Aquatics

SPRING 2015

A Publication of the Florida Aquatic Plant Management Society

Aquatics

SPRING 2015

Volume 37, Number 1

Do you know this plant? It's becoming one of the biggest problems in canals in south Florida – particularly in Homestead on the east coast, Ft. Myers on the west coast. It's common throughout Big Cypress Basin as well. See the bottom of Aquavine for the identity of this aquatic weed. Photo courtesy Lyn Gettys, UF/IFAS.

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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.

 Aquatics (ISSN 1054-1799) is the official publication of the Florida Aquatic Plant Management Society.

Introducing…

Dr. Stephen Enloe!

The University of Florida's new extension specialist for invasive species in upland and aquatic ecosystems

We'd like to extend a hearty "GO GATORS!" welcome to Dr. Stephen Enloe, who joined the faculty at UF as an Associate Professor of Agronomy in January 2015. He is housed at the UF/IFAS Center for Aquatic and Invasive Plants along with Drs. Bill Haller and Mike Netherland. Dr. Enloe has been involved with invasive plant research and extension for the past 18 years. He has worked throughout the western and southeastern United States, including California, Colorado, Wyoming, Alabama and now Florida. Over the last seven years, Dr. Enloe has worked extensively on cogongrass, Chinese privet, Chinese tallowtree, Japanese climbing fern, Chinaberry tree and a host of other invasive plants. He also recently worked in the area of bioenergy, with an emphasis on preventing potential bioenergy species from becoming the next big invaders.

With the move to the University of Florida to replace the giant Dr. Ken Langeland, Dr. Enloe's focus will now be divided between upland and aquatic invasive plant issues. He is excited to be wading into the area of aquatics and hopes to bring a fresh approach that will help address the monumental task of aquatic plant management in Florida. In terms of upland research, Dr. Enloe is continuing work on cogongrass and also has plans for immediate projects on Old World climbing fern, Brazilian peppertree and several other species. In terms of aquatic work, he has already seen firsthand the incredible impact of the aggressive *Ludwigia* complex of species and plans to quickly move into that area of research.

He is excited to be wading into the area of aquatics and hopes to bring a fresh approach that will help address the monumental task of aquatic plant management in Florida.

Dr. Enloe earned his Ph.D. at UC Davis in Plant Biology under Joe DiTomaso, a Master's degree in weed science from Colorado State University under Scott Nissen and an undergraduate degree in Agronomy from NC State. He also worked as a Post-doctoral Associate with the USDA Aquatic and Invasive Weed Research Unit under Dave Spencer. Welcome aboard, Stephen!

Report of Aquatic Plant Control Activities Conducted in Florida Public Waters During 2014

by Jeffrey D. Schardt

Aquatic Plant Management Authority and Scope

The Fish and Wildlife Conservation Commission (FWC) is designated by the Florida Legislature as the lead agency to direct the control of aquatic plants in the state. The FWC administers aquatic plant management through a permitting program, primarily for riparian owners to control plants adjacent to their properties, and through dispersing funds to government agencies and private sector companies to control aquatic plants in public lakes and rivers. The Cooperative Aquatic Plant Management Program (Cooperative Program) administered by the FWC in the state's public lakes and rivers involves complex operational and financial interactions between state, federal and local governments as well as private sector companies. The FWC has entered into 45 financial agreements (including cooperative agreements, contracts, task assignments and purchase orders) with the aforementioned entities to control and monitor aquatic plants.

Aquatic plant management funding comes from a variety of sources, including documentary stamps, gasoline taxes and boat registrations. The FWC also receives federal funding through the U.S. Army Corps of Engineers (USACE) and USACE management crews control aquatic plants in much of the St. Johns River and its tributaries. Each year the FWC files two reports summarizing plant management activities under the Cooperative Program in Florida public waters. Types and amounts of aquatic plants controlled, and control expenditures, are documented in a report to the Florida Legislature summarizing state and federal aquatic plant control accomplishments. The FWC also files a report to the Florida Department of Environmental Protection, documenting herbicide use authorized by the FWC in Florida waters pursuant to National Pollution Discharge Elimination System (NPDES) regulations.

Waters eligible for aquatic plant control funding under the Cooperative Program include those on sovereignty lands accessible via public boat ramp, waters that are designated Fish Management Areas and waters that lie within FWC Wildlife Management Areas. Invasive aquatic plants are inventoried each year in Florida's 457 public lakes and rivers that cover approximately 1.25 million acres. Inventories are conducted during the peak growing period, from April through November. These inventories provide a mechanism for early detection and rapid response to control new invasive plant introductions before they become established and require long-term and large-scale management. For invasive plant populations that are already established, inventories provide information to develop management priorities and document funding needs on a statewide basis. Finally, annual aquatic plant inventories document changes in plant communities in response to management efforts as well as changes that may occur in waters where no control has been implemented.

FWC biologists work with stakeholders to identify the primary uses and functions of each public waterbody. Aquatic plant populations are inventoried at least once each year in these systems with an emphasis on invasive species to determine if plants impair or may impair the identified uses and functions. Management objectives are then developed for each waterbody and funding is allocated to address statewide management priorities for the ensuing fiscal year. Managers have nearly 60 biological, herbicidal, mechanical and physical control options available to integrate into aquatic plant control strategies, adapting to the uses and functions as well as current conditions in each waterbody. A detailed description of the uses of Florida waters, the benefits of aquatic plants and how aquatic plants may impair these uses, aquatic plant control options, management plan development, and research and outreach efforts, is presented in the following website designed and maintained in a collaborative effort between the FWC and the University of Florida, Center for Aquatic and Invasive Plants (UF): http://plants.ifas.ufl.edu/manage/

Management operations and expenditures are reported for the state fiscal year that extends from July 1, 2013 through June 30, 2014. Plant presence and abundance is reported on a seasonal basis to better compare plant growth and management response through an annual growth cycle. Invasive plants were present in 96 percent of Florida's 457 public waters in 2014. Once established, eradicating invasive plants is difficult or impossible and very expensive; therefore, continuous maintenance is critical to keeping invasive plants at low levels to sustain attributes like navigation, flood control and recreation while conserving native plant habitat for fish and wildlife. The FWC's highest management priorities (established in rule under section 68F-54.005 F.A.C.) are the control of floating plants (waterhyacinth and waterlettuce) and submersed hydrilla. "Other plants" listed in the tables include both native and nonindigenous plants that may impair the uses of Florida public waters.

Operational Results for 2014

Table 1 presents the amount of control and associated funding for each plant type

Table 1. Acres of aquatic plants treated and treatment expenditures in Florida public waters during fiscal year 2013 - 2014 listed by control within each Water Management District.

Acres	Northwest	Suwannee	St. Johns	Southwest	S. Florida	TOTAL
Floating	522.75	221.66	18,417.93	4,942.74	18,959.40	43,064.48
Hydrilla	24.55	31.96	1,057.71	1,621.06	6,262.91	8,998.19
Other Plants	1,064.75	293.35	846.53	1,983.72	8,910.44	13,098.79
TOTAL	1,612.05	546.97	20,322.17	8,547.52	34,132.75	65,161.46
Expenditures	**Northwest**	**Suwannee**	**St. Johns**	**Southwest**	**S. Florida**	**TOTAL**
Floating	$64,850.23	$37,459.43	$1,704,914.35	$657,123.53	$2,651,340.42	$5,115,687.96
Hydrilla	$9,702.48	$30,272.59	$566,438.24	$1,052,871.45	$3,678,302.61	$5,337,587.37
Other Plants	$156,886.08	$68,555.99	$201,934.05	$1,635,599.90	$1,866,816.10	$3,929,792.12
TOTAL	$231,438.79	$136,288.01	$2,473,286.64	$3,345,594.88	$8,196,459.13	$14,383,067.45

within the boundaries of the five water management districts to provide geographical perspective on where plants are controlled in Florida. Table 2 breaks down aquatic plant management expenditures by federal and state funds. Fourteen of the 28 non-native aquatic plant species found in Florida public waters during 2014 are considered to be invasive in that they are capable of causing environmental or economic harm if not managed on a routine basis. Some are widespread like floating plants or hydrilla and are under continuous maintenance. Others are present in only a few locations and are under eradication or containment programs to prevent them from becoming established in Florida waters. Table 3 lists the fourteen invasive aquatic plants found in Florida public waters, summarizing acres controlled and associated control expenditures for Fiscal Year 2013-2014. Acres controlled and expenditures for other non-native plants, native plants and floating islands are combined at the bottom of Table 3.

Waterhyacinth and waterlettuce, two of the world's fastest growing and most invasive plants, covered as much as 125,000 acres of Florida public waters as recently as 1959, and therefore, are the FWC's highest aquatic plant management priorities. Figure 1 shows the ranges in size of the floating plant populations reported in Florida public lakes and rivers in 2014. Although these plants are widespread, found in 249 public waters and covering about 4,600 acres, 84 percent of the individual waterbody populations reported in 2014 covered fewer than ten acres, keeping overall management costs and environmental impacts at low levels.

Figure 2 shows waterhyacinth cover in Florida public waters in approximately ten-year intervals dating from 1947 through 2014 to give an historical perspective of the abundance of this prolific plant species through the decades. The Maintenance Control management philosophy was implemented for floating plants in the early 1970s. Under this management strategy, invasive plants are controlled on a statewide, routine and consistent basis, suppressing them to levels where they do not impair the identified uses or functions of individual waterbodies. Since implementing maintenance control efforts, the overall floating plant population has been reduced from about 125,000 acres in 1959 to a few thousand acres at any one time for the past 35 years. Floating plants were evaluated by

Table 2. Federal and state funds expended during Fiscal Year 2013-2014 to control aquatic plants in Florida public water bodies.

Federal	
Floating Plants	$1,771,157.15
Hydrilla	0
Other Plants	0
Subtotal	**$1,771,157.15**
State	
Floating Plants	$3,344,530.81
Hydrilla	$5,337,587.37
Other Plants	$3,929,792.12
Subtotal	**$12,611,910.30**
Federal + State	
Floating Plants	$5,115,687.96
Hydrilla	$5,337,587.37
Other Plants	$3,929,792.12
Total	**$14,383,067.45**

Table 3. Acres of aquatic plants treated and associated expenditures in Florida public waters during Fiscal Year 2013-2014.

Plant	Acres Treated	Expenditures
Hydrilla	8,998.19	$5,337,587.37
Floating plants	43,064.48	$5,115,687.96
Large-flower primrose	1,049.43	$481,452.82
Cuban club rush	1,614.34	$212,871.79
West Indian marsh grass	365.90	$65,958.03
Torpedograss	564.70	$58,457.05
Giant salvinia	111.75	$37,941.01
Hygrophila	14.01	$10,495.70
Paragrass	24.33	$5,421.53
Wild taro	6.25	$2,826.07
Water spinach	1.40	$283.34
Wetland nightshade	0	0
Napier grass	0	0
Remaining other plants /floating islands	9,346.68	$3,054,084.78
Total	**65,161.46**	**$14,383,067.45**

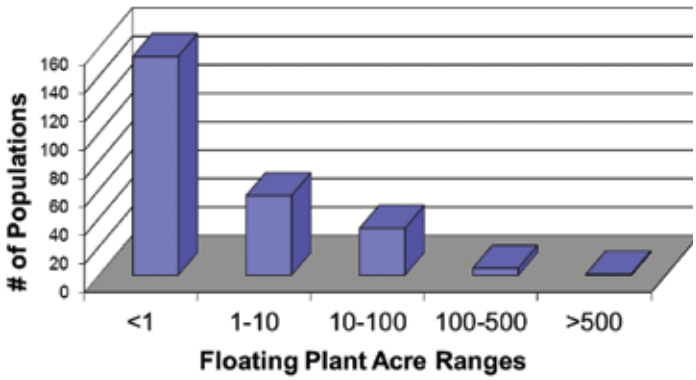


Figure 1. Number of public lakes and rivers in which floating plants were reported in 2014; reported by range of population size.

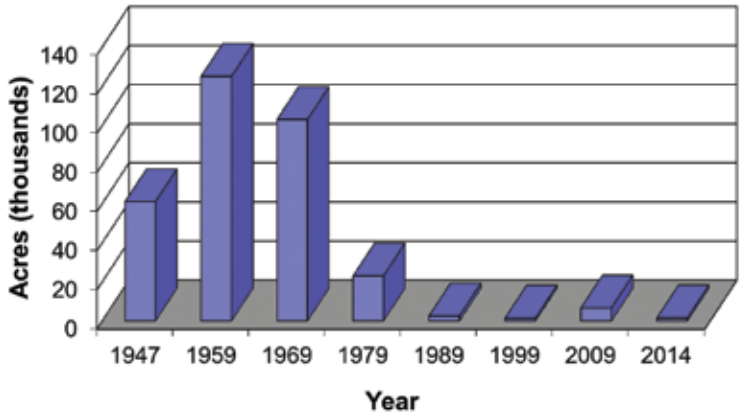


Figure 2. Acres of waterhyacinth reported in Florida public lakes and rivers from 1947-2014.

the FWC to be under maintenance control in 99 percent of Florida's 457 public waters during 2014. Approximately $5.12 million were spent controlling more than 43,000 acres of floating plants in Florida public lakes and rivers during Fiscal Year 2013-2014 (Tables 1-3).

Submersed hydrilla, imported during the 1950s as an aquarium plant, is capable of growing several inches per day, filling the water column and covering the surface of water bodies that are not frequently and routinely managed. Insufficient funding allowed hydrilla to evolve into statewide water and habitat management crises by the mid-1990s, infesting nearly 100,000 acres in 365 (80 percent) of Florida's public lakes and rivers. Figure 3 compares funding for hydrilla control vs. acres of hydrilla inventoried in public waters from 1982-2014. When funding is adequate, hydrilla can be suppressed at low levels. When funding is insufficient, hydrilla expands and forms underground tubers that can persist for many years, representing the potential for immediate regrowth after control, and the need for prolonged higher levels of management funding until these tuber "banks" are depleted.

Sufficient, recurring funding since the late 1990s and improved technology aided by FWC-funded research, enabled FWC contractors to reduce hydrilla to about 21,840 acres in 2014 (Figure 3). However, managers must remain diligent as subterranean tubers are estimated to infest about 60,000 acres and represent the potential for immediate regrowth. The FWC spent $5.34 million treating about 9,000 acres of hydrilla in public waters during Fiscal Year 2013-2014 to conserve the multiple uses of these resources (Tables 1-3). This is $12.2 million less than the peak hydrilla control expenditure in Fiscal Year 2002-2003 (Figure 3). Figure 4 shows acreage ranges for the 185 hydrilla populations that were identified in public lakes and rivers during 2014. Seventy-eight percent of all hydrilla populations observed in 2014 covered fewer than ten acres, and 98 percent of Florida's 457 public waters were considered by the FWC to be under maintenance control in regards to hydrilla. Sixty-one percent of the hydrilla acreage reported during FWC inventories of public lakes and rivers during 2014 occurred in the four lakes of the Kissimmee Chain of Lakes.

At least one of the eleven invasive species, in addition to hydrilla, waterhyacinth, and waterlettuce, was found in 94 percent of Florida's public waters during 2014, collectively covering about 16,160 acres. Nearly $4.0 million were spent controlling about 13,000 acres of aquatic plants other than hydrilla and floating plants during Fiscal Year 2013-2014 (Tables 1-3). Most of the control was for the tussock-forming plants, large-flower primrose willow and Cuban club rush in the Kissimmee Chain of Lakes, floating islands in Tsala Apopka and lyngbya, especially in coastal rivers of Citrus County, to conserve fish and wildlife habitat and recreational uses.

A breakdown of management activities in Florida public waters by waterbody, acres

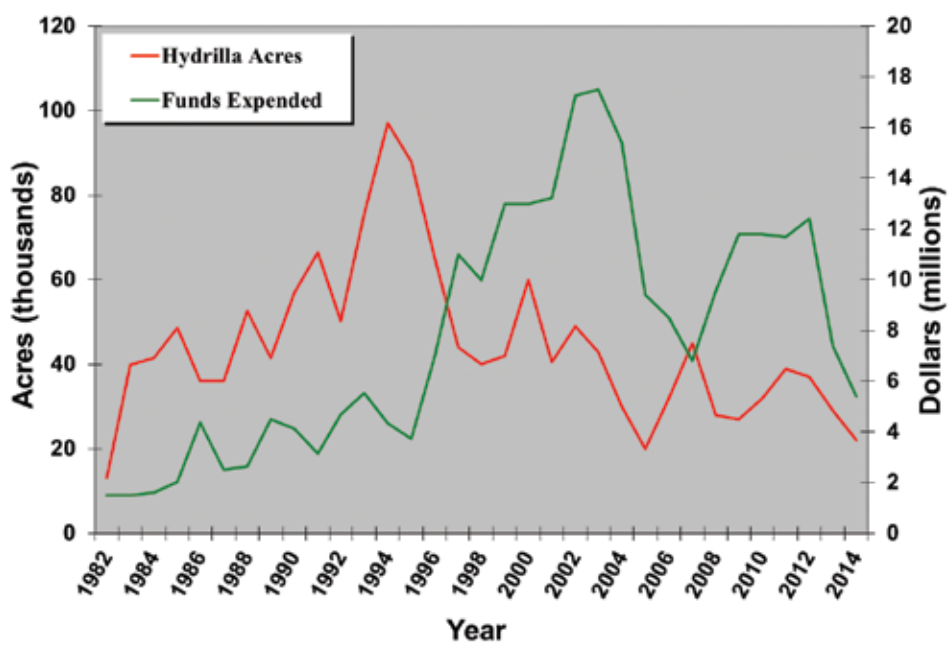


Figure 3. Acres reported and dollars spent managing hydrilla in Florida public lakes and rivers from 1982-2014.

controlled for each plant type, management entity, and management cost funded through the FWC and USACE for Fiscal Year 2013-2014 is available in the full report (FWC Annual Report – Aquatic Plant Control Program (FY 2013-2014) posted on the UF / FWC website at: http://plants.ifas.ufl.edu/manage/developing-management-plans/fwc-annual-reports

NPDES Herbicide Use Obligations and Reporting Requirements

Most of the active aquatic plant control achieved by the FWC is through the application of herbicides registered for use in water by the U.S. Environmental Protection Agency (USEPA) and the Florida Department of Agriculture and Consumer Services (FDACS). The FWC authorizes herbicide use for aquatic plant control under coverage of Generic Permit #FLG510039-IWPG issued by the Florida Department of Environmental Protection pursuant to National Pollutant Discharge Elimination System (NPDES) regulations. The Generic Permit requires entities responsible for applying herbicides to waters of the U.S. to take measures to reduce herbicide use. The FWC meets this obligation by integrating non-chemical technologies (especially biological controls) where possible, under maintenance control programs to keep invasive and nuisance plants under control in Florida public waters.

Since 1970, the State of Florida has spent nearly $20 million funding about 151 research projects for non-herbicide plant control. Subjects include biological controls (including grass carp), ecology, mechanical control, plant physiology, prevention and surveillance. An additional $3.5 million have funded 12 programs to improve aquatic and invasive plant management education and outreach efforts. Nearly $3.2 million have been directed to 58 research projects to enhance herbicide cost-effectiveness and selectivity to conserve non-target plant and animal species. Sterile grass carp are now stocked in more than 100 Florida public lakes at low rates, reducing herbicide use to occasional spot or small applications in those systems to keep hydrilla under control. Nearly all of Florida's public lakes and rivers are under maintenance control in regards to invasive hydrilla and floating aquatic plants. The FWC continues to meet management objectives for these species while reducing overall control expenditures and herbicide use.

Aquatic Herbicide Use for 2014

There are fifteen classes of chemical herbicide compounds registered by the USEPA and the FDACS for use in Florida waters to manage aquatic plants during 2014. These compounds are formulated and sold under numerous trade names. They are applied directly to the target plant or dispersed within the water for the purpose of managing aquatic plants to conserve the uses or functions of the waterbody. In most cases, the USEPA label lists pounds of active ingredient (a.i.) contained in each gallon of liquid formulation or a percent of the weight of solid formulation herbicides. However, most imazapyr, triclopyr, and 2,4-D labels provide the amount of acid equivalent (a.e.) available for the compound. Most USEPA labels for copper compounds provide only the amount of elemental copper (el) contained in the product. Therefore, the active component of these compounds applied to Florida waters during 2014 is listed in pounds of acid equivalent or pounds of elemental copper.

Table 4 summarizes the amount of herbicide active component applied to Florida public waters under the Cooperative Program during 2014. The total amount of each herbicide active component applied to individual public waters authorized by the FWC under the Cooperative Program in 2014 is itemized by waterbody, plant type controlled, management entity, and herbicide registration number in the full report (Annual Report of Pollutant Discharges to the Surface Waters of the State from the Application of Pesticides – 2014) posted on the UF/FWC website. The Generic Permit requires that any adverse incident related to herbicide applications be reported and corrective actions be taken to resolve problems and prevent future occurrences. There were no adverse incidents to report related to pesticide applications for aquatic plant control operations funded by FWC in 2014 and therefore, no corrective actions were necessary.

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

Herbicide Class	Lbs. Active Applied
2, 4-D	14,138.29
Bispyribac	40.00
Carfentrazone	8.71
Copper Chelate	948.00
Diquat	47,831.73
Endothall	206,696.96
Flumioxazin	1,497.94
Fluridone	381.30
Glyphosate	43,409.17
Imazamox	284.78
Imazapyr	3,668.55
Penoxsulam	905.75
Peroxide	76.50
Topramezone	30.21
Triclopyr	59.81

Table 4. Summary of pesticide active component applied by FWC contractors to Florida waters during 2014.

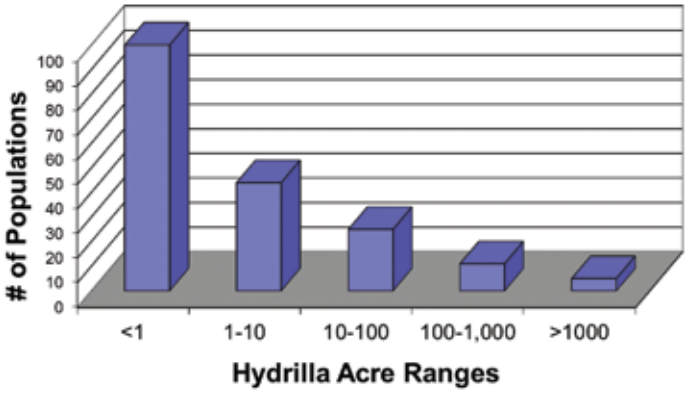


Figure 4. Number of public lakes and rivers in which hydrilla was reported in 2014 reported by range of population size.

UF/IFAS Assessment of Non-Native Plants Launches an Interactive Website

by Deah Lieurance and S. Luke Flory

Discussion of non-native invasive plants in the southeastern United States is often focused on heavy-hitters like waterhyacinth (*Eichhornia crassipes*), kudzu (*Pueraria montana)* and melaleuca (*Melaleuca quinquenervia*). Many of these species are regulated and their ecological impacts are well known. The Florida Exotic Pest Plant Council lists 76 species as Category I invasive plant species present in the state and causing ecological damage (FLEPPC 2014). However, it is estimated there are approximately 1,400 non-native plant species in Florida, with 124 species currently present in state parks (FLEPPC 2014). Are these species problematic but less widely researched or publicized? Are they non-threatening? Or will they be a problem in the future? Given the limited resources available for monitoring and removal efforts for invasive plants, it is a top priority to identify those species that are safe to use in landscapes and gardens and those that should be regulated, monitored for escape, or targeted for removal.

The UF/IFAS Assessment of Non-Native Plants in Florida's Natural Areas (UF/IFAS Assessment) was developed in the late 1990s by the UF/IFAS Invasive Plant Working Group to provide objective, data-driven recommendations for the use of non-native plants in the state and to help identify problem species before they cause ecological damage and become costly for land managers. Initially, the UF/IFAS Assessment was used as an internal tool to provide information to IFAS faculty and staff on the potential use of non-native plant species. In the years since its creation, the UF/IFAS Assessment has become a valuable resource extending beyond university personnel. Master gardeners, homeowners, professional landscapers and the Florida Department of Agriculture and Consumer Services also regularly consult the UF/IFAS Assessment for guidance on what should be recommended for planting and what should not.

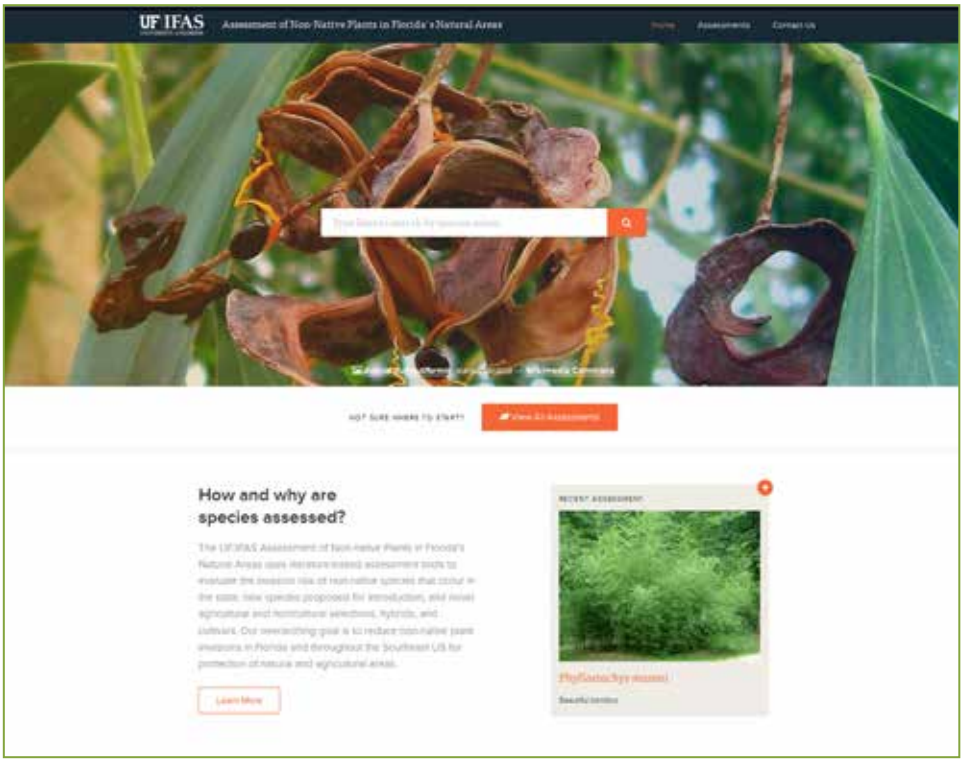


Figure 1. Home page for the UF/IFAS Assessment's new interactive website at http://assessment.ifas.ufl.edu

The UF/IFAS Assessment utilizes three tools to evaluate non-native species: the Status Assessment for species already present in the state, the Predictive Tool for species proposed for introduction (or for a new use such as biomass planting) and the Infraspecific Taxon Protocol for cultivars, varieties, hybrids or subspecies of non-native, invasive species found in Florida (see http://edis.ifas.ufl.edu/ag376 for more information on the specifics of these tools). Of the 850+ species evaluated thus far, approximately 70% have been designated as safe for use in the state. Many of these species are sold by the horticulture industry and add to the state economy. A "not a problem" from the UF/IFAS Assessment provides some confidence that the species will not become a problem in the future.

The UF/IFAS Assessment takes a different approach than the Florida Exotic Pest Plant Council (FLEPPC) plant listing process. Instead of focusing on species thought to cause immediate or impending ecological harm (a so-called "black list"), the UF/IFAS Assessment provides results for all non-native species, including those safe for planting (a "white list"). In addition, UF/IFAS Assessment protocols incorporate economic and geographic data for each species evaluated. The results are compiled in a comprehensive database that identifies problematic species that should not be planted (Conclusion=invasive), species that should be monitored for invasive characteristics (Conclusion=evaluate further), and species that are not predicted to be a problem and are safe to plant (Conclusion=not a problem species).

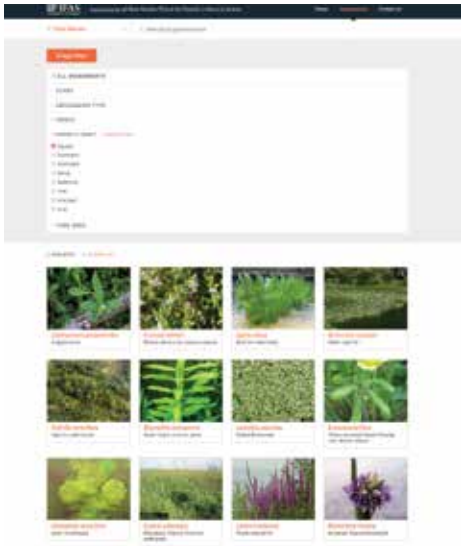


Figure 2. View of the assessment tab where users can filter through the 850+ species by conclusion type, origin, growth habit, etc. Here the species are filtered by growth habit: aquatic.

In November 2014 the UF/IFAS Assessment launched an interactive, searchable website and database (Figure 1) to help people determine whether that non-native plant in their backyard should be removed or not. Results in the database are specific to the north, central, and south regions (or zones) of the state. The database can be filtered by zone, conclusion type, origin, growth habit, and evaluation method (Figure 2). For example, a simple search can tell you what aquatic plants to avoid in south Florida or which grasses originating from temperate regions in Asia are acceptable to plant in central Florida (Figure 3). Over 1500 images were added to the database, as well as relevant links to the USDA Plants Database, EDDMapS, and the UF/IFAS Center for Aquatic and Invasive Plants. Additionally, the site is mobile-friendly, meaning it can be readily accessed on smartphones and tablets. UF/IFAS Assessment staff are actively identifying and evaluating additional potentially problematic non-native species. As well, species are regularly re-evaluated to account for changes in their status in the state. New species entries and changes to the current recommendations are updated regularly in the database so users have access to the most current information.

Development of the web site and database was made possible by a unique partnership between UF/IFAS, the Florida Fish and Wildlife Conservation Commission, and the Florida Department of Agriculture and Consumer Services, demonstrating how land grant universities can work with agencies to benefit the state. Everyone from weekend gardeners to professional landscapers to UF faculty and staff can rely on the recommendations of the UF/IFAS Assessment team when considering the use of non-native plants. The new IFAS Assessment web site provides one more tool for Floridians to manage and conserve our valuable natural resources by helping to prevent further non-native plant invasions. Find your plant at http://assessment.ifas.ufl.edu!

References

Florida Exotic Pest Plant Council (FLEPPC). 2014. Florida EPPC's 2013 Invasive Plant Species List. Online at http://www.fleppc.org/list/list.htm

Dr. Deah Lieurance (dmlieurance@ufl.edu) is the Coordinator for the UF/IFAS Assessment of Non-Native Plants and Dr. Luke Flory (flory@ufl.edu) is an Assistant Professor of Agronomy at the University of Florida in Gainesville.

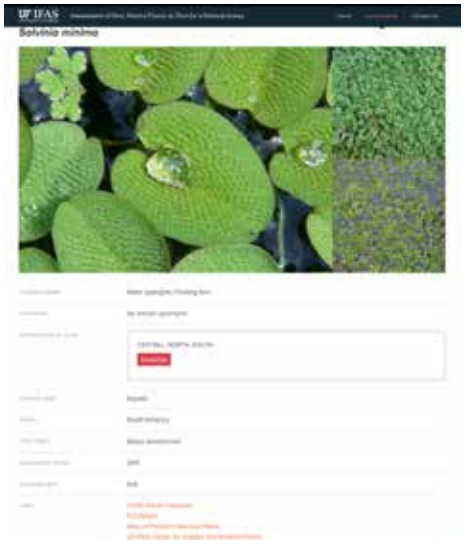
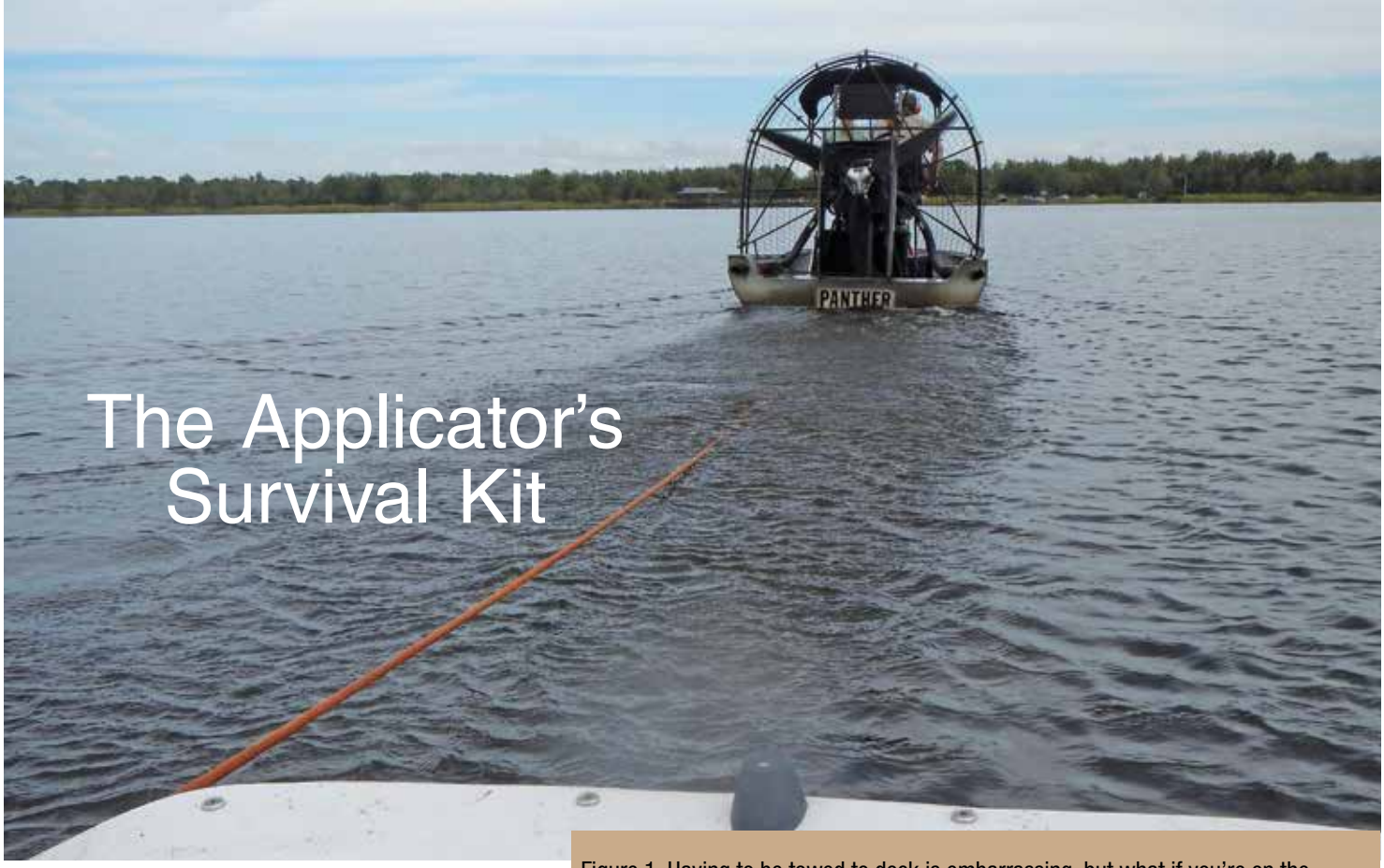


Figure 3. Species page with conclusions for *Salvinia minima* determined to be invasive and not suitable for planting in all zones of Florida. Other information provided includes growth habit, origin, the tool used to evaluate, when assessed, and links to USDA Plants database, EDDMapS, Atlas of Florida's Vascular Plants, and the UF/IFAS Center for Aquatic and Invasive Plants.



The Applicator's Survival Kit

Figure 1. Having to be towed to dock is embarrassing, but what if you're on the water alone with nobody to rescue you? Photo courtesy Lyn Gettys, UF/IFAS.

by Stephen Montgomery

Let's face it – being an applicator is a multi-task job. It requires us to be part biologist, part salesperson, part public relations person, part chemist and part handyman/mechanic. With so many responsibilities, things don't always run as smoothly as we'd like. There are a lot of delays we have no control over like weather, traffic or dealing with homeowners. All too often the most time-consuming and costly delays are things that could be easily rectified with a little preparation. Equipment failure is an eventuality that we all deal with sooner or later. There's nothing more aggravating than having an operation brought to a screeching halt halfway through the day and realizing you don't have the means to correct it. Even though it's impossible to prepare for every situation, a well-stocked "survival kit" can head off many of the headaches that can ruin a productive day. Think about equipment problems you and other colleagues have encountered in the past and try to build up an inventory of tools, spare parts and other items. The time spent stocking up is a lot better than the time spent in the middle of a lake in a boat with a dead motor or a leaking spray system on a hot summer day two hours before quitting time. Each applicator's kit is obviously tailored for his or her specific needs (and that's particularly true about spare parts), but here are a few items that some of my fellow applicators carry:

Necessity may be the mother of invention, but an applicator in a pinch may very well be the most ingenious thing on earth. Some items can be useful in ways other than their intended purpose. I've heard of some truly MacGyver-like fixes to get out of a jam over the years, such as pieces of PVC used as bridges to bypass a section of dry rotted hose and layers of rubber glove under a hose clamp to stop a leaking line. I've even used window spline wrapped in duct tape as a temporary gasket. None of these ideas are permanent fixes, of course, but they can work long enough to finish a job or may keep a small mess from becoming a big one. Forethought and preparation are key elements to overcoming the day-to-day operational headaches of our profession. The closest hardware store may as well be a million miles away once you're out on the water and a problem occurs. A small investment of time in advance could pay big dividends down the road.

Steve "Monty" Montgomery (smontgomery@allstatemanagement.com) is a senior biologist at Allstate Resource Management in Davie.

Spare spark plugs	Spray tips and stabilizers	Extra O-rings
Lug wrench	Spare motor recoil	Hose clamps
Extra fuses	Trailer hub and bearings	Winch crank
Tow strap	Extra hose	Lubricants
PVC pipe scrapst	Spare winch cable	Wire ties
Rope	Spare prop	Extra cotter pins
Flashlight	Rubber gloves	Spare valves
Duct tape	Basic tool kit	2x4 pieces

Improving Communication and Cooperation Among Aquatic Professional Societies

by Mark V. Hoyer, Terry McNabb, Mike Allen and Michael D. Netherland

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

Introduction on the Overlap among Three International Aquatic Professional Societies: NALMS, AFS, APMS (Mark Hoyer, NALMS President 2010)

Improving Communication between All Lake Management Interests, the NALMS Perspective (Terry McNabb, NALMS President 2013 and APMS President 1997)

Benefits of Cooperation between Aquatic Professional Societies: AFS, NALMS, and APMS (Mike Allen, AFS Representative)

Common Interests That Link the Aquatic Plant Management Society with NALMS and AFS (Michael Netherland, Immediate Past President of APMS)

Mark Hoyer started the session by showing how the mission statements of each society use different language but the primary action statements (AFS: "Conservation and Sustainability", NALMS: "Management and Protection", APMS: "Environmental Stewardship") point to a shared goal of protecting natural resources now and into the future. An analysis of publications was performed by searching eight key words from the last five years in each Society's peer-reviewed journal using Thomson Reuters Web of Science. While there was considerable overlap among the journal articles, there was also significant specialization (Table 1). The amount of overlap shows abundant common interest, while the areas of specialization demonstrate that each society could help the other with specific management expertise.

Mark also pointed out that each society has a magazine (AFS *Fisheries*, NALMS *LakeLine*, and the Florida chapter of APMS has *Aquatics*, which is distributed to all APMS members). The magazines contain general information on the current activities of each society along with professional articles on aquatic resource management and research that would be of interest to all groups. Each of these magazines exists in an electronic format that, with little or no expense, could easily be shared among the three societies, vastly increasing information exchange among the three memberships.

	AFS	NALMS	APMS
Key Words	Percent of Total Papers		
Fish	**81**	8	6
Habitat	**40**	13	10
Aquatic Vegetation	3	3	**14**
Water Quality	5	**45**	1
Phosphorus	1	**21**	7
Nitrogen	2	**14**	7
Oxygen	5	5	**2**
Herbicide	0.1	0.5	**37**

Figure 1. Percentage of all publications for the last five years (January 2009 to December 2014) found using eight key words and THOMSON REUTERS Web of Science in each society's peer-reviewed journal. Bold print indicates the largest percentage within a journal.

Terry McNabb focused his presentation

on the overlap of the three societies and how information from each one helps him in the management efforts he puts forth on a daily basis as a business owner. He feels all three societies do a good job promoting the management of aquatic resources; however, much more could be accomplished by better communications among them using each society's strengths toward the common goal of protecting natural resources.

Terry pointed out that toxic algae (e.g., golden algae, *Prymnesium parvum*) is becoming more important to aquatic plant managers, while also impacting fish populations on a large scale (VanLandeghem et al. 2013). Both APMS and AFS have little expertise in toxic algae and could benefit from the experience of NALMS in this area. For more than a decade, NALMS has worked with and hosted multiple Blue Green Algae Initiatives (http://www.nalms.org/home/programs/blue-green-algae-initiative/blue-green-algae.cmsx).

Mike Allen suggested that developing stronger ties with related professional organizations that focus on lake management and aquatic habitats could provide better education for all members, more shared science among our sub-disciplines and better understanding of the full range of tools available for improving fishery resources. He suggested a few opportunities and mechanisms for improving collaboration among societies, including:

- Holding special symposia and/or joint chapter meetings that can focus professionals, especially at the local level, on pertinent resource management issues of common interest. Holding joint meetings of the national societies would be impossible due to logistical issues; however, NALMS has 14 state affiliate groups. (http://www.nalms.org/home/members/affiliate-members/nalms-affiliate-members.cmsx), APMS has 6 regional chapters (http://apms.org/regional-chapters/) and AFS has four divisions and 44 chapters (http://fisheries.org/units/units) that show considerable geographical overlap where it might be possible.
- Membership for all three societies is static or declining and it is hard for individuals to be members of all three. Explore the potential to bundle memberships, such that total membership of all three societies could improve.

Mike Netherland pointed out that all issues related to the management of aquatic plants, and especially the spread of invasive aquatic plants, is of great importance to all three societies. From his experience, the most common concerns expressed by NALMS and AFS members regarding organized aquatic plant management programs revolves around the following:

- Controlling too much vegetation
- Impact to non-target native vegetation
- Loss of habitat for fish
- Potential for managed lakes to switch from macrophytes to algae-dominated systems

The APMS feels that improved communication between these three societies could help facilitate meaningful dialogue that would allow aquatic managers and researchers to better understand and address the concerns expressed above. Increasing linkages among APMS, NALMS and AFS members would insure broader perspectives when addressing aquatic invasive plant issues.

Approximately 70 individuals enthusiastically participated in the discussion that followed the presentations. The one resounding consensus was that all three societies would benefit from increased communication. Many suggestions on how to make this happen were discussed – some easier to accomplish than others. Here we list some of these ideas, both the easy and the more difficult, that could be accomplished if the Executive Boards of each society agree and work together. We recommend one Executive Board member from each society establish some form of regular communication together (e.g. conference calls) and report back to their respective boards.

Some of the "easier to accomplish" ideas that need to be discussed and hopefully approved by each Executive Board are as follows:

- Each society should provide space in their respective magazines (*Fisheries, LakeLine* and *Aquatics*) for editorial articles from the leadership of the other societies. This would be easily accomplished as presidents from AFS and NALMS already write an article for their respective magazines that could be adjusted for the other societies' magazines and it would be a good idea for the APMS president to start. This simple task would give members information on the current status and, to some extent, direction of the other societies that may be of interest.
- The web sites of each society should have direct links to those of the other societies.
- Many individuals cannot travel to more than one meeting per year due to money and time limitations. Therefore, each society should organize and sponsor a core information session at the annual meetings of the other societies (e.g., APMS could hold an aquatic invasive plant control session at the NALMS and AFS annual conferences). This would allow multiple concentrations of information at each annual meeting and add areas of information that are generally not available.

Some of the more innovative suggestions to increase communication among societies are as follows:

Membership for all three societies is static or declining and it is hard for individuals to be members of all three. Members are looking for more value in a membership, so we should explore the idea of bundling memberships so all three societies can benefit by their collective members while increasing communication.

Currently AFS and NALMS use Taylor and Francis for publishing their professional journals. AFS also uses them for publishing the *Fisheries* magazine. If NALMS and APMS would work toward using Taylor

and Francis to publish their journal and magazine, it could be easier to share professional information. All three magazines are provided in an electronic format, so sharing would be with little or no cost.

It would be difficult to hold shared national society conferences due to timing of meetings and size. However, joint meetings with state chapters could be feasible and beneficial. Encourage regional and state chapters of each society to collaborate.

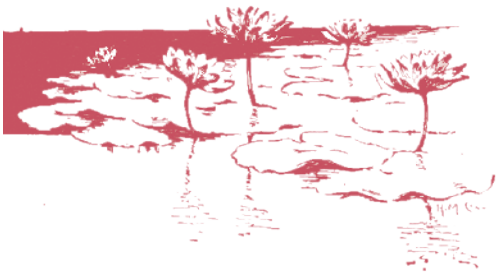
Many other suggestions were made during the discussion for increasing communications among societies. However, the ideas listed above are a good start for increased dialogue. Now each society's membership needs to communicate their desire to move forward with this initiative to their respective Executive Boards.

Literature

VanLandeghem MM, M Farooqi, B Farquhar and R Patino. 2013. Impacts of golden alga *Prymnesium parvum* on fish populations in reservoirs of the Colorado River and Brazos River Basins, Texas. Transactions of the American Fisheries Society 142:581-595.

About the authors:

Mark Hoyer (past president of NALMS; mvhoyer@ufl.edu) is the Director of Florida LAKEWATCH in Fisheries and Aquatic Sciences at the University of Florida. ***Terry McNabb*** (past president of APMS and NALMS; tmcnabb@aquatechnex.com) manages Aquatechnex, LLC, a lake and aquatic plant management firm that operates in the Western United States. ***Dr. Mike Allen*** (president of Southern Division AFS; msal@ufl.edu) is a professor of fisheries and aquatic sciences at the University of Florida whose research program evaluates fish population and fish community responses to changes in fish mortality, habitat and species interactions. ***Dr. Michael Netherland*** (past president of APMS; mdnether@ufl.edu) is a research biologist with the U.S. Army Engineer Research and Development Center and is stationed at the University of Florida Center for Aquatic and Invasive Plants in Gainesville.



Aquavine

2015 Florida Aquatic Weed Control Short Course

The 2015 University of Florida IFAS Aquatic Weed Short Course will take place on May 4 through 7 in Coral Springs, Florida. The Short Course features leading experts in aquatic and upland vegetation management and is designed to benefit those new to the industry as well as experienced professionals seeking a comprehensive update. Looking to become certified in the State of Florida? This is the course for you. Looking for CEUs? They've got you covered. The University of Florida has put on this course for nearly half a century, so register now to take advantage of some of the best instruction available. For more information on registration, the agenda or hotel reservations, visit http://www.conference.ifas.ufl.edu/aw

Present at FSHS, publish with ASHS!

The Florida State Horticultural Society is holding its annual meeting on May 31 through June 2 at the Renaissance World Golf Village Resort in St. Augustine, Florida. A Natural Resources section was added several years ago and is a great venue to present information on the biology, ecology and management of plants in aquatic and upland ecosystems. All papers presented during the meeting will be published in the 2015 FSHS Proceedings and may be co-published in one of the prestigious ASHS journals – HortScience or HortTechnology – as well. For more information about the meeting, visit www.fshs.org; abstracts and titles are due March 13, 2015 and should be emailed to FSHS Natural Resources Section VP Lyn Gettys (lgettys@ufl.edu).

SCAPMS Student Scholarship Now Available

The South Carolina Aquatic Plant Management Society is seeking applications for its annual Phillip M. Fields Scholarship Award. The society intends to award a $3,000 scholarship to the successful applicant in Summer 2015 at the APMS annual meeting in Myrtle Beach, SC. Eligible applicants must be enrolled full time at an accredited college or university in the United States. Course work or research in an area related to the biology, ecology or management of aquatic plants in the Southeast is also required. Applications must be received no later than May 1, 2015 and will be evaluated on the basis of relevant test scores (ACT, SAT, GRE, etc.), college grades, quality and relevance of coursework or research, a proposed budget, information obtained from references and other related considerations. Application forms and additional information are available at www.scamps.org/scholarship.html

2015 APMS Annual Meeting – Myrtle Beach, SC

The 2015 meeting of the Aquatic Plant Management Society will be held July 12 through 15 at the Hilton Myrtle Beach Oceanfront Resort in Myrtle Beach, South Carolina. The meeting will be held in conjunction with the annual meeting of the South Carolina Aquatic Plant Management Society. The meeting promises to showcase a great deal of new research and will be highlighted by events such as the annual duck race, golf tournament, fishing tournament and MORE! Visit www.apms.org for more information on registration and setting up accommodations. We look forward to seeing you all in July!

2015 ASHS Annual Conference – New Orleans, LA

The American Society for Horticultural Science is holding its annual meeting on August 4 through 7 at the Sheraton New Orleans in New Orleans, Louisiana. The Invasive Plants Research Working Group is hosting a regular session, a poster session and a professional tour of the swamps of Louisiana to see what happens when horti-

cultural plants such as waterhyacinth escape cultivation and become invasive in aquatic systems. Abstracts should be submitted online at the ASHS website (www.ashs.org) by March 15; be sure to select the "Invasive Plants Research" category when submitting your abstract. See you in New Orleans!

14th International Symposium on Aquatic Plants

Looking to travel abroad in 2015? Why not head to the 14th International Symposium on Aquatic Plants, September 14 through 18 in Edinburgh, Scotland? The meeting will be held in the beautiful Playfair Library of Edinburgh, the historic capital of Scotland. Interest in aquatic plants and their management has spread worldwide and the ISAP program will reflect just that. This program is intended to appeal to both scientists and managers alike. For more information, visit https://sites.google.com/site/aquaticplants2015

39th Annual FAPMS Conference

It is NEVER too early to start thinking about attending the 2015 Florida Aquatic Plant Management Society Conference, which will be held October 5 through 8 at the Buena Vista Palace Hotel and Spa in Lake Buena Vista, Florida. As always, this year's conference will bring you up to speed on the best in research and management of aquatic plants in Florida and beyond. Stay tuned for more about the FAPMS meeting in Aquatic Magazine or visit www.fapms.org for updates.

*The plant on the front cover of this issue of *Aquatics* is rotala (*Rotala rotundifolia*). Native to Asia, this weed was introduced through the aquarium and water garden industries and escaped cultivation in the 1990s. For more information about rotala, check out the fact sheet describing rotala at edis.ifas.ufl.edu/ag381

Dr. Brett Hartis (bmhartis@tva.gov) is Program Manager of the Tennessee Valley Authorities' Aquatic Plant Management Program and is located in Guntersville, AL.

Calendar of Events 2015

March 30 – April 1
Western Aquatic Plant Management Society 34th Annual Conference
Portland OR
wapms.org/

May 4 – 7
UF/IFAS Aquatic Weed Control Short Course
Coral Springs FL
www.conference.ifas.ufl.edu/aw/

April 8 – 10
Florida Exotic Pest Plant Council Annual Symposium
Melbourne FL
fleppc.org/

April 15 – 17
Florida Vegetation Management Association Annual Conference and Trade Show
Daytona Beach FL
www.myfvma.org/conference

May 31 – June 2
Florida State Horticultural Society 128th Annual Meeting – ***now with a Natural Resources Section!***
St. Augustine FL
fshs.org/

June 8 – 11
Florida Lake Management Society 26th Annual Technical Symposium
Naples FL
flms.net

July 12 – 15
Aquatic Plant Management Society 55th Annual Meeting
Myrtle Beach SC
apms.org

August 4 – 7
American Society for Horticultural Sciences
New Orleans LA
ashs.org

August 16 – 20
American Fisheries Society 145th Annual Meeting
Portland OR
2015.fisheries.org/

September 14 – 18
Aquatic Plants 2015: 14th International Symposium on Aquatic Plants
Edinburgh Scotland
sites.google.com/site/aquaticplants2015/

October 5 – 8
Florida Aquatic Plant Management Society 39th Annual Conference
Lake Buena Vista FL
www.fapms.org

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

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

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Florida Aquatic Plant Management Society
FAPMS
Established in 1976

More information and the application packet are online at www.fapms.org/myers_scholar.html or contact Keshav Setaram at 407-891-3562