FDNR). As the Invasive Plant Management Program developed, it shifted funds towards plant control operations and focused less on research. In 1970, the Invasive Plant Management Program established a Research Program and they started contracting research projects. Since that time, Invasive Plant Management has transitioned to the Florida Environment Protection (FDEP) in 1993, and then to the Florida Fish and Wildlife Conservation Commission (FFWCC) in 2008. Currently for fiscal year 18/19, the program budget is \$1.15M and supports 30 applied projects on herbicide, biocontrol, education, prevention, and ecology. The Research and Outreach Program will soon release a research and outreach online tracking system.



Florida's aquatic plant management program

Alex Dew (Florida Fish & Wildlife Conservation Commission; Alex.Dew@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. 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.



Aquatic Plant Management Society update

Craig Aguillard (APMS; caguillard@landolakes.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 TAPMS 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 TAPMS and Chapter members. A brief update will be provided on the 2018 Annual Meeting held in Buffalo, NY.



Florida Exotic Pest Plant Council, what it's all about

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

There are many invasive species organization acronyms out there, but perhaps the most recognized one for upland land managers in Florida is the Florida Exotic Pest Plant Council (FLEPPC). FLEPPC was officially established in 1984 and their mission is to reduce the impacts of invasive plants in Florida through the exchange of scientific, educational, and technical information. To facilitate this they host a conference every year and provide grants to land managers, educators and researchers to further the goal of advancing invasive plant management and outreach in Florida.



Exciting test plots and treatment result with Method 240 SL in natural areas

Michael Terry (Southwest Florida Water Management District; michael.terry@swfwmd.state.fl.us)

These are all Hack & Squirt Test plots and treatments with Method 240 SL at different rates on multiple species in Natural areas. Species include: Tallow trees, Chinaberry trees, Lead trees, Mimosa trees, Austrian pine trees, Camphor trees and Brazilian Pepper trees. Brazilian pepper trees test plots were both Inland and Coastal. Lead trees are not being controlled by Method 240 SL, BUT all other species treatments are doing great. Larger scale treatment on Tallow trees in a 900 acre site did great with Method 240 SL at 50% rate: One man, Squirt bottle and machete. Number of Hacks depends size of trees, how many stems, and species. Conclusion: You can cover more acres with less people, less herbicide and oil, and less time in most cases and get great control!! {I still need more time on some of my Test plots to be completed!}



Promising new herbicide technologies for the management of Old World climbing fern

Jonathan S. Glueckert and Stephen F. Enloe,(University of Florida; jglueckert@ufl.edu)

Old World Climbing Fern (*Lygodium microphyllum*) is an aggressive invasive fern that is native to Africa, Asia, and Australia. It was first detected in Florida in Martin County in 1960 and has since spread throughout South and Central Florida, with isolated populations observed as far North as Jacksonville. OWCF is one of the most difficult invasive plants to manage in Florida due to its wind dispersed spores, tolerance to flooding, and its tendency to grow in areas with challenging access and stipulations that limit treatment methods. In 2016 a partnership was formed between the UF Center for Aquatic and Invasive Plants, FWC, SFWMD, and the Arthur R. Marshall Loxahatchee NWR to reinvigorate research of better management practices for OWCF. This talk will focus on newly initiated studies located in the Arthur R. Marshall Loxahatchee National Wildlife Refuge, one of the most difficult places to control OWCF in South Florida and will cover results from over a dozen studies initiated during the last two years that are helping to develop new tools and strategies for management.



AERF updates

Carlton Layne (Aquatic Ecosystem Restoration Foundation; layn1111@bellsouth.net)

The Aquatic Ecosystem Restoration Foundation is a nonprofit organization that advocates for environmentally responsible management and stewardship of aquatic resources in the United States. Executive Director Carlton Layne will update attendees on legislation and other matters that affect aquatic resource managers.



Syngenta product updates

Scott Jackson (scott.jackson@syngenta.com)

This presentation will outline safe use of Syngenta products and will inform attendees about changes in label language and use patterns.



UPI products and operational use patterns: Tools for a successful aquatic plant management program

Justin Nawrocki (Justin.Nawrocki@uniphos.com) and Jeremy Slade (Jeremy.Slade@uniphos.com)

The active ingredient, endothall, has been used as an herbicide since the late 1950's. Endothall is currently manufactured by United Phosphorus, Inc. (UPI) as an aquatic herbicide under the trade names: Aquathol K, Aquathol Super K, Hydrothol 191, and Hydrothol Granular. Aquastrike is a premix of endothall and diquat and the most recent release is a premix of endothall and 2,4-D. UPI also has the copper product Current. In this presentation I will discuss technical information (product labels; treatment rates, PPE and restrictions, regulatory status) on current endothall and

copper products, including control of several aquatic plants and algae at varying rates alone and in combination with other aquatic herbicides. Collaborative treatment regimes and services will also be discussed. UPI is committed to providing superior product stewardship and services to insure aquatic plant management programs are effective and cost competitive.



Helena product updates

James Boggs (boggsj@helenaagri.com)

This presentation will focus on Helena products with a particular emphasis on the differences in triclopyr formulations in the Industrial and vegetation management market.



The effects of ProcellaCOR SC on hygrophylla, hydrilla, rotala and crested floating heart

Kevin Damaso (Aquatic Vegetation Control, Inc.; kdamaso@avcaquatic.com)

Hygrophylla polysperma is a submersed invasive weed that has proved to be challenging to adequately control. Previous attempts to control in mitigation waters have largely included quarterly applications of flumioxazin and diquat. A 6 acre test plot was designated for a trial of ProcellaCOR SC. Short term results look very positive and long term results will be presented. Results will also be shared on hydrilla, rotala and crested floating heart.



Calcium substrates used to control plant growth and reduce water column phosphorus in wetlands treating agricultural runoff

Kevin A. Grace, Dawn S. Finn, Cassandra A. Cummins, Karen Hileman and Jaimee Henry (DB Environmental, Inc.; Kevin@DBEnv.com)

Eutrophication, or excessive growth of algae and aquatic plants, commonly results from an increased supply of nutrients, especially phosphorus, to freshwater systems. North of the Everglades, a large network of constructed wetlands has provided phosphorus removal from agricultural drainage waters in order to protect downstream marshes from eutrophication. These treatment wetlands are comprised of emergent and submerged aquatic macrophytes growing on organic soils, and while performance has exceeded initial expectations, final polishing of the drainage waters will require further optimization in order to meet water quality-based effluent limits and Everglades restoration objectives. To that end, the role of calcium in removing and storing phosphorus in these systems has been investigated at a variety of scales, from laboratory bench-scale incubations to field investigations in marsh flow ways covering thousands of acres. Examples of large-scale management strategies to provide a calcareous substrate and improved P removal performance will be discussed, including muck soil removal (to expose underlying limestone bedrock), soil inversion (to bring buried calcium-rich marl sediments to the surface), and soil amendments (applying limerock gravel as a “cap” above muck soils). Each offers promise as a means of controlling internal phosphorus release from the wetland soil into the water column, as

well as influencing the rate of aquatic plant growth that drives P removal and retention processes in these large wetland systems.



New FWC waterbody data map

Alex Dew (Florida Fish & Wildlife Conservation Commission; Alex.Dew@myfwc.com)

The Invasive Plant Management Section (IPMS) of the Florida Fish & Wildlife Conservation Commission (FWC) has developed a new tool for reporting the agency's data for public waterbodies. This tool is a one-stop-shop set of maps for a variety of data where users can see what is currently happening on their waterbodies and view historical plant and fisheries data.

Data offered includes the IPMS Plant Treatment Schedule and Annual Workplan, FWC's Boat Ramp Finder, a bathymetry explorer for selected lakes, FWC Fisheries data for lakes in the Long Term Monitoring Program, Aquatic Plant Survey data from the IMPS annual survey, and IPMS Historical Treatment data with annual summary by lake, county, and water management district.



ProcellaCOR study work

Jim Godfrey (St. Johns River Water Management district; jgodfrey@sjrwmd.com)

This presentation will give the results of ProcellaCOR test work conducted in the field for SJRWMD and will include a discussion of transect widths, block treatments and trails for access.



Abstracts: Poster competition

Comparison of reduced hack and squirt and basal bark treatment for *Schinus terebinthifolia* by two contractor crews in South Florida

Mackenzie Bell and Stephen Enloe (University of Florida; Me.bell@ufl.edu)

The current treatment performed by ground crews to control *Schinus terebinthifolia* is a basal bark application of triclopyr. This treatment is effective; however, it can be time-intensive, costly, and quickly approach the maximum label rate use of triclopyr per acre. Recent research has indicated that aminocyclopyrachlor and aminopyralid have shown promise in effectively controlling *S. terebinthifolia* when used in a reduced hack and squirt approach. Yet, this has not been tested operationally. We developed a contractor-based protocol for a "reduced hack and squirt" approach to use these new herbicides that can be implemented in a variety of scenarios and should be highly effective for *S. terebinthifolia* control. We conducted this experiment in June 2018 in South Florida on a site that consists of a dense monoculture of *S. terebinthifolia* broken up into a grid of twenty-four approximately 0.5-acre plots. Each crew, comprised of 6 contractors, were assigned 12 plots and instructed to treat with basal bark, untreated control, or a reduced hack and squirt approach for specific randomized plots. This presentation will go into the current data gathered from this project as well as related studies built off of this reduced hack and squirt approach. The unique

scale of this project informs both scientists working on progressing treatment approaches as well as the crews that perform this type of work in natural areas each day.



Integrated management practices controlling submerged vegetation in the stormwater canals of Cape Coral, Florida

Jason Cull (Lee County Hyacinth Control District; cull@lchcd.org)

Cape Coral is an urban metropolis constructed in the 1950s with a network of canals built to provide residents with waterfront property. These waterways have additional functions such as flood control, navigation, irrigation usage, and recreational activities. The canals extend over 400 linear miles averaging 8 feet in depth and 50 feet wide, nearly half are freshwater managed and the remaining are tidally influenced by the Caloosahatchee River and Gulf of Mexico. The Lee County Hyacinth Control District manages the aquatic vegetation in Cape Coral of which we incorporate an integrated method of control utilizing chemical, biological and mechanical means. Areas stocked with triploid grass carp within the Cape's urbanized interior freshwater systems are routinely monitored with hydro acoustic technology (Biosonic DT-X Echosounder) to determine the presence and height of underwater submerge vegetation. The implementation of this technology has greatly improved management decisions in grass carp stocking quantities and rates. Data, graphs, and photos will be presented as an example of an improved protocol for management of this unique system in South West Florida.



Construction of treatment wetland to reduce nutrient loading from stormwater runoff into coastal waters

Abraham Dasilvio and Samuel Mwenda (Bethune-Cookman University;
Abraham.k.dasilvio@students.cookman.edu)

A treatment wetland is being constructed in an existing diversion pond with of an outfall canal that drains the urban Daytona Beach and South Daytona areas into the Halifax River. The goal of this restoration project funded by the Indian River Lagoon National Estuary Program (IRL-NEP) is to improve existing storm-water discharge management programs within the Reed canal, which receives untreated urban runoff totaling 1,252 acres from the drainage area. This project remove non-native invasives, excavate the land to restore elevation, and will create a storm-water treatment wetland using native plants/trees. Expected outcomes will be a 20% reduction in total nutrients, a 30% reduction in total sediment in the storm-water discharge evidenced by monitoring water quality. Public education programs will be conducted to gauge awareness knowledge of storm-water pollution, fertilizer ordinance, and how they impact the estuarine systems.



Field evaluations of herbicide efficacy on invasive *Scleria* species (*S. lacustris* and *S. microcarpa*) in Florida

Alexandra L. Onisko, Gregory E. MacDonald and Candice M. Prince (South Florida Water Management District and University of Florida; aonisko@sfwmd.gov)

Scleria is a genus of sedges that are common in Florida and the Caribbean. Recently there have been introductions of invasive *Scleria* that are causing displacement of native species and are considered threatening by the Florida Exotic Pest Plant Council (FLEPPC). *Scleria lacustris* is an invasive annual sedge in marshes in Central and South Florida (FLEPPC category I species). *S. lacustris* is challenging to manage; germination depends on seasonal hydrologic fluctuations, and the variable arrival of the wet season can lead to missed treatment opportunities. Additional non-native species of the same genus have been discovered in Florida, *Scleria microcarpa* (2015) and *Scleria eggersiana* (2017). Both species are perennial and inhabit the shaded understory of hardwood swamps. *Scleria microcarpa* has been documented in 3 counties in Central Florida aggressively infesting hundreds of acres of cypress swamps. Both species are listed as Early Detection and Rapid Response species within their respective Cooperative Invasive Species Management Areas (CISMA). Field trials have been established for both *S. lacustris* and *S. microcarpa* to evaluate the efficacy of non-selective and sedge specific herbicides. Initial observations suggest both species can be effectively controlled with glyphosate, but other, more selective materials also provided control. Additional trials to link seasonal water fluctuation and intermingled desirable native flora are also underway. Ongoing research of all three species is imperative to develop the best management practices that consider the size of the infestations, stage of growth of the plants, and the natural habitats where the infestations occur.



Method 240 SL hack & squirt results in natural areas

Michael Terry (Southwest Florida Water Management District; Michael.terry@swfwmd.state.fl.us)

These are all Hack & Squirt Test plots and treatments with Method 240 SL at different rates on multiple species in Natural areas. Species include: Tallow trees, Chinaberry trees, Lead trees, Mimosa trees, Austrian pine trees, Camphor trees and Brazilian Pepper trees. Brazilian pepper trees test plots were both Inland and Coastal. Lead trees are not being controlled by Method 240 SL, BUT all other species treatments are doing great. Larger scale treatment on Tallow trees in a 900-acre site did great with Method 240 SL at 50% rate: One man, Squirt bottle and machete. Number of Hacks depends size of trees, how many stems, and species. Conclusion: You can cover more acres with less people, less herbicide and oil, and less time in most cases and get great control!! {I still need more time on some of my Test plots to be completed!!}



Abstracts: Wednesday, October 17, 2018

Lake & Wetland Management: Trends in living shoreline solutions

Brian Fischer (brian.fischer@lakeandwetland.com)

Several erosion control methods are available for lakes, canals, ponds, rivers, and beaches. But which methods restore the shoreline to a natural sustainable living state? Which lasts longer?

Retains the integrity of the shoreline? Which is worth the money? This update reviews options in erosion control and considers project longevity, cost and Best Managements Practices.



BioSafe: GreenClean - 2018 product update

Tom Warmuth (TWarmuth@biosafesystems.com)

A brief presentation on the BioSafe line of commercial algaecides and products for surface water management. Label updates, product use and application methods. Current and upcoming projects in the state of FL.



SePRO: Advancements in aquatic plant management

Kelli Gladding (KelliG@sepro.com) and Rory Roten

As invasive aquatic plant and algae infestations have evolved in Florida in recent years, so have the challenges and resources available to manage our water resources. To proactively meet these challenges, SePRO continues to invest in research, technology and technical expertise to advance the science of aquatic plant and algae management. This update will touch on recent advancements available to address today's aquatic threats.



The aquatic weed control herbicide challenge

Stephen Enloe and Greg MacDonald (University of Florida; sfenloe@ufl.edu; pineacre@ufl.edu)

Managing invasive plants in Florida's aquatic and natural areas is an ongoing and difficult challenge for managers. Preventative, biological, chemical and mechanical methods are integrated in an overall approach, but herbicides (chemical) are still the most often utilized form of control. Herbicides can be utilized in a variety of non-traditional application techniques, from foliar spot treatments to basal bark and cut stump treatments. Herbicide formulation, carrier solution (including adjuvants), and carrier volume can play an important role in the success of treatments. Nearly all herbicides were developed for weed control in cropping systems, so development of novel techniques and uses, coupled with careful practitioner observations, have led to the use patterns and recommendations for many of our invasive species. This talk will discuss the various aspects of herbicides, including mode of action, formulations, adjuvant and specialized carriers, application technologies and species responses. This will be an interactive quiz with audience members competing for prizes.



Adjuvants - What you need to know

Jay Ferrell (University of Florida; jferrell@ufl.edu)

This presentation will provide an overview of the different classifications of adjuvants, how they work, why we need them and how you can determine which adjuvant works best for your needs.



How much salt can kill hydrilla and eelgrass?!?

Mohsen Tootoonchi, Lyn A Gettys, Kyle Thayer and Ian Markovich (University of Florida; m.tootoonchi@ufl.edu)

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.



Early field application results using ProcellaCOR on various aquatic plants

Jason Cull (Lee County Hyacinth Control District; cull@lchcd.org)

In the Spring of 2018, a new tool became available to the aquatic management industry in the form of an herbicide named Florypyrauxifen-benzyl, or otherwise called Procellacor. Procellacor is a selective systemic herbicide used for the management of submerged, emerged, and floating freshwater aquatic vegetation. Controlled greenhouse and mesocosm research studies have showed promising signs that this could be an effective tool for aquatic plant management, however as we all know results can vary among the many factors involved in weed management. Lee County Hyacinth Control District has put the product to the test, conducting numerous field applications using Procellacor individually and combining it with other products on an array of every-day invasive plant issues. And here are our results...



Crested floatingheart ramet viability and management

Ian J. Markovich, Lyn A. Gettys, Kyle L. Thayer, Carl J. Della Torre III, Mohsen Tootoonchi and Joseph Sigmon (University of Florida; ijmarkovich@ufl.edu)

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 6– month period. Because 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 reduced biomass of this noxious weed. These methods could be useful for management of crested floatingheart.



Distribution and mitigation of Rotala rotundifolia in South Florida

Kyle Thayer and Lyn A Gettys (University of Florida; kthayer25@ufl.edu)

Rotala rotundifolia is an aquatic invasive plant that has been crowding out South Florida canal ways since 1996. Due to its aggressive growth behavior (much like *Hygrophila polysperma*), the South Florida Water Management District and private companies alike have been developing mitigation efforts to manage this plants encroaching sprawl. For the past four years, Dr. Lyn Gettys and her team at the Fort Lauderdale Research and Education Center have been researching Best Management Practices on how to control *Rotala* from becoming more problematic throughout the State of Florida. This talk will outline the current distribution, identifying features, close relatives, along with the best control methods discovered thus far for *Rotala rotundifolia*.



The exotic island apple snail-Kissimmee Grass connection

Bill Haller and Jacob Thayer (University of Florida; whaller@ufl.edu)

There has been a significant decline in the highly desirable native Kissimmee Grass in some Central Florida lakes over the past 3-4 years. This phenomenon has been blamed on everything from water levels, organic matter accumulation in the hydrosols to the invasive aquatic plant control herbicide programs. Research by Dr. Netherland and others has shown that organic matter content of the soils and the spray program are likely not related to the decline of this grass. Feeding trials conducted in 2017-18 show that the Island Apple Snail will feed on Kissimmee grass even when given a choice between hydrilla and the grass. This presentation will discuss the feeding characteristics of the native and exotic apple snails and present the data on the Kissimmee Grass feeding trials.



Working in the public eye

Stephen "Monty" Montgomery (Allstate Resource Management, Inc.; Smontytime@yahoo.com)

As applicators, the nature of our work often puts us squarely in front of the public eye. Having to deal with curious and sometimes misinformed residents is part of the job. This presentation will discuss how to handle interactions with people that engage us while working. Methods for educating those we come in contact with, and how to convey a professional image of our industry will be reviewed. It will cover how to respond to many common questions from local residents and what information is important to relate to uniformed individuals. The presentation will also outline strategies for explaining the proper use of herbicides to aggressive and biased persons.



Boating law and responsibilities

Arthur Morrow and Whitney Chase (Florida Fish & Wildlife Conservation Commission; Arthur.morrow@myfwc.com)

A brief overview of the following topics: Vessel Registration and Display; Who may operate a Vessel (boating Safety Cards and Times with Navigation Lights); Boating Safety (vessel size, Capacity Plate, Weight Vs People); EPRBS (Flares); Ignition Safety Kill switch/ lanyard; Life Jackets (types); Fire Extinguishers; Ventilation; SPD; Diver Down Flag; Mufflers and Flag (Air Boats); Visual Distress Signals; PWCs; MSDs; Navigational Rules; Rules of the road; Unlawful operations (BUIs, Reckless, Careless); Boating Accidents; and Environmental conditions.



Pesky natives

Lyn A Gettys (University of Florida; lgettys@ufl.edu)

Plant management activities are usually focused on introduced species, but native species don't always behave and sometimes require implementing control methods. This presentation will introduce audience members to some of the native species that can grow to nuisance levels and cause problems similar to those created by exotic species.



Water: The smallest factor that makes the greatest difference

Fred Fishel (University of Florida; weeddr@ufl.edu)

Although water comprises 95 to 99 percent of spray mixtures containing herbicides, many applicators are not knowledgeable of their water's chemistry. Research since the 1970's have shown that hard water can significantly impact the effectiveness of certain herbicides, especially those characterized as weak acids, including 2,4-D, dicamba, and glyphosate. The pH of water can also impact pesticidal effectiveness as Florida's water sources tend to be alkaline in reaction. Applicators are encouraged to have their water tested for its chemical properties. Based on test results, the addition of an adjuvant may be recommended to overcome the problems associated with water used in pesticide spray mixtures.



Abstracts: Thursday, October 18, 2018

Field and mesocosm evaluations of graminicides on *Hymenachne amplexicaulis*, West Indian marsh grass: control and non-target effects

Kaitlyn Quincy and Stephen Enloe (University of Florida; kquincy@ufl.edu)

West Indian marsh grass, *Hymenachne amplexicaulis*, is a perennial, stoloniferous species that forms monocultures in freshwater marshes in Florida. Typically, broad-spectrum herbicides such as glyphosate and imazapyr are used for control; however, these herbicides do not conserve native grasses. The availability of the grass specific herbicides sethoxydim and fluzafop-p-butyl prompted this study to test their efficacy on *Hymenachne* and non-target impacts on native plant species in littoral marshes of a central Florida lake and in mesocosms. Natural area plots were treated in the fall of 2017 with 24 oz/A fluzafop, 64 oz/A fluzafop, or 3 %v/v sethoxydim, each with 1% v/v MSO. At 180 DAT the graminicide treatments showed at least an 85% decline in *Hymenachne* cover compared to the untreated control with no differences between treatments. At 180 DAT, no decline was recorded in native grass species cover monitored at the site (*Leersia hexandra* and *Luziola fluitans*) when compared to the untreated control. Preliminary results indicate the graminicides tested provide good short-term control of *Hymenachne* and no observable impact on the native community. Mesocosm studies are ongoing to assess potential impacts of the graminicides on additional native grasses.



Construction of treatment wetland to reduce nutrient loading from stormwater runoff into coastal waters

Abraham Dasilvio and **Samuel Mwenda** (Bethune-Cookman University; samuel.mwenda@students.cookman.edu)

A treatment wetland is being constructed in an existing diversion pond with of an outfall canal that drains the urban Daytona Beach and South Daytona areas into the Halifax River. The goal of this restoration project funded by the Indian River Lagoon National Estuary Program (IRL-NEP) is to improve existing storm-water discharge management programs within the Reed canal, which receives untreated urban runoff totaling 1,252 acres from the drainage area. This project remove non-native invasives, excavate the land to restore elevation, and will create a storm-water treatment wetland using native plants/trees. Expected outcomes will be a 20% reduction in total nutrients, a 30% reduction in total sediment in the stormwater discharge evidenced by monitoring water quality. Public education programs will be conducted to gauge awareness knowledge of storm-water pollution, fertilizer ordinance, and how they impact the estuarine systems.



Fire in the wetlands

Susanna Toledo (Florida Fish & Wildlife Conservation Commission; Susanna.toledo@myfwc.com)

Prescribed fire is a necessary resource management tool for Florida's natural communities. Using fire in resource management reduces invasive species infestations, increases native plant diversity, reduces deposition of organic sediment in aquatic systems, reduces risks of wildfires and enhances habitat for fish and wildlife. This presentation will focus on the benefits of burning in aquatic systems.



Behavior invasive of local aquatic plants in a lagoon of the Colombian Caribbean

Maria Isabel Pozzo, José Andrés Posada and Aracelly Caselles-Orsorio (Universidad del Atlántico; isapozzo@gmail.com)

Some native or local aquatic plants can be consider invasive or colonizer aggressive if they cause environment modifications and affect another species and ecosystems. To evaluate invasive behavior of floating plants in a lagoon located in Santo Tomas (Atlántico), a shallow lagoon in a low watershed of the Magdalena River, we analyzed of spatiotemporal composition and species coverage during 8 months covering the rainy and drought season. Three sampling areas were each separated into three transections (9 totals) of 1x10 m. pH, electric conductivity, dissolved oxygen (DO), redox potential and water temperature were measured using a multipara metric probe (WTW Multi 3220). Water samples were analyzed for organic matter and nutrients in a laboratory. A wide variations of DO was registered in all lagoon (<1 - 8.3 mg.L⁻¹) while pH ranged 6.5-7.5 values. 20 identified aquatic plant families included 34 genera and 41 species. The highest percentage of coverage was for the species *Ipomoea aquatica* (18.74%), *Ludwigia helminthorrhiza* (14.31%), *Eichhornia azurea* (13.75%) and *Pistia stratiotes* (10.74%). *P. stratiotes* is considered an invasive species worldwide. Although *I. aquatica*, *L. helminthorrhiza* and *E. azurea* are unconsidered to be invasive, they appeared invasive or dominant. The PCA analysis showed that nutrient concentrations (10,1; 5,5 y 7,3 mg.L⁻¹ of ammonium, nitrate and orthophosphate, respectively) and a mesotrophic tendency of the Santo Tomas lagoon favored by the Magdalena river flood pulse, promote the invasive capacity of these aquatic floating plants. Our results indicate that the invasive behavior of local species are related to variable water levels (flood-drought) and biological characteristics of aquatic plants to cover and dominate the surface water made available by the river pulse.



Autonomous technology for aquatic plant management

Andrew W. Howell & Robert J. Richardson (North Carolina State University; awhowell@ncsu.edu)

Invasive exotic macrophytes, such as *Hydrilla verticillata* and *Salvinia molesta*, often have undesirable effects on native aquatic ecology and the associated local economy within invaded regions. Aquatic vegetation surveys and aquatic herbicide applications are integral components of vegetation management programs that protect water resources. However, surveys and herbicide applications can be labor intensive and there is often subjectivity among surveyors which, can lower survey accuracy and management efficiency. The recent popularity of autonomous unmanned vehicles (AUVs) generate multiple paths for aquatic plant researchers and managers to

explore. In addition to providing a platform for small optical imagers (aerial) or hydroacoustic units (boat), AUVs provide opportunities to remotely deliver herbicide applications. This research describes the use of aerial and boat AUVs to summarize macrophyte components among varying waterways and discuss how unmanned equipment may be incorporated in treatment programs and post-treatment monitoring. Successful collection of imagery and hydroacoustic data, as well as herbicide application through the AUVs, has been verified. Further research is being conducted to optimize and utilize current AUVs systems for aquatic plant management.



Lookalike aquatic plants

Lyn Gettys (University of Florida; lgettys@ufl.edu)

Correct plant identification is critical to determine whether a species is likely to become invasive, and if so, what management options are most appropriate. This can be challenging when the evidence provided with a request for identification is unclear and can be made more difficult when the species in question is a “fluffy” submersed plant. In this presentation Dr. Gettys will discuss the defining characteristics of parrotfeather, limnophila, fanwort, and coontail, four submersed species that are similar in appearance, and will provide attendees with the information needed to separate these lookalike species to obtain an accurate identification.



Surveys for potential biological control agents for *Nymphaea mexicana* Zuccarini in South Africa

Megan K. Reid, Julie A. Coetzee and Martin P. Hill (Rhodes University, South Africa; g14r6198@campus.ru.ac.za)

Nymphaea mexicana Zuccarini is an emerging invasive alien aquatic plant that is becoming increasingly problematic in South Africa as other aquatic invasive plants are being managed successfully using biological control. A biological control programme has not yet been initiated to manage *N. mexicana* populations, so it is important to begin the process so that further spread of this plant is prevented, and negative impacts mitigated. Pre-release surveys and observations of *N. mexicana* in the field suggest that no significant predation of the plant occurs in South Africa, so it is necessary to conduct surveys in the native range for an appropriate candidate to control this plant. This thesis aims to conduct such surveys, and to prioritise and import potential biological control agents into quarantine for host specificity testing.



Red root floater (*Phyllanthus fluitans*) update

Michael Sowinski (Florida Fish & Wildlife Conservation Commission; Michael.sowinski@myfwc.com)

In August 2010, Dr. George Wilder from the Naples Botanical Garden in Naples, Florida, discovered red root floater (*Phyllanthus fluitans*) growing in a canal attached to the Peace River in Desoto County west of Fort Ogden, and reported his findings to the Florida Fish and Wildlife Conservation

Commission (FWC). Since the initial discovery, FWC biologist Michael Sowinski, along with the Southwest Florida Water Management District (SWFWMD), found individual plants to large populations of the small floating plant scattered along roughly thirty-one river miles of the Peace River. Some highlights since the initial discovery will be presented along with an overview of this species.



Identification of common wetland sedges in Florida

Alexandra L. Onisko, Gregory E. MacDonald and Candice M. Prince, South Florida Water Management District and University of Florida; aonisko@sfwmd.gov)

Non-native sedges pose threats to Florida’s wetlands, but correct identification can be difficult due to the unique characteristics of sedges and their similar appearance to many grass species. The purpose of this presentation is to provide attendees with an overview of sedge identification and morphology and in-depth descriptions of native, invasive, and look-a-like species of common sedges in Florida wetlands. With these skills attendees will be more confident in determining the correct identification of these species in the field. Control strategies of problematic species will be discussed as well as how to record observations of invasive species and what to do if you discover Early Detection and Rapid Response (EDRR) species in the field.



Notes

[illegible]

[illegible]

In memoriam: Mike Bodle

Mike Bodle passed away on August 26, 2018 in West Palm Beach. Mike had a bachelor's degree from the University of Notre Dame and conducted graduate studies in aquatic botany at the Florida Institute of Technology.

Mike protected Florida's delicate ecosystem first as a Biologist at the Florida Department of Natural Resources and then as a Senior Environmental Scientist at the South Florida Water Management District until he retired in 2017. He served as FAPMS president in 2010 and was editor of *Aquatics* magazine for many years. He was also an active board member of FLEPPC, SE-EPPC and the Florida Native Plant Society. He will be remembered affectionately by invasive species managers all over the world.



Mike Bodle was the Robin Williams of aquatic plant management with his lightning quick wit and raucous laugh that permeated the room.



Mike Bodle was the Sam Clemons of aquatic plant management. Always on an adventure – whether for work or pleasure, recording it with wry humor and beautiful prose that begs you to read on.

Mike Bodle was the James Garner of aquatic plant management. Like Garner in *The Great Escape*, Mike was the provider who could deliver any item at a moment's notice - from a gallon of herbicide to a helicopter.

None of us has a weed named after us.

None of us has an EPA herbicide label requiring users to notify us prior to use.

Mike knew everyone – everyone liked Mike.

Mike Bodle was a generous man with an infectious smile and a heart of gold. In honor of Mike's love of nature, a GoFundMe campaign has been started with the goal of funding a bench at Mounts Botanical Garden in West Palm Beach. If you're so moved, please contribute at <https://www.gofundme.com/memorial-bench-for-mike-bodle>

Mike Page (Helicopter Applicators) has sponsored this conference in memory of Mike Bodle. In addition, the 2018 FAPMS Presidential Reception is being held in Mike's honor.

Be sure to thank our sponsors!



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