

# Aquatics

WINTER 2014

---

A Publication of the Florida Aquatic Plant Management Society





# DON'T LET ALGAE RUIN YOUR DAY

We're being  
watched and monitored  
as if we  
were terrorists!

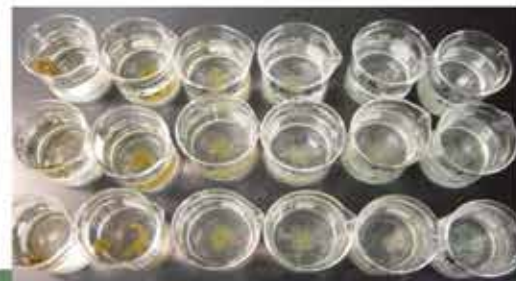
We have  
the news media  
talking about us.

In some places  
they even  
test us on a  
regular basis.

One of our  
biggest fears is the  
Applied Biochemists'  
Algal Challenge Test.



**Take the  
Algal Challenge Test  
and choose your  
best defense.**



[www.appliedbiochemists.com](http://www.appliedbiochemists.com)  
1-800-558-5106



Willie Goldsby of City of North Lauderdale using an ILH 5x4-100 mini-harvester to remove floating eelgrass from a lake at BallenIsles Country Club in Palm Beach Gardens, FL. Photo courtesy Lyn Gettys, UF/IFAS.



Tracy Wood, 2013 FAPMS Aquatic Plant Manager of the Year, gives FAPMS a thumbs-up! Photo courtesy Keith Mangus. See meeting Recap on page 11.

## Contents

- 5** In Memoriam: Rex Land  
BY LOWELL TRENT
- 6** The Florida Invasive Plant Education Initiative  
BY KATIE WALTERS
- 11** Recap: What Happened at the FAPMS 38<sup>th</sup> Annual Conference?  
BY KAREN BROWN AND BRETT HARTIS
- 13** *Megamelus scutellaris*, a new biological control agent for waterhyacinth *Eichhornia crassipes*  
BY PHILIP W. TIPPING
- 17** Hydrilla Control Complexities in a Multiple-Use Central Florida Reservoir System  
BY JEFFREY D. SCHARDT
- 22** Aquavine  
BY BRETT HARTIS

To become a member of FAPMS and receive *Aquatics* magazine, please visit the website at: [www.fapms.org](http://www.fapms.org)

The mission of FAPMS is "To Preserve Florida's Aquatic Heritage." FAPMS was formed in 1976 and provides a forum for those interested in aquatic plant management to meet, discuss and exchange ideas and information.

All rights reserved. Reproduction in whole or in part without permission is prohibited. *Aquatics* (ISSN 1054-1799) is the official publication of the Florida Aquatic Plant Management Society.

The Florida Aquatic Plant Management Society has not tested any of the products advertised or referred to in this publication, nor have they verified any of the statements made in any of the advertisements or articles. The Society does not warrant, expressly or implied, the fitness of any product advertised or the suitability of any advice or statements contained herein.

## FAPMS 2015 Board of Directors

### Officers

#### President

Ed Harris  
Invasive Plant Management Section  
FL Fish and Wildlife Conservation Commission  
6830 Shadowridge Drive, Suite 201, Orlando, FL 32812  
407-858-6170; Ed.Harris@MyFWC.com

#### President-Elect

Angie Huebner  
Invasive Species Management  
701 San Marco Blvd, Jacksonville, FL 32207  
904-894-3648; 904-232-3696 fax  
Angie.L.Huebner@usace.army.mil

#### Past President

James Boggs Jr.  
Helena Chemical  
P.O. Box 1758, Dade City, FL 33526  
352-521-3538; boggsj@helenachemical.com

#### Secretary

Stephanie Walters  
Winfield Solutions  
2601 W Orange Blossom Trail, Apopka, FL 32712  
407-466-8360; 407-884-0111 fax;  
swalters@landolakes.com

#### Treasurer

Jennifer Myers  
Applied Aquatic Management, Inc.  
P.O. Box 1469, Eagle Lake, FL 33839  
863-533-8882; 863-534-3322 fax;  
jmyers@tampabay.rr.com

#### Editor

Lyn Gettys, PhD  
University of Florida IFAS FLREC  
3205 College Ave, Davie, FL 33314  
954-577-6331; lgettys@ufl.edu

## BOARD OF DIRECTORS

### Third Year

Angie Huebner  
Invasive Species Management  
701 San Marco Blvd, Jacksonville, FL 32207  
904-894-3648; 904-232-3696 fax  
Angie.L.Huebner@usace.army.mil

J. D. Gillenwalters  
Aquatic Vegetation Control, Inc.  
16351 SW Pinto Street, Indiantown, FL 34956  
561-261-4592; jd@avcaquatic.com

Craig Smith  
Territory Manager-Aquatics – UPI  
4230 NE Indian River Drive, Jensen Beach, FL 34957  
561-301-8326; craig.smith@uniphos.com

### Second Year

Keith Mangus  
Applied Aquatic Management, Inc.  
PO Box 1469, Eagle Lake, FL 33839  
863-287-1082 Cell; 863-533-8882 Office  
keithmangus@tampabay.rr.com

Bryan Finder  
Polk County Parks and Natural Resources  
4177 Ben Durrance Rd, Bartow, FL 33830  
863-534-7377; BryanFinder@polk-county.net

Mike Hulon  
Texas Aquatic Harvesting  
PO Box 4034, Lake Wales, FL 33859  
863-696-7200; texasaquaticmh@aol.com

### First Year

Linda DeFee  
Aquatic Vegetation Control  
1860 W. 10th Street, Riviera Beach, FL 33404  
561-845-5525; ldefee@avcaquatic.com

Kelli Gladding  
SePRO Corporation  
38 Cunningham Drive, New Smyrna Beach, FL 32168  
386-409-1175; kellig@sepro.com

Jeremy Slade  
United Phosphorus Inc.  
4003 NW 65th Ave Gainesville, FL 32653  
662-617-4571; jeremy.slade@uniphos.com



For over 20 years, SePRO Corporation has developed innovative technologies to advance the science of water resource management. Whether you are looking to assess a water resource, design a prescription or implement a restoration program, SePRO Corporation provides the expertise and solutions to preserve our most precious natural resource...water.

For more information visit our web site at  
[www.stewardsofwater.com/aquatics](http://www.stewardsofwater.com/aquatics)

# The Stewards of Water

## Solutions to Preserve our most Precious Natural Resource...Water

*SonarGenesis<sup>®</sup>, Captain<sup>®</sup> XTR and Phoslock<sup>®</sup> are some of the innovative solutions from SePRO Corporation to improve the management of aquatic plants, algae and water quality. Call 800-419-7779 for more product information.*



SePRO Corporation Carmel, IN 46032

\*Trademark of SePRO Corporation. Phoslock is a registered trademark of Phoslock Water Solutions Ltd. Always read and follow label directions. ©Copyright 2014 SePRO Corporation.



## Committee Chairs

### Aquatics Magazine Advertising

Angie Huebner  
Invasive Species Management  
701 San Marco Blvd, Jacksonville, FL 32207  
904-894-3648; 904-232-3696 fax  
Angie.L.Huebner@usace.army.mil

### Auditing

Keshav Setaram  
SFWMD St. Cloud Field Station  
3800 Old Canoe Creek Road, St. Cloud, FL 34769  
ksetaram@sfwmd.gov

### Awards

Scott Glasscock  
Disney Pest Management  
2220 S Service Lane, Lake Buena Vista, FL 32830  
407-824-1528; Scott.glasscock@disney.com

### By-Laws

Stephanie McCarty  
407-461-4635; stephemccarty@aol.com

### Editorial

Lyn Gettys, PhD  
University of Florida IFAS FLREC  
3205 College Ave, Davie, FL 33314  
954-577-6331  
lgettys@ufl.edu

### Editorial (Associate)

Karen Brown  
University of Florida/IFAS  
Center for Aquatic & Invasive Plants  
7922 NW 71st Street, Gainesville, FL 32653  
352-273-3667; kpbrown@ufl.edu

### Governmental Affairs

Jeff Schardt  
Florida Fish & Wildlife Conservation Commission  
Invasive Plant Management Section  
3800 Commonwealth Blvd, MS 705  
Tallahassee, FL 32399  
850-617-9420; jeff.schardt@myfwc.com

### Historical

John Gardner  
Aquatic Systems Inc.  
2100 NW 33rd Street, Pompano Beach, FL 33069  
954-977-7736; john@aquaticsystems.com

### Local Arrangements

Bill Torres  
Florida Event Planning & Meeting Service  
329 Dreadnaught Court, Tallahassee, FL 32312  
850-519-4310; fapms@embarqmail.com

### Membership & Publicity

James Boggs Jr.  
Helena Chemical  
P.O. Box 1758, Dade City, FL 33526  
352-521-3538; boggsj@helenachemical.com

### Merchandise

Steve Montgomery  
Allstate Resource Management  
6900 SW 21st Court, Bldg. #9, Davie, FL 33317  
954-382-9766; 954-382-9770 fax  
smontgomery@allstatemanagement.com

### Nominations

Tim Harris  
602 North Palm Ave, Palatka, FL 32177  
386-328-2737  
Tim.T.Harris@usace.army.mil

### Program

Chance DuBose  
Helena Chemical  
PO Box 1758, Dade City, FL 33526-1758  
407-256-2342 mobile; 352-521-3538 office;  
dubosec@helenachemical.com

### Resource Demonstration

Brett Bultemeier  
Clarke Aquatic Services  
6416 NW 168th Street, Alachua, FL 32615  
352-240-5560; bbultemeier@clarke.com

### Scholarship

Keshav Setaram  
SFWMD St. Cloud Field Station  
3800 Old Canoe Creek Road, St. Cloud, FL 34769  
407-846-5226; ksetaram@sfwmd.gov

### Vendor

Scott Jackson  
Syngenta Professional Products  
133 Saronia Circle, Royal Palm Beach, FL 33411  
561-402-0682; Scott.Jackson@SYNGENTA.COM

### Web Site

Angie Huebner  
Invasive Species Management  
701 San Marco Blvd, Jacksonville, FL 32207  
904-894-3648; 904-232-3696 fax  
Angie.L.Huebner@usace.army.mil

# IN MEMORIAM

## Rex Land

*Charter member of FAPMS and APMS/Hyacinth Control Society*

*August 5, 1927 – October 25, 2014*



Rex was working with the Florida Game and Fresh Water Fish Commission when the waterhyacinth control program — the first aquatic weed control program in Florida and probably in the nation — was initiated. Airboats were being invented using kitchen chairs for seats and various other readily available materials. Prop guards, of course, had not even been thought of. Waterhyacinths were virtually closing off most of the lakes, rivers and other water bodies with no effective control method in sight. Rex and other FGFWFC “game wardens” worked law enforcement, game management or fish management as needed, but became “weed wardens” as the waterhyacinth problem demanded more attention.

Thanks to airboats, 2,4-D and men like Rex who were willing to tackle such a problem, this first “million dollar” aquatic problem was definitely subdued by the time I met Rex. At that time, he was the supervisor of several airboat spray crews manned by the first “nozzle heads.” I found these men — and especially Rex — to be a source of wisdom, knowledge and history that was seldom found in written form, but was extremely valuable to those new to the field who were puzzled by things that were hard to understand. A brief historic review from Rex would usually make perfect sense.

For instance, what happened to Lake Apopka? And, for that matter, many others?

How his wisdom, observation and insight sometimes enlightened degreed professionals became obvious on an occasion when biologists were discussing the effects of hydrilla in Orange Lake on fish condition, other factors and how to conduct studies. Although the near-solid hydrilla cover had drastically changed the lake, Rex and others were already collecting creel census data using airboats. Rex commented, “Well, I can tell you, when these ‘cane pole’ fishermen are throwing the brim back, something is definitely wrong and the K factors are obviously not good!” Many fisheries biologists were opposed to spray programs, but could it be that hydrilla management and control was the answer?

I could go on, but I’ll end with one event that illustrates how he saved the Commission and me from public embarrassment. We were acclimatizing a large load of grass carp to be stocked in Lake Conway and this was a media event. When he opened the tank, a strange look came on his face and he quietly let me know that many of the fish were dead. Rex asked, “What do you want to do?” My reply and prayer was “Try to only stock live ones.” Miracle of miracles, Rex did it — he returned the dead ones to the hatchery and everyone was happy, especially Rex and me.

Words to describe or capture the essence of Rex Land seem to elude my often-slow recall; however, last evening in a church service a teaching on the *Fruit of the Spirit* listed the following: love, joy, peace, patience, kindness, goodness, faithfulness, gentleness and self-control. These, I believe, Rex had and shared throughout the time we worked together, perhaps even from his early years. Rex Land was reliable, knowledgeable, level-headed, cool — all in all, the ideal right-hand man.

Florida is and will remain a better place to live because of the time God blessed us with this man who never sought the limelight, but faithfully and cheerfully worked diligently throughout his long career in aquatic weed control. Farewell, Rex — we’ll miss you!

*Submitted by Lowell Trent, FWC (retired)*



# THE FLORIDA INVASIVE PLANT EDUCATION INITIATIVE



Figure 1. With identification guides in hand, teachers race to win the plant ID challenge. Photo courtesy Jeff Schardt, FWC.

## by Katie Walters

The Florida Invasive Plant Education Initiative is part of the University of Florida/IFAS Center for Aquatic and Invasive Plants Information Office. The Information Office provides information to all stakeholders about the impacts and management of invasive plants. The Education Initiative was formed in 2005 to reach out specifically to teachers and their students. Over the years we have developed four curriculum modules, an annual professional development workshop for educators (PLANT CAMP), online resources, educational materials and games, and a social media presence. Regular communication and collaboration with teachers ensures our materials remain relevant and usable in the classroom. Our

continuing partnership with the Florida Fish and Wildlife Conservation Commission (FWC) and organizations such as the Florida Aquatic Plant Management Society (FAPMS), the Aquatic Plant Management Society (APMS), and the Aquatic Ecosystem Restoration Foundation (AERF), allows us to offer these materials and workshops at no cost to Florida educators. Over 300 teachers have attended our workshops who, in turn, have taught approximately 70,000 Florida students over the last 9 years!

A survey of Florida residents in July 2014 indicated that 63% of respondents were not knowledgeable or only slightly knowledgeable about the types of invasive species in Florida and 66% were not knowledgeable or only slightly knowledgeable about how to prevent invasive species

from entering Florida. Florida has major problems with invasive species due to its tropical climate and year-round growing season. Education can play a critical role in preserving Florida's natural areas by increasing awareness of the ecological and economic harm caused by invasive species. Introducing the next generation to the importance and complexities of natural resource management will help ensure we have the engaged citizens, scientists, researchers, and resource managers needed to confront these problems in the future.

## Lessons and Activities

In 2009, the *Educate to Innovate Initiative* was launched by the White House with the goal of moving American students from the middle to the top of the pack in science and math achievement over the next ten



Figure 2. Teachers attending PLANT CAMP take a habitat management tour on Lake Toho. Photo courtesy Jeff Schardt, FWC.

years. To meet this challenge, schools are emphasizing lessons that incorporate STEM — Science, Technology, Engineering and Math — concepts and practices. With this in mind, the Education Initiative

developed *Lakeville – A Natural Resource Management Activity*.

Lakeville is a curriculum unit that introduces students to the real-world scenario of managing a freshwater ecosys-

tem to demonstrate the interrelation of social, political, economic, and ecological concerns. Students role-play as either stakeholders (anglers, developers, farmers, politicians, nature lovers, etc.) or as organisms (native, non-native, and invasive plants and animals) that are part of a hypothetical local freshwater ecosystem called Lakeville. The organisms present their potential ecological and economic benefits/harm to the stakeholders. The stakeholders ask questions and then vote on which organisms to allow into Lakeville. After Lakeville has been populated with organisms, students assess what effects their decisions will have. The activity challenges students to integrate their new understanding of the impacts of invasive species with an understanding of how natural resource management decisions are made (and, hopefully, how better decisions can be made).

Teachers are introduced to the Lakeville activity as part of the professional development workshop PLANT CAMP. Thanks to generous funding from FWC, AERF, APMS, and FAPMS, Education

## Paul Mason

*S.E. Regional Aquatics Manager*

407-718-9154

paul.mason@cpsagu.com

# Aquatics & Invasives

## Joe Collins

*Sales/Gov't Accounts Coordinator*

352-222-0655

joseph.collins@cpsagu.com

**Herbicides  
Adjuvants  
&  
Pre-mixes**

**Crop  
Production  
Services**



**Sales  
Service  
&  
Support**

TIMBERLAND DIVISION

## Troy Knowlton

*Aquatic Specialist*

727-348-7569

troy.knowlton@cpsagu.com

FAX

321-226-0213

## Cary Martin

*Aquatic Specialist*

704-305-7752

cary.martin@cpsagu.com

**AUTHORIZED DISTRIBUTOR FOR ALL MAJOR CHEMICAL MANUFACTURERS**



Initiative staff have also been able to present demonstrations in 10+ schools for the past four years. Each class is given a Lakeville Teacher Kit, including all materials needed to complete the activity. Of the 13 schools that participated during the 2013-14 school year, 10 completed pre- and post-tests to measure student gains. The tests consist of nine multiple choice knowledge-based questions such as the definitions of native, non-native, and invasive, and identifying characteristics of invasive plants. Overall the students had a 17% gain in knowledge from the pre- to post-test. Individual schools ranged from overall gains of 7 to 64%.

Lakeville is a stand-alone curriculum unit. The Education Initiative also has developed four curriculum modules that build upon each other. These modules cover the definition of invasive, native, and non-native; the role of macrophytes and dissolved oxygen in an aquatic environment; plant management options and considerations; and trophic states. Educators are able to download presentations, lesson plans, and worksheets directly from the initiative's website. These resources make it easier for teachers to incorporate invasive species lessons into their curriculum. In addition to these resources, we provide background information and hands-on training at our annual five-day professional development workshop, PLANT CAMP.

## PLANT CAMP

Experiencing Florida's natural areas, mastering the basics of plant identification, learning proper plant disposal techniques, and practicing safe and effective control methods are just a few of the hands-on activities teachers experience at PLANT CAMP. Each year, 24 teachers are selected through an application process to attend the workshop, hosted by UF/IFAS CAIP and the FWC's Invasive Plant Management Section (IPMS). Thanks to our generous sponsors, lodging and meals for teachers are paid for and they receive materials with approximately \$500 worth to take back to their classroom. University of Florida faculty, Florida State Park and FWC Regional Biologists, administrators from FWC's IPMS, and plant managers from



Figure 3. A quick break from the airboat ride! Dr. Mike Netherland, USACE-ERDC, shows teachers the plants on Lake Toho up close. Photo courtesy Charlie Bogatescu, UF/IFAS CAIP.

the private sector contribute as presenters and instructors.

When the workshop comes to a close, teachers participate in a group discussion to brainstorm and share ideas on how to implement the concepts learned during the week in their classrooms. Participants also discuss how they will share the materials and ideas with fellow educators. Participant evaluations in 2014 indicated a full 100% of the educators planned to teach about

aquatic invasive plants and share what they learned with other teachers. All participants also "agreed" or "strongly agreed" that the workshop increased their knowledge on invasive species and on the important role education has to play in addressing this issue. As one attendee wrote, *"The materials, labs, and expertise of the professionals were amazing. I am so impressed with your organization and our treatment. I think funding a program such as this actually makes*

### Summary of key concepts covered during PLANT CAMP

DAY	Presentations/Key Concepts
1. Welcome Session – Why are we here?	Definitions of native, non-native, and invasive   Challenges of controlling invasive plants   Characteristics of invasive plants
2. Upland Plant Field Trip & Investigations	Plant morphology   Demonstration of control techniques   Invasive and native look-a-likes   Botanical illustration   Plant identification
3. Why We Need to Manage Invasive Plants	Aquatic plant identification techniques   Pond ecology   Herbicide research, use, registration, and history   Biological control   Re-vegetation activity
4. Aquatic Plant Field Trip & Investigations	Habitat management tour on Lake Tohopekaliga   Demonstration of control techniques   Curricula demonstration   Outreach strategies
5. Lakeville & Invasive Plant Film Festival	Professional development with curriculum unit Lakeville   Graduation!





Figure 4. Dr. Bill Haller, UF/IFAS CAIP, explains a herbicide research project to teachers. Photo courtesy Jeff Schardt, FWC.

*a difference and the outreach will happen in the schools! Way to go!"*

In addition to the evaluation, participants complete a pre- and post-test and survey. The test asks eight knowledge-based questions. The survey asks for teachers' opinions on the various methods of plant management (chemical, biological, physical, and mechanical). The survey asked whether they think each method is necessary and whether they favor or oppose the method. Following are some of the results from PLANT CAMP 2014:

- Participants learned that non-native plants are not necessarily invasive — with seven getting the definition of non-native right on the pre-test and eighteen answering correctly on the post-test (a 157% gain).
- When asked to identify three native Florida plants, only six teachers were able to answer correctly pre-camp. Post-camp, nineteen answered correctly (a 216% gain).
- Overall, the teacher participants showed a 41% gain on correct answers from pre- to post-test.
- The pre-survey showed a variety of opinions; at least one participant chose every option (strongly agree, agree, neither agree nor disagree, disagree, strongly disagree, or don't know) for every method, with the exception of "strongly" favoring herbicides and

"strongly" opposing mechanical or physical methods.

- The post-survey group had a broader understanding of the various control methods. After spending a week learning about invasive plant management,

participants indicated they "strongly" or "somewhat" favored nearly all methods and "strongly agreed" or "agreed" that all methods were necessary.

From the comments below, it is clear that PLANT CAMP presenters helped to provide participants with a solid knowledge base from which to form their opinions on control methods:

- *As long as there is a lot of research done, I favor herbicide and biological control. I favor physical control, but it's a lot of work.*
- *After PLANT CAMP I have a better understanding of the use of herbicides to control aquatic weeds.*
- *I was wary of biocontrol but now understand more of the testing of selectivity of the process so now I am more in favor of it.*
- *Very surprised how my view has changed in realizing the importance of the controls.*

Invasive species will continue to be an issue in Florida. We have economically and ecologically valuable freshwater ecosystems that need continued management and

## Restore Lakes Naturally



**Vertex aeration helps:**  
Lower nutrients that feed algae  
Grow bigger, healthier fish  
Reduce bottom muck

 **Vertex Water Features**  
Pond & Lake Restoration

**800-432-4302 • [www.vertexwaterfeatures.com](http://www.vertexwaterfeatures.com)**



Figure 5. Teachers participate in a tuberous sword fern pull, learning the limits of physical removal. Photo courtesy Jeff Schardt, FWC.

maintenance. We need today's students to become tomorrow's environmental stewards — armed with the information, practices, and awareness to address 21<sup>st</sup> century environmental issues.

To find out more, visit our website at [plants.ifas.ufl.edu/education](http://plants.ifas.ufl.edu/education). Questions? Ideas? Send us an email at [caip-education@ufl.edu](mailto:caip-education@ufl.edu)

## Follow us!



Facebook: UF/IFAS Invasive Plant Education Initiative



Twitter: @PLANT\_CAMP



YouTube: UFInvasivePlantsEDU

## References

Dodds NMW, MH Miller and AJ Lamm. 2014. Floridians' perceptions of invasive species (IFAS Publication Number AEC524). Gainesville: University of Florida Institute of Food and Agricultural Sciences. Online at [edis.ifas.ufl.edu/wc186](http://edis.ifas.ufl.edu/wc186)

The White House. n.d. Educate to innovate. Online at [www.whitehouse.gov/issues/education/k-12/educate-innovate](http://www.whitehouse.gov/issues/education/k-12/educate-innovate)

*Katie Walters (katie716@ufl.edu) is the Education Initiative Coordinator for the University of Florida IFAS Center for Aquatic and Invasive Plants Information Office.*

# William L. Maier Jr. Memorial Scholarship

The Florida Aquatic Plant Management Society Scholarship and Research Foundation, Inc. is pleased to announce the availability of the William L. Maier Jr. Memorial Scholarship, which provides up to \$2,500 to a deserving graduate student who is:

1. Enrolled in an accredited Florida University or College
2. A US citizen
3. Majoring in a field of study directly related to the management of aquatic vegetation for the ecological benefit of aquatic and wetland habitats (eligible fields of study are listed in the application packet)
4. Submits the required 800 to 1,000 word essay and application, as determined by the FAPMS Scholarship and Research Foundation's Board of Directors by August 1, 2015

More information and the application packet are available online at [www.fapms.org/maier\\_scholar.html](http://www.fapms.org/maier_scholar.html)



**Alachua, FL**  
386-462-4157

**Belle Glade, FL**  
561-996-6200

**Boynton Beach, FL**  
561-585-2221

**Dade City, FL**  
352-521-3538

**Dundee, FL**  
863-439-1551

**Ft. Pierce, FL**  
772-464-8660

**Homestead, FL**  
305-245-0433

**Immokalee, FL**  
239-657-3141

**Mt. Dora, FL**  
352-383-8139

**Palmetto, FL**  
941-722-3253

**Wauchula, FL**  
863-773-3187

**James Boggs**  
863-557-0076

**Tim McDuffie**  
352-206-5087

**Chance Dubose**  
407-256-2342

Always read and follow label directions. Helena & People...Products...Knowledge... are registered trademarks of Helena Holding Company. ©2014 Helena Holding Company.



**Helena Chemical Company • 2405 N. 71st St. • Tampa, FL 33619**  
813-626-5121 • [www.helenachemical.com](http://www.helenachemical.com)



# RECAP:

## What Happened at the FAPMS 38<sup>th</sup> Annual Conference?

by Karen Brown and Brett Hartis

FAPMS returned to Daytona Beach from October 14 through 16 for their 38<sup>th</sup> annual conference. There was a fantastic turnout of 325 people and all three days were packed with great presentations, events, and fun!

President James Boggs kicked off the meeting with a call to order, which was followed by the keynote address delivered by Jeff Schardt of the Florida Fish and Wildlife Conservation Commission's Invasive Plant Management Section. Schardt presented a comprehensive and entertaining review of the history of aquatic plant management, which dates to the late 1800s. He covered the various state and local agencies that became active by the 1950s and the research and management issues that have taken place since that time. The presentation was interspersed with personal anecdotes and photographs gathered over Schardt's 38-year career. Jeff has seen it all and will have a full article ready for the Summer 2015 issue of *Aquatics* that will follow his retirement from FWC. The morning was rounded out with several updates on invasive plant management throughout the state of Florida. The afternoon session featured talks on pesticide safety and the "Aquatic Plant Manager" competition presentations.

Wednesday morning's session included an update on the Florida Exotic Pest Plant Council (FLEPPC) and talks from FLEPPC members on invasive plants in areas such as the Florida Everglades and the Loxahatchee National Wildlife Refuge. In exchange, there will be an aquatics session from FAPMS members at the FLEPPC Symposium in Melbourne Beach from April 8 through 10, 2015. Other presentations touched on a variety of topics, including discussions of new successes in biocontrol, vegetation management in stormwater treatment areas, integrated pest



Figure 1. The iconic Daytona Beach. Photo courtesy Don Doggett.



Figure 2. Jeff Schardt receives the Honorary Lifetime Member Award from President James Boggs. Photo courtesy Don Doggett.



Figure 3. Go ducks! Photo courtesy Keith Mangus.



Figure 4, left. Dean Jones, 2014 FAPMS Aquatic Plant Manager of the Year. Photo courtesy Don Doggett.



Figure 5. Incoming President Ed Harris presents a plaque to outgoing President James Boggs. Photo courtesy Don Doggett.



Figure 6. Stephanie McCarty receives the Honorary Lifetime Member Award from President James Boggs. Photo courtesy Keshav Setaram, SFWMD.



Figure 7. FAPMS photographer Keith Mangus. Photo courtesy Don Doggett.



Figure 8. Tracy Wood, 2013 FAPMS Aquatic Plant Manager of the Year, gives FAPMS a thumbs-up! Photo courtesy Keith Mangus.

management, and the discovery of invasive *Phragmites* in Florida.

Wednesday evening's activities gave everyone a chance to have some fun and win some prizes with the always-popular duck race and the awards banquet. **Dean Jones** took home the coveted **Aquatic Plant Manager of the Year** plaque plus \$500. Incoming President **Ed Harris** presented a plaque to outgoing President **James Boggs**. **Jeff Schardt** and **Stephanie McCarty** took home well-deserved **Honorary Lifetime Member** awards. **Aquatic Plant Manager Presentation** winners were **Joey Liberator** (Allstate Resource Management) – 1<sup>st</sup> Place, \$300 prize; and **Kevin Damasso** (Aquatic Vegetation Control) – 2<sup>nd</sup> Place; \$200 prize. **Leif Willey** (Aquatic Systems) and **Jim Beau Wilmoth** (AquaPlant Con-

trol) tied for 3<sup>rd</sup> Place with a \$100 prize. Each applicant also received an extra \$100 for their participation in the competition. It takes a lot of incentive for folks to present in front of 325 peers, especially when it's not in their normal line of work. Thanks, guys!

The meeting wrapped up Thursday morning with label updates and new products from the industry sector. The final event was the grand prize drawing for a fully-outfitted Ascend Sit-On-Top kayak built especially for anglers. The prize was provided by top sponsor **United Phosphorus, Inc.** and was taken home by **Dan Niemi** with Allstate Resource Management.

As usual, FAPMS had excellent sponsorship of the conference: **Grand Sponsor**, United Phosphorus, Inc.; **Diamond Sponsors**: Applied Biochemists – A Lonza Business; Crop Production Services; Helena Chemical Company; SePRO Corporation; Syngenta Professional Products. **Platinum Sponsors**: Alligare, LLC; Applied Aquatic Management, Inc.; BioSafe Systems, LLC; Clarke Aquatic Services, Inc.; Keeton Industries; Lake and Wetland Management, Inc.; Texas Aquatic Harvesting, Inc.; Winfield Solutions, LLC. **Gold Sponsors**: Allstate Resource Management, Inc.; Aquafix, Inc.; Aquatic Vegetation Control, Inc.; Brewer International; Chemical Containers, Inc.; Dow Agrosciences; Eco-Pak, LLC; Kasco Marine; Nufarm Americas; Red River Specialties, Inc.; and Vertex Water Features.

If you missed the meeting this year, have no fear! The 2015 FAPMS meeting will be in Lake Buena Vista October 5 through 8. Watch the FAPMS website for details to come.

*Karen Brown (kpbrown@ufl.edu) is the Information Office Coordinator at University of Florida/IFAS Center for Aquatic and Invasive Plants; Dr. Brett Hartis (bmhartis@ncsu.edu) is an Aquatics Extension and Research Associate at North Carolina State University in Raleigh.*





Figure 1. Waterhyacinth infestation. Photo courtesy USDA.

# *Megamelus scutellaris*, a new biological control agent for waterhyacinth *Eichhornia crassipes*

by Philip W. Tipping

## The Weed

Waterhyacinth originated in lowland tropical South America, probably in the Amazon basin. Its erect, free-floating habit and showy flowers made it attractive for use in ornamental ponds and garden pools, which inevitably led to spread by people. It was first introduced into the US in the late 1800s, then into many tropical and subtropical (and some warm-temperate) regions of the world. Individual rosettes produce clones that form extensive floating mats which support canopies that, in mature stands, extend 3' or more above

the water surface. Problems caused by waterhyacinth in its invaded range are well documented, and result from its rapid growth, clonal propagation, ability to re-infest via the seed bank or from plant fragments, and lack of natural enemies. Infestations negatively affect water traffic, water quality, infrastructure for pumping and hydroelectric operations, water use, and biodiversity. Floating mats block drainage, causing flooding or preventing movement of floodwaters. Dense mats reduce light to submersed plants, thus depleting oxygen in aquatic communities. The resultant lack of phytoplankton alters the composition of invertebrate communities. Other problems include property damage during



Figure 2. Waterhyacinth flower. Photo courtesy USDA.

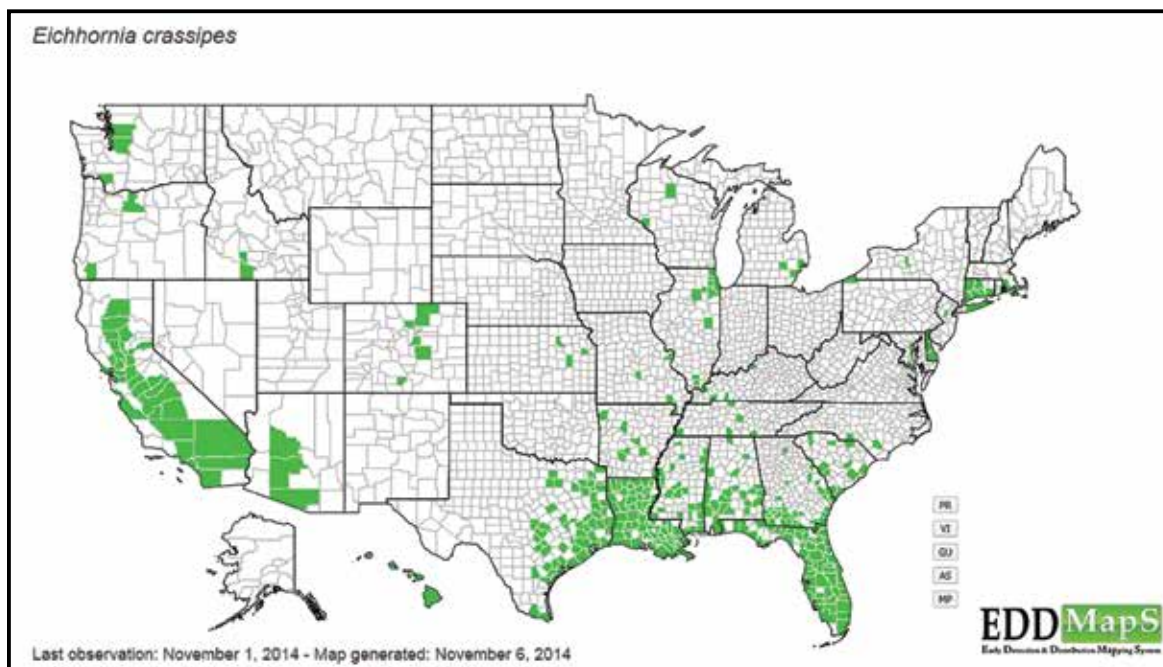


Figure 3. Distribution of waterhyacinth in the US (including waif populations). Image courtesy EDDMapS 2014. Early Detection & Distribution Mapping System. The University of Georgia - Center for Invasive Species and Ecosystem Health. Available online at [www.eddmaps.org](http://www.eddmaps.org); last accessed Nov 19, 2014.



Figure 4. *Neochetina eichhorniae*. Photo courtesy Lyn Gettys, UF/IFAS.

floods, water loss due to evapotranspiration, and increases in populations of organisms that transmit human and animal diseases. Waterhyacinth remains the world's most troublesome aquatic weed as it continues to invade water bodies and wetlands in new regions, sometimes with life-threatening consequences. Most recently, it has invaded Lake Victoria in Uganda and Kenya with devastating results to the local economies.

Waterhyacinth is now found in all Gulf Coast states, Hawaii, and in California, and extends southward through Mexico. It is also common in the Caribbean. In Africa, it has infested the Nile, Congo, and Zaire River watersheds. It also occurs in Senegal, the Central African Republic, South Africa, and Madagascar. It is common in tropical Asia including Southeast Asia, most of the Indian subcontinent, and extends through coastal China into South Korea and Japan. It is also found throughout Indonesia and in Australia.

## Biological Control Efforts

Three insects were released in the United States during the 1970s: *Neochetina eichhorniae* Warner (weevil) in 1972, *N. bruchi* Hustache (weevil) in 1974, and *Niphograptus albiguttalis* (Warren) (moth) in 1977. These insects now occur throughout the range of waterhyacinth. A series of field experiments was conducted at four Florida sites from 2008 to 2010 using an "insecticide-check" approach (plants were sprayed with insecticides) to keep the biocontrol agents off the plants in order to quantify the current levels of suppression provided by these agents. In the field *N. albiguttalis* was rarely found, while more than 99% of all *Neochetina* sp. adults were *N. eichhorniae*. Although it was not possible to separate the relative impacts of *Neochetina* sp. adults from larvae on individual plant variables, the larvae played a major role in reducing plant biomass and the number

of flowers. Plots exposed to attack by the biocontrol agents contained 58.2% less biomass and produced 97.3% fewer flowers. Despite these large reductions, attack by the existing biocontrol agents decreased waterhyacinth coverage by only 16.8% and most of this was attributed to a low-nutrient site where plant growth was less vigorous. Overall, coverage trended upwards during the course of the experiments and was always close to 100% when the plots were harvested. Although coverage is a somewhat arbitrary measurement, especially for floating plants subject to compression and dispersion, it influences the perception of biological control efficacy which, in turn, directly influences herbicide management decisions in Florida. Despite waterhyacinth populations that now produce less than half as much biomass and up to 98% fewer seeds than before the deployment of biological control agents, the overall approach used to achieve maintenance control of the plant





Figure 5. *Megamelus* adults: short-winged female (upper), two long-winged females (lower). Photo courtesy USDA.



Figure 6. Oviposition scars from *Megamelus* on waterhyacinth. Photo courtesy USDA.



Figure 7. Eggs of *Megamelus*. Photo courtesy USDA.

in Florida will probably not change unless new biological control agents, such as *Megamelus scutellaris* Berg (planthopper), can reduce coverage significantly.

### ***Megamelus scutellaris*** ("Megamelus")

*Megamelus scutellaris* Berg (Hemiptera: Delphacidae) is a small (2 to 3 mm) planthopper whose nymphs and adults feed on the sap of waterhyacinth, *Eichhornia crassipes* Mart. (Solms) (Pontederiales: Pontederiaceae). Its home range is southern South America including Argentina, Paraguay, Uruguay, and Brazil. Adults have two wing forms, short and long-winged, with the latter found in the dispersal or flying stage. Nymphs are active and readily hop, even off the surface of the water, and appear to have few natural enemies and suffer little predation in their home range. They are heavily parasitized in South America, which usually holds their populations in check. Without parasites, their populations will probably increase rapidly in the field. We collected adults from South America

in April 2006 and brought them into our quarantine facility at the USDA ARS Invasive Plants Research Laboratory (IPRL) in Ft. Lauderdale, where host range studies were conducted.

*Megamelus* completes its life cycle in less than 30 days and readily moves to new populations of waterhyacinths when host plant quality declines, which could make it more useful than the current waterhyacinth weevils and moth when integrated with herbicide programs in Florida. In other states where spraying is less frequent and widespread, we anticipate that this species will rapidly build up damaging densities on waterhyacinth.

The host range of *Megamelus* was determined based on a variety of no-choice and choice tests with 63 plant species, including 12 from the Pontederiaceae family, of which waterhyacinth is a member. No-choice tests are conducted with only the "non-host" plant species, while insects in choice tests are offered the non-host plant and waterhyacinth together. Additionally, 27 native and 5 exotic associated wetland



To order call your local distributor or  
**800-228-1833**

You'll get improved wetting, sticking and penetration for all types of aquatic herbicides. Our surfactants are made from natural citrus peel oil and are easy to mix and apply. This season, put some extra kick into your aquatic spray program with nonionic spray adjuvants like Cide-Kick from Brewer International. **Add Cide-Kick!**

P.O. BOX 690037 • VERO BEACH, FL 32969  
T: 772- 562-0555 • F: 772-778-2490  
MEMBER OF: APMS, AERF AND RISE  
**WWW.BREWERINT.COM**

**BREWER**  
International

species and 11 economic species were also tested. Megamelus exhibited a high level of oviposition and developmental fidelity to waterhyacinth, meaning that it only laid eggs on waterhyacinth and it was unable to sustain populations on any other test plant after the first generation. It is also unlikely to cause problems to other plants when herbicides eliminate waterhyacinth populations because survival was virtually non-existent on associated wetland plants. Pickerelweed (*Pontederia cordata*) was an unsuitable host because neither adults nor nymphs were unable to survive on it for 7 days. It took two years to complete the quarantine-based host range testing. The regulatory process to obtain a permit took another two years and a permit for release was granted in 2010. Today the insect is established in southern and northern Florida and is slowly increasing its density at release locations.

## Life History of Megamelus

A few days after mating, females begin ovipositing (laying eggs) within plant tissue located in the top of the petiole (leaf stalk) and the lamina (broad leaf) of waterhyacinth. These sites may or may not bear an oviposition scar characterized by three parallel tracks. Most oviposition sites con-

tain two eggs. Eggs are oval with a sharp tip and a rounded base. They are milky white when laid and turn yellowish white with reddish eye spots before hatching. Nymphs emerge after 7 to 13 days depending upon the temperature and begin feeding on the plant closest to the water surface. Nymphs develop through five instars and will feed on both the petioles and the broad leaves. Development of the entire immature stage in outdoor conditions can take about 25 days. Field observations in Argentina have found that the immature stages of Megamelus overwinter in decayed mats of waterhyacinth.

Planthoppers like Megamelus feed by inserting their mouthparts (stylets) into the vascular tissue and ingesting the sap, usually from the phloem. Saliva is secreted during penetration, forming a stylet sheath that acts to hold the stylets together and facilitate lubrication and movement toward food sources. The sheath remains imbedded in the tissue after the stylets are withdrawn and the presence of enough stylets can interrupt the flow of nutrients through that area of the phloem. Most stylet probing is between the plant's cells and causes significant damage to cell components, leading to cell death.

## Damage to waterhyacinth by Megamelus

Waterhyacinth were heavily damaged by Megamelus in the quarantine colonies at IPRL and the plants eventually wilted and died. In order to quantify this damage, a study was conducted using eight waterhyacinth plants of similar size. Plants were randomly assigned to a control treatment with no Megamelus feeding or ovipositing, or to an insect treatment where two females and one male (7 to 10 days old) were permitted to feed and oviposit on the plants for 7 days. Fresh weight biomass and the number of leaves per plant were recorded prior to placing them in aquaria filled with water. Two consecutive generations of Megamelus were permitted to develop on the plants over 67 days. Plant fresh weight, number of leaves, and number of individual plants were recorded. Plants without Megamelus grew larger and produced more leaves than plants attacked by the insects. We were not concerned with the number of Megamelus because two of the four plants had collapsed and most of the insect populations had died. However, we counted 682 and 1286 insects on the two remaining plants that still contained some green tissue. It's likely they would have collapsed in the near future. These data clearly indicate the potential of Megamelus to damage waterhyacinth and to rapidly increase their numbers in a relatively short time.

Megamelus is now part of the USDA effort through the Comprehensive Everglades Restoration Plan (CERP) to mass-rear and redistribute biological control agents that target weeds such as Old World climbing fern and air potato. We are currently seeking locations infested with waterhyacinth to release Megamelus, including locations that are actively managed with herbicides. Please contact me at your earliest convenience if you would like to have your site considered.

Dr. Phil Tipping ([philip.tipping@ars.usda.gov](mailto:philip.tipping@ars.usda.gov)) is the Research Leader at the USDA-ARS Invasive Plant Research Laboratory in Ft. Lauderdale, Florida.

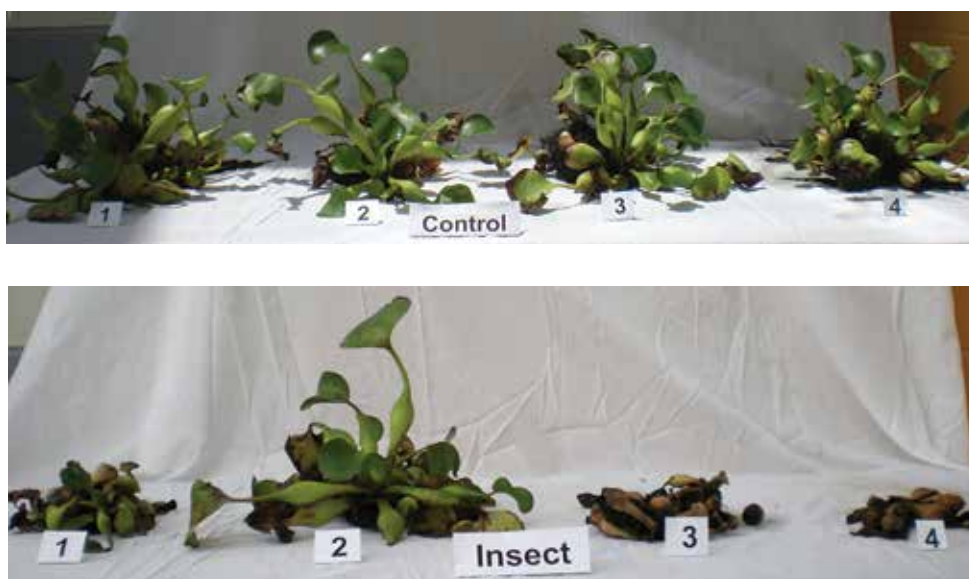


Figure 8. Waterhyacinths grown for 67 days without insects (upper) or with Megamelus (lower). Plants 1 and 2 in the Megamelus treatment were infested with 682 and 1286 individuals of Megamelus, respectively. In contrast, only 4 and 5 individuals of Megamelus were found alive on plants 3 and 4; most of the insects had died. Photo courtesy USDA.



# Hydrilla Control Complexities in a Multiple-Use Central Florida Reservoir System



Figure 1. Lock and dam at the south end of Lake Toho. Photo courtesy FWC.

by Jeffrey D. Schardt

## Background

The Fish and Wildlife Conservation Commission (FWC) is designated by the Florida Legislature as the lead agency in directing the control of aquatic plants in the state's 460 public lakes and rivers. FWC staff monitor aquatic plant populations, develop management plans, and contract with government entities and private companies to control aquatic plants to conserve the identified uses and functions of individual public waters. One of the most important aquatic systems, with one of the most diverse and engaged stakeholder groups in Florida, is the Kissimmee Chain of Lakes.

The Kissimmee Chain of Lakes (KCOL) is a series of four interconnected waters, collectively covering about 64,500 surface acres in Osceola County, in central Florida.

From north to south, the KCOL includes Lakes: Toho (18,810 acres), Cypress (4,097 acres), Hatchineha (6,665 acres), and Kissimmee (34,948 acres). The KCOL is part of a Federal Navigation and Federal Flood Control Project, providing flood protection to the cities of Kissimmee and St. Cloud, as well as a navigable connection via the Kissimmee River and Lake Okeechobee to the Atlantic Ocean and Gulf of Mexico. Lock and dam structures are located at the south ends of both Lakes Toho and Kissimmee.

In addition to flood control and navigation, the KCOL generates significant recreation and tourism revenues to local communities. The lakes are a world-renowned bass fishing destination, hosting frequent national tournaments in winter and spring months as well as dozens of year-round local events. Waterfowl hunting is a popular sport with scouting and hunting activities

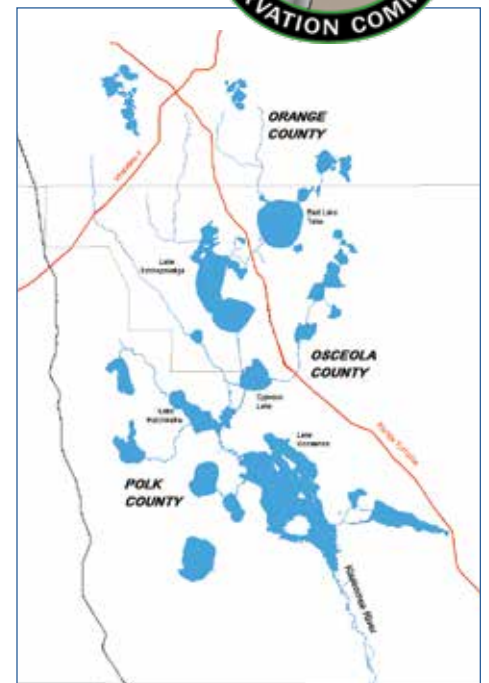


Figure 2. Kissimmee Chain of Lakes. Image courtesy FWC.



Figure 3. Hydrilla infestation on Lake Hatchineha. Photo courtesy FWC.

extending from mid-September into early February. The KCOL provides habitat for the endangered snail kites (*Rostrhamus sociabilis*) that nest from December through July and forage year round. The lakes are a well-advertised and well-attended eco-tourist destination. Residential development continues to expand from north to south, especially around Lake Toho. As these once rural waters evolve into a more urban environment, the number of stakeholder desires and expectations continues to expand.

Prior to lock and dam construction, the lakes fluctuated annually by as much as ten feet. Under strict water schedules implemented by the US Army Corps of Engineers and the South Florida Water Management District (SFWMD), lake levels now vary an average three to four feet per year. Without naturally occurring periodic droughts and wildfire and subsequent flooding, native emergent plants like cattail (*Typha* spp.), pickerelweed (*Pontederia cordata*), and spatterdock (*Nuphar advena*) can cover vast monospecific stands of the littoral zone without intensive management. Additionally, the KCOL is host to several of the most invasive aquatic plants found in Florida. Floating water hyacinth (*Eich-*

*hornia crassipes*) has been present in the system since the early 1900s. Submersed hydrilla (*Hydrilla verticillata*) was first reported in the late 1970s and grew to fill the water column and cover more than 65% of the surface of the KCOL waters as recently as the late 1990s. Two emergent, mat-forming plants, Cuban bulrush (*Oxycaryum cubense*) and large-flower primrose-willow (*Ludwigia grandiflora*) have been reported in Florida lakes since the 1980s, but have only begun to display invasive characteristics in recent years. They are now under intensive management in the KCOL to prevent them from covering native grass beds and forming smothering, floating mats. Other invasive plants controlled in the KCOL include floating water lettuce (*Pistia stratiotes*) and emergent torpedograss (*Panicum repens*) and paragrass (*Urochloa mutica*).

Although the KCOL represents only 5% of the total surface area of Florida public waters, as much as 40% of the FWC annual aquatic plant management budget has been spent controlling invasive plants in this system to conserve its identified uses and functions. The lakes of the KCOL are commonly among the top ten most heavily infested with hydrilla. Most of the expenses

are for the control of hydrilla, often exceeding \$5 million per year. In 2011, FWC developed position statement committing the agency to preventing newly discovered hydrilla introductions from expanding and becoming large-scale problems, and to managing established hydrilla populations on a case by case basis to conserve identified uses and functions of individual waterbodies.

## Large-scale Hydrilla Management Considerations

Aquatic plant managers have learned that the most effective time to manage an invasive plant such as hydrilla is before it becomes a problem, filling the water column and covering thousands of contiguous acres, displacing native plants and impairing uses and functions of Florida waters. However; many stakeholders in the KCOL have come to rely on recreational and ecological attributes provided by invasive plants, especially hydrilla, and request that hydrilla not be managed in specific areas of the KCOL until it becomes a problem. At low to moderate densities, hydrilla provides habitat for fisheries and an edge effect that can enhance angling efficiency. High densities of hydrilla attract overwintering waterfowl, improving hunting opportunities. High densities of hydrilla also have been reported to provide feeding substrate for invasive island applesnails (*Pomacea insularum*) which are in turn fed upon by endangered snail kites.

Sustaining a higher level of hydrilla in the KCOL to provide ecological services for endangered species and enhanced recreational opportunities for stakeholders presents significant management challenges. About 95% of active invasive aquatic plant control in Florida is achieved using herbicides registered for use in waters by the U.S. Environmental Protection Agency and the Florida Department of Agriculture and Consumer Services. When used according to label directions, herbicides provide a cost-effective and environmentally compatible method for controlling aquatic plants. However, many stakeholders voice concern with the use of herbicides in public waters. New federal





Figure 4. Snail kite plucking a snail from a hydrilla infestation. Photo courtesy FWC.

regulations under the National Pollution Discharge Elimination System (NPDES) require entities using pesticides to take steps to minimize the amount applied to waters of the U.S. Conversely, managing for higher levels of hydrilla requires more frequent and larger-scale control via herbicide applications. Controlling more mature and robust hydrilla also requires a higher rate of herbicide, increasing the amount used, cost, and potential for non-target plant damage.

Increased herbicide use and frequency also raises concerns about resistance development and eventual loss of a very limited number of herbicides registered for use in aquatic systems. Resistance in Florida has been verified to two of the most frequently used herbicides to control hydrilla; potassium endothall and fluridone. While endothall resistance was contained in two lakes by applying different modes of action and stocking sterile grass carp, fluridone tolerance was too widespread to contain before it was verified. Prior to 2001, fluridone was the primary large-scale hydrilla control tool in Florida for more than 15 years, generally providing 15-18 months of hydrilla suppression with minimal adverse impacts to native plants, at a cost of under \$100 per acre of hydrilla controlled. While research has provided new herbicide control options that can

be applied as selectively as fluridone, the duration of hydrilla control is about half as long and costs per acre controlled are more than double that of previous large-scale fluridone applications.

With the many stakeholder demands in the KCOL, there are few strategies to manage hydrilla — especially on a large-scale — that satisfy all stakeholder requests, and few opportunities during the year that meet optimum control conditions. Postponing hydrilla control for ecological services usually allows hydrilla to expand, ensuring that large-scale hydrilla control will eventually need to be conducted. The most cost-effective and selective time to apply herbicides for large-scale hydrilla control is in late fall through late spring — November through April in Central Florida. Herbicides must be applied to the entire water column in the control zone to control submersed plants. Water levels are generally lower in the KCOL during winter through late spring, creating water storage capacity in the reservoirs to reduce flooding concerns associated with the onset of spring/summer tropical rainfall. Lower volumes of water require less herbicide use. Rainfall is also reduced during this period, reducing the chances of flushing herbicide-treated water out of this flow-through system.



## Results You Can See, Not Hear.

- Increase Fish & Aquatic Life
- Reduce Bottom Sludge
- Decrease Offensive Odors
- Improve Water Quality
- Improve Dissolved Oxygen
- Minimal Maintenance
- Aquatic Management Solution
- Enhance Water Clarity

KeetonAquatics.com  
800.493.4831  
info@keetonaquatics.com

**KEETON**  
INDUSTRIES  
OTHER PONDS AND LAKES ARE GREEN WITH ENVY™



Lower seasonal water temperatures correspond with higher dissolved oxygen content to buffer bacterial decomposition, providing an increased margin of safety to avert fish kills during herbicide application vs. applying during hot summer months. Native plants are generally dormant, and although hydrilla may be suppressed from cooler temperatures, it is usually actively growing for herbicide uptake. This allows managers to meet objectives of weeding out hydrilla while conserving or enhancing a more diverse native plant community. Hydrilla's most active growth occurs from June through August, with profuse lateral branching and elongating as much as 6-8 inches per day. This intense growth allows hydrilla to recover rapidly from summer herbicide applications that may be effective for only one to three months. Most herbicides used for large-scale hydrilla control are broken down microbially or by photolysis. In winter, low water temperature and seasonal low sunlight intensity ensure that herbicides are in the water column longer before they are broken down, enhancing hydrilla control and allowing for a lower herbicide dose to be applied.

Sustaining higher levels of hydrilla to provide ecological services in the KCOL magnifies management complexities. Surface mats of hydrilla attract some waterfowl species and hunters request that hydrilla be left unmanaged in key areas before and during Florida's various duck hunting seasons. Scouting for duck hunting begins in September with intermittent seasons scheduled through late September. Hunting season opens again for a week in late November and then extends from early December into early February. This leaves narrow windows for large-scale hydrilla control in agreed-upon areas in early November and early December, while leaving other hydrilla control for February through early May.

Snail kites begin nesting behavior in December. Nesting and fledging of young birds can last through July into August. If nests aggregate near dense hydrilla beds, the U.S. Fish and Wildlife Service establishes setback areas for aquatic plant control to reduce potential nest disturbance and loss of hydrilla foraging habitat. Hydrilla control

delayed to accommodate duck hunting through January may thus be delayed again through July by snail kite nesting — a time when large-scale hydrilla control is not effective and therefore not advisable for the many aforementioned reasons.

Hydrilla control is coordinated among stakeholders to accommodate fisheries and angling activities on the KCOL. As mentioned, small bass fishing tournaments occur throughout the year in the KCOL and hydrilla control can be performed around these events. However, large national tournaments visit the KCOL every few years, usually in February or March, and organizers routinely request suspension of large-scale hydrilla control for several weeks before and during the week of the tournament. Largemouth bass (*Micropterus salmoides*) anglers request that large areas of offshore hydrilla be left unmanaged year-round for cover and as an attractant to enhance fishing success. However, accommodating these requests may degrade open water habitat necessary for black crappie (*Pomoxis nigromaculatus*) fisheries and angling success.

In recent years, the toxin producing periphytic cyanobacteria, *Aetokthonos hydrillicola* (aetokthonos) has been documented with increasing frequency on hydrilla in Lakes Toho and Hatchineha. The toxins produced by these cyanobacteria are linked to Avian Vacuolar Myelinopathy (AVM). Aetokthonos causes brain lesions and death in birds such as American coots (*Fulica americana*) that feed on hydrilla containing cyanobacteria when in its toxic phase — usually late in the year when coots are present in large numbers. The toxins, and therefore AVM, are passed on to raptors that prey on the impaired or dead coots. More than 150 bald eagle (*Haliaeetus leucocephalus*) deaths have been attributed to aetokthonos-infested hydrilla in South Carolina reservoirs. South Carolina officials are contemplating a more aggressive hydrilla control program, especially in fall months, to reduce this serious threat to bald eagles. Tests conducted at the University of Georgia showed that apple snails feeding on infested hydrilla which are then fed to sentinel chickens also pass along the toxins, causing AVM in the test birds. While no

deaths to coots or eagles have been reported in Florida, there is awareness that snail kites feeding on apple snails that have fed on aetokthonos-infested hydrilla in the KCOL could acquire the disease.

## Large-scale Hydrilla Management Logistics in the KCOL

Implementing large-scale hydrilla control on such a tight schedule in the KCOL requires intensive planning months in advance of operations. Following is a sequence of events that occur preceding control events.

FWC schedules a summer meeting with stakeholders to review current levels of hydrilla and emergent plants after the most recent control events, and to petition stakeholder assessment and management requests for upcoming fall / winter / spring hydrilla and large-scale emergent plant management efforts. The KCOL Interagency Group (IA Group) meets with stakeholders during public meetings. The IA Group is a small management team consisting of agency staff that has aquatic plant habitat-related management responsibilities on the KCOL.

In mid-summer, the IA Group along with the University of Florida (UF) conduct point intercept sampling assessments of submersed plants in each of the KCOL lakes. Plant species are identified and densities and locations recorded on a map of each lake. Using data from plant inventories and input from stakeholder meetings, the IA Group drafts areas where hydrilla or other submersed and emergent plants require late fall / early winter control, and areas where control may be postponed until the following spring. The IA Group drafts reasons for hydrilla control and overlays proposed control plots onto maps depicting hydrilla and other submersed plant locations and densities. The map and reasons for proposed control are forwarded to stakeholders.

- Reasons for late fall / early winter hydrilla control include:
- Boat basin and boat ramp access, and navigation in established trails.
- General boating and public use, espe-



cially in the north end of Lake Toho.

- Water movement, primarily near entry and exit areas of the canals that connect the KCOL lakes, and near the flood control structures and navigation locks.
- Open areas for fishing as previously requested or agreed upon by anglers.
- High public use areas where hydrilla will likely form mats adjacent to historic snail kite nesting and foraging sites after kite nesting begins, preventing hydrilla control at that time.

The IA Group attends another public stakeholder meeting in early fall to establish final hydrilla control plots and approximate timing for late fall / early winter (early November and early December — between duck hunting seasons) control efforts and identifies potential locations for spring control (February through early May). Using data from plant inventories and input from stakeholder meetings, FWC drafts final hydrilla control plans for each lake in the KCOL and schedules a meeting among the IA Group, plant control contractors, and UF personnel to establish the most appropriate herbicide types and rates to apply, identify contractors for each control site, and schedule timing for hydrilla control. FWC biologists and SFWMD water level authorities evaluate current water levels and volumes to determine herbicide quantities necessary to achieve agreed upon rates for each control plot. The IA Group determines where each contractor will work and assigns points of contact to coordinate herbicide delivery and staging logistics. FWC biologists work with communications personnel to notify stakeholders and advertise upcoming hydrilla control operations.

In November and December, the IA Group implements large-scale hydrilla control applications adapting to weather and other local conditions, and assists as necessary in operation logistics. The IA Group meets collectively on the KCOL in late January and individual IA Group members conduct intermittent inspections from February through April to assess previous control effects and evaluate where hydrilla may require large-scale control in February and before May. FWC notifies stakeholder

groups via email of any areas where hydrilla may need control. After receiving feedback from stakeholders, the IA Group meets with contractors to plan and implement control as outlined above for fall / winter applications. Hydrilla control is scheduled accordingly, postponing as long as possible before May to extend control as far as possible through the summer months.

FWC contracts with the UF to monitor herbicide applications on the KCOL and to provide an independent evaluation of impacts on invasive plants as well as native plant communities. UF also conducts research under FWC contract to develop improved methods for assessing and controlling invasive plants while conserving and enhancing diversity in native plant

communities. FWC is committed to working with all stakeholder groups to sustain the recreational, habitat, and flood control attributes of the KCOL. To learn more about the FWC aquatic plant management program in Florida, please visit ***Plant Management in Florida Waters: An Integrated Approach*** — a cooperative effort of the University of Florida and the Florida Fish and Wildlife Conservation Commission — at [plants.ifas.ufl.edu/manage](http://plants.ifas.ufl.edu/manage).

*Jeffrey D. Schardt (jeff.schardt@myfwc.com) is a Biological Administrator III with the Florida Fish and Wildlife Conservation Commission's Invasive Plant Management Section.*

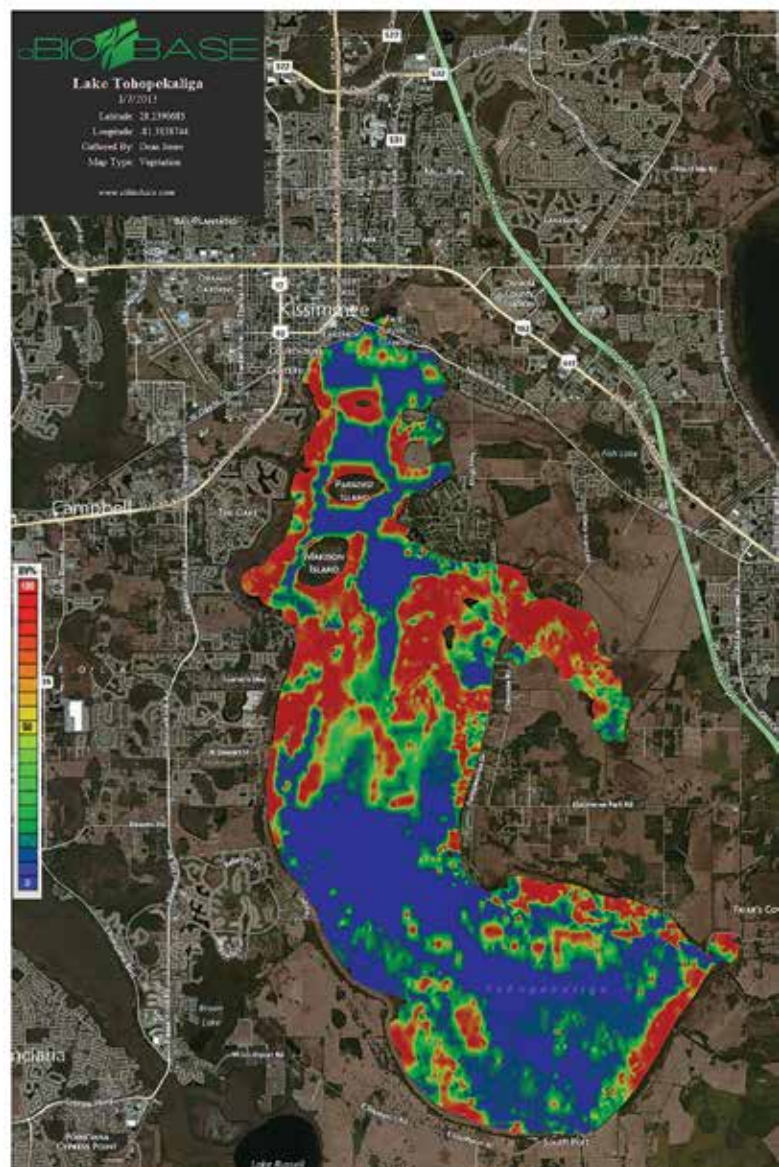


Figure 5. Inventory of submersed plants in Lake Toho. Image courtesy FWC and BioBase.



by Brett Hartis

## Clemson Extension Service to Launch Master Pond Manager in Spring 2015

Clemson Extension Service will launch the new Master Pond Manager (MPM) program in the spring of 2015. The MPM program aims to improve the knowledge of those actively involved in the management of recreational and stormwater ponds, and to serve as a value-added training opportunity. The in-depth training utilizes a host of experts to deliver a six-week, self-paced online and field based curriculum.

The MPM program can be tailored to meet the needs of commercial managers as well as pond owners. An abbreviated, four-week certificate level course option will be available in either recreational or stormwater pond management. The MPM program will also include continuing education opportunities that ensure participants stay up-to-date with the latest in technology, techniques and regulations pertaining to the management of pond systems. The Master Pond Manager course was developed through collaborative efforts of Clemson University Cooperative Extension Service, Center for Watershed Excellence, and multiple partners. Information on the MPM program can be found at the Center for Watershed Excellence's homepage at [www.clemson.edu/public/watershed](http://www.clemson.edu/public/watershed)

## Aquatic Mapping Forum Launched

NC State University has launched an

open-use forum for all things “aquatic mapping”. Pre- and post-treatments surveys, mapping pond bathymetry, delineating watershed boundaries... if you want to talk about it, then this is the place for you! More likely than not, you have also experienced the frustration of dealing with the issues of data collection, data processing, and/or output development in your mapping projects. Well, now there is a forum just for you! Even if you are new to the science, have a look and feel free to leave comments, questions, or just brag a little! You can check out the forum at [aquaticmapping.prophpb.com](http://aquaticmapping.prophpb.com)

## Benefits of Controlling Nuisance Aquatic Plants and Algae in the United States – a new CAST Commentary White Paper

Safe, accessible water resources are essential, but various threats are closing the taps. A growing problem comes from nuisance aquatic plants that invade rivers, lakes, and other aquatic ecosystems. They can affect aesthetics, drainage, fishing, water quality, fish and wildlife habitat, flood control, human and animal health, hydropower generation, irrigation, navigation, recreation, and, ultimately, land values. The authors of this commentary emphasize the necessity for the skillful management of nuisance aquatic plants. They hope regulators, managers, stakeholders, and legislators gain scientific insights about this important issue. Using specific examples and detailed explanations of the situation, this paper thoroughly examines the negative impacts of nuisance plants and the need to be aware, informed, and — when possible — proactive about the problems. To view the full commentary, visit [www.apms.org](http://www.apms.org) and search the “What’s new” section.

## APMS Blog, Twitter, and LinkedIn

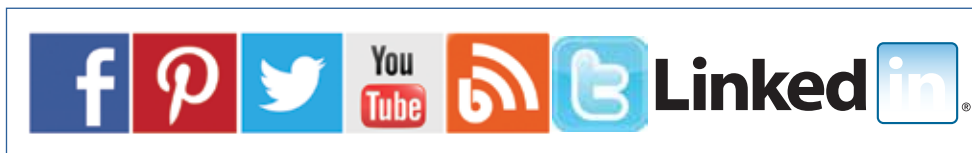
If you haven’t already, check out the Aquatic Plant Management Society Social Media! Read national news about aquatic

plant management or take in reviews of some great JAPM articles. The blog also features outstanding student research and careers in Aquatic Plant Management. If you would like your work or the work of others featured, email us at [webmaster@apms.org](mailto:webmaster@apms.org). To receive an e-mail when new material is added (optional), complete the “FOLLOW BY E-MAIL” field. APMS is also on Twitter; if you’re looking for your daily dose of aquatic plant management news, just follow APMS @APMSociety! Find interesting news articles in aquatic plant management? Tweet @APMSociety! Looking for a job in aquatic plant management, hoping to network, or just looking for aquatic plant management answers? Check out APMS LinkedIn group. Go to the APMS website at [www.apms.org](http://www.apms.org) and click on the Social Network tab to find the blog, Twitter, and LinkedIn pages. You can also find both the South Carolina and Florida APMS on Facebook, so check them out now!

## AERF Social Media and Outreach

AERF has joined the social media scene in full force! Have you noticed the big, familiar icons at the top right corner of our [aquatics.org](http://aquatics.org) web page? Click on each link to visit us on Facebook, Twitter, or the AERF’s customized blog, “The Aquatics Update”. Along with industry and regulatory updates, the blog features such segments as the “AERF Spotlight”, highlighting outstanding individuals, and the “Feature Focus Friday”, which showcases current research in the aquatic sciences. New postings are frequent, often 2 to 3 times per week, so please stop by and discover the latest in aquatic plant management, science, and innovation! Like what you see? Let us know by leaving us a comment, “liking” us on Facebook or following us on Twitter. If you would like to nominate someone to be featured in our blog or would like your content considered, please email us at [socialmedia@aquatics.org](mailto:socialmedia@aquatics.org). We look forward to seeing and hearing from you in each of our outlets!

*Dr. Brett Hartis ([bmhartis@ncsu.edu](mailto:bmhartis@ncsu.edu)) is an Aquatics Extension and Research Associate at North Carolina State University in Raleigh.*







## Calendar of Events 2015

**January 20-22, 2015**  
**Northeast Aquatic Plant Management Society Annual Meeting**  
 Saratoga Springs, NY  
[www.neapms.net](http://www.neapms.net)

**January 26-28, 2015**  
**Southern Weed Science Society Annual Meeting**  
 Savannah, GA  
[www.swss.ws](http://www.swss.ws)

**February 9-12, 2015**  
**Weed Science Society of America Annual Meeting**  
 Lexington, KY  
[wssa.net/meeting/annual-meeting](http://wssa.net/meeting/annual-meeting)

**February 22-25, 2015**  
**Midwest Aquatic Plant Management Society Annual Meeting**  
 Indianapolis, IN  
[www.mapms.org](http://www.mapms.org)

**March 2-3, 2015**  
**Florida Weed Science Society Annual Meeting**  
 Haines City, FL  
[sites.google.com/site/floridaweedsociety/2010location](http://sites.google.com/site/floridaweedsociety/2010location)

**March 30-April 1, 2015**  
**Western Aquatic Plant Management Society Annual Meeting**  
 Portland, OR  
[wapms.org](http://wapms.org)

**April 8-10, 2015**  
**Florida Exotic Pest Plant Council Annual Symposium**  
 Melbourne Beach, FL  
[www.fleppc.org](http://www.fleppc.org)

**April 15-17, 2015**  
**Florida Vegetation Management Association Annual Meeting**  
 Daytona Beach, FL  
[www.myfvma.org](http://www.myfvma.org)

**May 4-7, 2015**  
**UF/IFAS Aquatic Weed Short Course**  
 Coral Springs, FL  
[conference.ifas.ufl.edu/aw](http://conference.ifas.ufl.edu/aw)

**May 31-June 2, 2015**  
**Florida State Horticultural Society Annual Meeting – now with a Natural Resources Section!**  
 St. Augustine, FL  
[fshs.org](http://fshs.org)

**June 8 - 11, 2015**  
**Florida Lake Management Association Annual Symposium**  
 Naples, FL  
[flms.net](http://flms.net)

**July 12-15, 2015**  
**Aquatic Plant Management Society Annual Meeting**  
 Myrtle Beach, SC  
[apms.org](http://apms.org)

### Too Many Weeds Spoil the Fishing

Exotic invasive aquatic plants such as Hydrilla, Eurasian Watermilfoil and Curlyleaf Pondweed, can be detrimental to a healthy fishery in lakes across the country.

These invasive plants when left unmanaged can alter the ecosystem of lakes and reservoirs, cause a decline in the fishery, and interfere with other valued uses of waterbodies.

**The Authoritative Leader in Aquatic Habitat Management**

Successful aquatic habitat management is all about achieving a balance in the aquatic ecosystem. United Phosphorus, Inc. offers assistance and a full line of aquatic products for properly managing exotic and invasive plants and algae to achieve and maintain a healthy aquatic environment for native aquatic plants.

\*Refer to the Directions for Use on the specific product labels.  
 Always read and follow label directions and precautions. Aquathol® K, Current®, Hydrothol®, and Symmetry® are registered trademarks of United Phosphorus, Inc. Copyright 2013 United Phosphorus, Inc.

TO OBTAIN A COPY OF OUR VIDEO, AQUATIC PLANT AND HABITAT MANAGEMENT, CALL 1-866-287-9190

**Aquathol® K and Aquathol® Super K Aquatic Herbicide**  
 For selective control of Hydrilla, Curlyleaf Pondweed, Coontail and other invasive and nuisance aquatic plants.  
*No restrictions on swimming, fishing or irrigation\**

**Current® Aquatic Herbicide**  
 A broad-spectrum non-selective aquatic herbicide.  
*No restrictions on fishing, swimming, irrigation, livestock watering, or potable water use*

**Hydrothol® 191 Aquatic Herbicide & Algaecide**  
 A broad-spectrum herbicide and algaecide. Hydrothol® 191 provides a companion product or an alternative to copper algaecides when controlling difficult algae species.  
*No restrictions on swimming, fishing or irrigation\**

**Symmetry® NXG**  
 A broad-spectrum algaecide.  
*No restrictions on fishing, swimming, irrigation, livestock watering, or potable water use*

**United Phosphorus, Inc.**  
[www.upi-usa.com](http://www.upi-usa.com)

PRESORT STANDARD  
US POSTAGE  
PAID  
PERMIT #592  
PONTIAC, IL

# Paul C. Myers Applicator Dependent Scholarship

The Florida Aquatic Plant Management Society Scholarship and Research Foundation, Inc. is pleased to announce the availability of the *Paul C. Myers Applicator Dependent Scholarship*, which provides up to \$1,500 to deserving dependents of FAPMS members. The scholarship is based on:

1. The applicant's parent or guardian having been a FAPMS member in good standing for at least three consecutive years
2. Financial need, which will be determined based on need and the expected family contribution amount indicated on the processing results of a Student Aid Report (OMB No. 1845-0008). This report is available by completing a Free Application for Federal Student Aid Federal Form available online at [fafsa.ed.gov](http://fafsa.ed.gov)
3. The applicant being a high school senior entering college the next academic year, attending community college, or being a college undergraduate
4. An evaluation of the quality of the application and required essay by the Scholarship Selection Committee, which is composed of three FAPMS members and four FAPMS Scholarship and Research Foundation members
5. Submission of a completed application by June 1, 2015

**More information and the application packet are online  
at [www.fapms.org/myers\\_scholar.html](http://www.fapms.org/myers_scholar.html)  
or contact Keshav Setaram at 407-891-3562**

