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COVER: Dr. Bill Haller gives participants a first hand look at hydrilla during a field trip.

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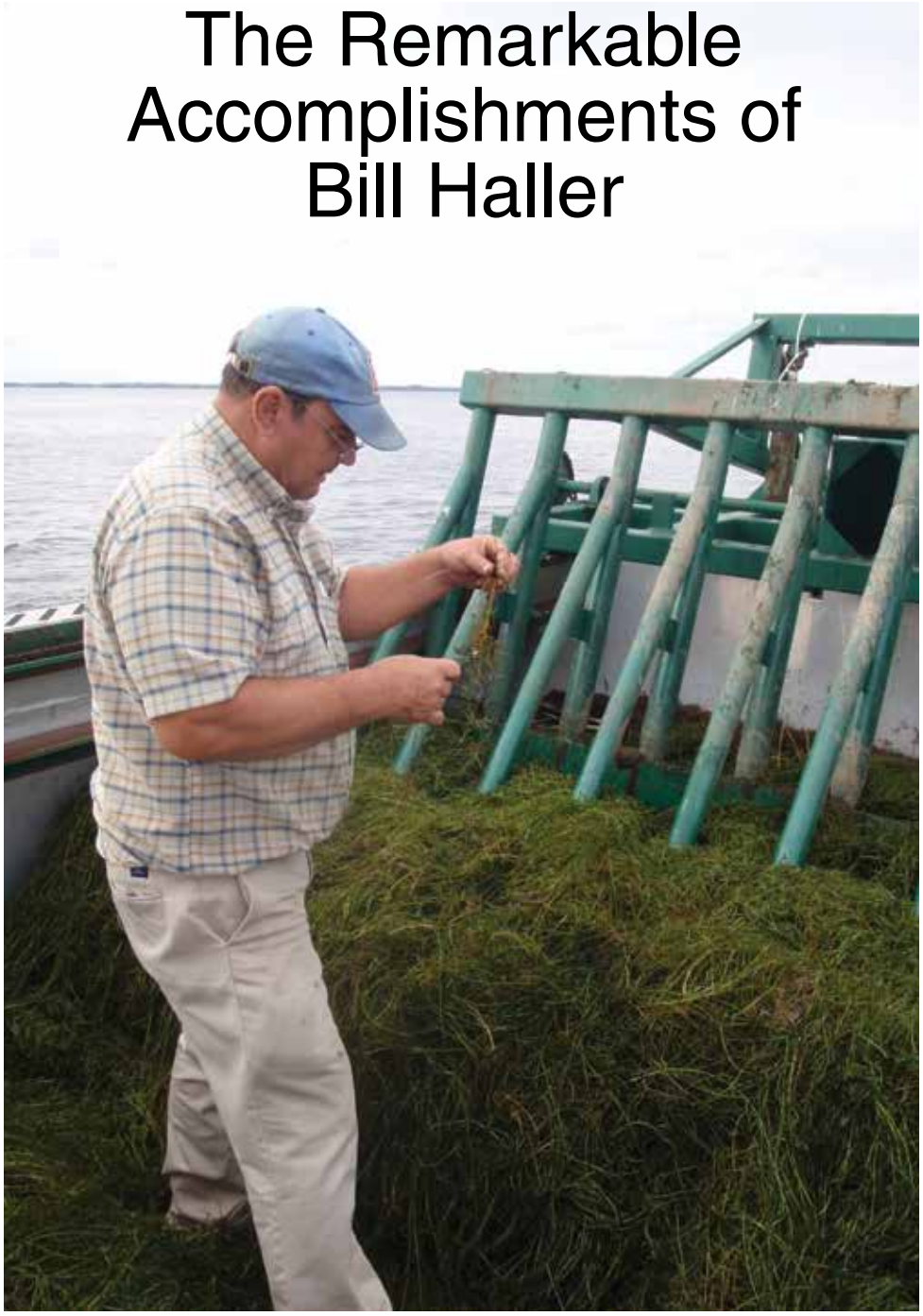
The Remarkable Accomplishments of Bill Haller



Bill Haller examines hydrilla on a large harvester.

By Karen Brown

The King of Thailand! No, not Bill Haller — he was obviously never the King of Thailand — but his international work and reputation landed him in a meeting with King Bhumibol, the King of Thailand, in 1983. Not many people can claim that distinction.

Bill Haller has done it all. I worked with him for 30 years at the University of Florida/IFAS Center for Aquatic and Invasive Plants (CAIP) but it took me a while to realize what an icon he is in this industry. First of all, he frequently looks like a heavy equipment operator when working at the CAIP due to his research activities (and his love of heavy equipment). Newcomers often have been amazed to learn that "*that* was Dr. Haller" when he passed by in a mud-stained tee shirt, leaving a trail of mud puddles behind. But he cleans up pretty well and has had an amazing career

spanning over 40 years in aquatic weed management research. Whether you know him as Bill, Dr. Haller, or just plain Haller, if you're in this business, you know him or you know *of* him. Following is a brief survey of his activities leading up to his retirement in May of 2018. He's still doing research and going to the office most days, though. As Professor Emeritus, he can and will work as long as he likes but now he's only tasked with doing the things he really likes. I can tell you that water and weeds will be involved.

After getting his Bachelor of Science degree in Agronomy from Cornell University, Bill Haller came to the University of Florida in the early 1970s to obtain his Master of Science and PhD degrees. His thesis was titled "Herbicide Evaluation and Phosphorus Uptake by Hydrilla and Milfoil" and his dissertation title was "Photosynthetic Characteristics of Three Submersed Aquatic Plants." He was hired by UF immediately after finishing his PhD, and was already generating more grant support than many established professors!

Dr. Haller served as Acting Director of the Center for Aquatic Plants (later the Center for Aquatic and Invasive Plants) on and off for a total of 13 years – the last stint running from 2007-2017 when Dr. Jay Ferrell was hired as Director.

Dr. Haller was the major professor (Committee Chair) for 9 PhD students including Drs. Brett Bultemeier, Joe Joyce, Tyler Koschnick, Ken Langeland, Chris Mudge and Mike Netherland – all highly respected individuals in aquatic plant management circles. He has been a committee member for 7 PhD students including Drs. Greg MacDonald, Russell Theriot and Jeff Hutchinson. All of these people went on to pursue successful careers in aquatic weed research and management in academia, at federal agencies and the corporate world. Dr. Haller was also the major professor for 6 Master of Science students including Dan Thayer, Sue Newman, Bill Spencer, Jan Miller, and Jon Gosselin, all of whom have had careers in aquatic weed management. And, finally, he has been a member of Master of Science (MS) degree committees for 22 students, most of whom went on to pursue aquatic weed or related natural resource management careers. What this tells me is Bill Haller not only guided these students through their academic programs, he infused them with his passion for aquatic weed management. During his career, he also hosted several post-doctoral associates and visiting scientists from around the world including Japan, England, Yugoslavia, Iran, India, Sudan, Egypt and Vietnam.

Dr. Haller has been a prolific author, co-author and editor. He co-authored *The Impact of Aquatic Plants and Their Management Techniques on the Aquatic Resources of the U.S.: An Overview* for the U.S. Environmental Protection Agency (USEPA) with Drs. Jerome Shireman and Daniel Canfield. He co-wrote the very interesting monograph, *History and Development of Aquatic Weed Control in the United States* with Mr. John Gallagher for *Reviews of Weed Science*, Weed Science Society of America. He has edited and contributed chapters to books, authored and co-authored numerous refereed scientific publications, technical reports and articles for popular/trade magazines. He has also authored or co-authored major project completion and annual reports to federal agencies such as the U.S. Army Corps of Engineers, the U.S. Department of Agriculture, and the USEPA. According to one expert, these reports provided science-based guidance for operational management of nuisance

Excerpted from the June 2018 newsletter of the Aquatic Plant Management Society

Friends and colleagues gathered at the CAIP on April 18 to celebrate Dr. Haller's 48 years of study and service to aquatic plant management. Dr. Haller will be relinquishing his teaching duties after this fall. He is not fully retiring and will stay on at the CAIP devoting time to his greenhouse and field studies. Bill started with UF in 1969 as a graduate student, and soon thereafter became interested in hydrilla and water hyacinth management. Bill conducted much of the original work on hydrilla physiology to understand why it is so invasive and to target weaknesses in its life cycle to keep it under control in Florida waters. He is still active in developing additional tools and strategies for controlling hydrilla. His research screening chemical compounds ultimately lead to several new EPA herbicide registrations for hydrilla management as well as applications to control other invasive plants. He is recognized as a state, national, and international authority in evaluating aquatic plant problems, and designing and implementing cost-effective, environmentally sound management programs.

Bill Haller's research and outreach efforts have shaped [and will continue to shape - Kurt Getsinger] Florida's approach to aquatic plant management for decades. He has provided insight to regulatory policy makers, environmental advocacy groups, and waterfront property associations; explaining the complex science of invasive plant control in understandable terms. Along the way, Bill introduced hundreds of undergraduate students to Florida waters and invasive plant issues in his course, Aquatic Weed Control [taught every other year since 1978 - Ed.] He has graduated approximately 50 students with Master of Science degrees, and 10 PhD candidates.

Bill Haller is also the longest serving member on the Aquatic Plant Management Society Board of Directors, serving as Editor of the *Journal of Aquatic Plant Management* from 1978 through 1997, and as a Director from 1997-2000.

Bill Haller – not afraid to get wet.

aquatic vegetation in public waterways across the nation.

Regarding professional societies, Bill Haller's service has been significant. He served as the Scientific Advisory Committee chair for the Aquatic Ecosystem Restoration Foundation and served for almost two decades on their Technical Advisory Committee. He served in six different capacities for the Aquatic Plant Management Society (APMS) including almost two decades on the Board of Directors and as Editor of the *Journal of Aquatic Plant Management*. He is a charter member of the Florida Aquatic Plant Management Society (FAPMS) and served as president from 1979-1980. He was president of the Florida Weed Science Society and has served on the board of the Southern Weed Science Society. He has served as director, vice-president and president of the William L. Maier Scholarship Foundation, Inc.

Dr. Haller spent a significant portion of his early career working in international activities and is known around the world. For example, in 1977, he assisted and lectured at a U.S. Agency for International Development (USAID) sponsored aquatic plant utilization and control short course in Thailand. From there he visited rivers in Taiwan, Japan, and the Philippines to survey sites of natural spawning of the grass carp. The potential for grass carp reproduction in Florida was a major controversy at that time.

In 1979, he was an invited participant on a National Academy of Science panel to evaluate and organize a conference on "Aquatic Weed Problems in the Gezira Irrigation Scheme in the Sudan." The panel spent three weeks in and around the irrigation scheme evaluating and conferring with Sudanese counterparts on aquatic plant ecology, teaching, extension and control. En route to Khartoum, they stopped in Cairo where a meeting was arranged by the Agricultural Attaché with Egyptian Irrigation and Fisheries Ministry staff regarding their aquatic weed problems and research on the grass carp.

In 1982, again at the request of USAID, Dr. Dale Habeck and Dr. Haller conducted an aquatic weed survey and assessment across the entire island of Java, Indonesia. They journeyed to Chang Mai, Thailand to attend the USAID International Plant Protection Center (IPPC) sponsored conference on *Mimosa pigra* control. On his way home, he visited scientists to learn about potential U.S.

aquatic weed species in Australia (*Salvinia molesta*), New Zealand (*Lagarosiphon* sp.) and Fiji (*Salvinia molesta* and *Hydrilla*). Also in 1982 he attended the 6th European Weed Research Conference (EWRC) and the 2nd International Herbivorous Fish Conference in Novi Sad, Yugoslavia.

Traveling to Sri Lanka in 1983, he visited scientists at the Weed Research Organization (WRO) at Oxford, England and then met with a company to discuss research in the U.S. with diquat-alginate. He presented a paper at the International Symposium on Aquatic Macrophytes sponsored by Catholic University in Nijmegen, Netherlands. A weed survey was conducted in Sri Lanka and discussions were held with Sri Lankan scientists. On his way home, he spent a week in Bangkok, Thailand with university scientists and the operations department of the Royal Irrigation Division. A meeting was held with the American Ambassador to Thailand and King Bhumibol, to discuss aquatic weed problems, draining wetlands for agricultural use and continued U.S. assistance.

In 1984, at the request of USAID-Ecuador, Bill and Dr. Joe Joyce, then CAIP Director, spent 10 days surveying weeds in the Guayas River and in the region of the Daule Peripa Hydroelectric Reservoir which at that time was under construction. It was evident water hyacinth would become a major problem and discussions were held with engineers to emphasize the serious nature of the issue and to suggest possible design changes which would permit flushing hyacinths over a spillway. A seminar was presented in Guayaquil to the Ecuadorian Academy of Sciences, with spirited discussion ensuing when shrimp farmers expressed their concerns of the possibility of finding pesticides in shrimp.

In 1986, he traveled to England, Wales and Scotland to attend and chair a session at the 7th European Aquatic Weed Research Symposium (AWRS). There he interviewed Dr. Alison Fox for a potential post-doctoral position. She collaborated on research projects with Bill and ultimately became a tenured UF faculty member in her own right. According to Dr. Kurt Getsinger of the US Army Corps of Engineers (USACE), "This relationship was instrumental in developing a 15-year Cooperative Research Agreement with the US Army Engineer Waterways Experiment Station, now known as the US Army Engineer Research and Development Center (ERDC), in Vicksburg, MS. Studies from partnerships linked in water-exchange processes (using rhodamine WT dye) with herbicide concentration and exposure time relationships that greatly improved efficacy against problematic submersed species such as Eurasian watermilfoil and hydrilla."

In 1993, the Mexican Institute of Water Technology requested that Dr. Randall Stocker (then CAIP Director) and Dr. Haller participate in a three scientist U.S. panel to review aquatic weed problems in Hidalgo and Guadalajara States. After visiting laboratories and scientists in Mexico City, they met with the Minister of Water and Hydrology and visited several reservoirs in western Mexico. The panel

developed a large-scale research/operations IPM demonstration project which the Mexican government immediately undertook. Through combinations of chemical, mechanical and drawdown techniques, three reservoirs were weed-free six to nine months following their visit. Since that time, several Mexican scientists have visited the CAIP and evaluated various control programs in Florida.

In 1994, Bill presented two papers at the 9th European AWRS in Dublin, Ireland. Meetings were held with Food and Agriculture Organization (FAO) Chief Fisheries Officer Tomi Petr and representatives from the Ugandan and Nigerian governments regarding herbicide residues and water hyacinth control in their respective countries.

In 1996, the Center for Aquatic Plants entered into an agreement with Aquatics Unlimited, a USAID funded consulting firm from California, to develop protocols for evaluating the environmental impact of herbicide use for water hyacinth control on Lake Victoria in Uganda. In May, seven Ugandan government scientists and officials attended the UF/IFAS Aquatic Weeds Short Course in Fort Lauderdale. They were then taken on a field trip to Lake Okeechobee and Kissimmee to view and discuss hyacinth control programs in Florida which were applicable to Lake Victoria.

In 1997 using the rapidly developing World Wide Web, Bill was able to develop and design field trials on Lake Victoria for determining impact, residues and efficacy of glyphosate and 2,4-D on water hyacinths. He obtained the necessary spray equipment, had it shipped to Uganda for the trials, then assisted with data analysis and interpretation.

That same year, he met with a Brazilian government delegation that was evaluating weed control projects in Florida. He was subsequently invited by the Brazilian government to speak at the Brazil IBAMA (EPA) Workshop on Control of Aquatic Plants held in Brasilia. At that time, the Brazilian government had not approved any herbicides for aquatic use. Many rivers in Brazil were being dammed for hydroelectric projects, and aquatic weed and public health problems were becoming widespread. Reservoirs in Rio de Janeiro State were surveyed and a test protocol was developed for Santana Reservoir where 1.5 to 2.0 million dollars a year of potential hydropower production was being lost due to aquatic weeds clogging pumps and channels.

In 2002, USAID — Guatemala sponsored a 7-day field trip in the region of Lake Izabal (150,000 acres), Rio Dulce and Lake El Golfete to assess the hydrilla invasion of this economically critical resource. The entire area was surveyed, and meetings took place with fishermen and local stakeholders. In 2 years, hydrilla had established in 4-5 m of water depth and covered 5,000 acres of the lake.

The discovery of fluridone resistant hydrilla in the early 2000s stimulated research on the development of new herbicides for aquatic use and was the emphasis of Bill's research program for the next 18 years. Dr. Getsinger recalled, "Back in the mid-90s, Bill and I met at an APMS meeting in Charleston, SC, and decided to reach out to the US EPA [Environmental Protection Agency] regarding aquatic herbicide issues. Bill suggested that I become the EPA Aquatics Subject Matter Expert (SME), since I represented a sister Federal agency — the USACE. The plan worked and with Bill's considerable help, the legacy chemicals remained registered, and eventually another 10 were added to the tool box. That SME relationship is still being served today." Herbicides labeled under that effort from 2000 to the present are:

Imazapyr	2001
Triclopyr	2002
Carfentrazone	2004
Penoxsulam	2007
Imazamox	2008
Flumioxazin	2010
Bispyribac	2011
Topramezone	2013
Sethoxydim	2017
Florpyrauxifen-benzyl	2018

Clearly, Bill Haller is a force to be reckoned with when it comes to aquatic weeds. Despite his extensive international experience and his tenured faculty position, however, he will listen to and talk in a respectful and friendly manner to *anyone* about aquatic weeds — ordinary citizens, retired people certain that they have an easy solution to hyacinth control, students of any age, herbicide applicators of all levels of experience, angry opponents of aquatic plant management, teachers, legislators, and the King of Thailand. And those are some of the remarkable accomplishments of Bill Haller.

By Karen Brown, retired from the University of Florida/IFAS Center for Aquatic and Invasive Plants, 2KarenPBrown@gmail.com.

Thanks to Dr. Kurt D. Getsinger (USACE-ERDC), Mr. Jeffrey Schardt (APMS) and Dr. Greg MacDonald (UF/IFAS Agronomy) for their assistance.

Scaling Up Research on Sethoxydim for Torpedograss Control in Aquatic Sites

By Stephen F. Enloe and Michael D. Netherland

Over the last 4 years, researchers at the University of Florida/IFAS Center for Aquatic and Invasive Plants (CAIP) have spent considerable time working on invasive grass management in aquatic systems in Florida. Torpedograss (*Panicum repens* L.) is by far the most problematic and has come to dominate thousands of acres of wetlands throughout Florida. It is a scourge to natural areas, mitigation sites, stormwater treatment areas, and retention ponds. Its highly aggressive growth has displaced many native emergent species and the academic terms "monoculture" and "monotypic stands" are widely used to describe its dominance. The scale of the torpedograss problem is vast, and solutions are needed to address everything from 0.1 acre retention ponds to hundreds and thousands of acres along lakes and rivers. This necessitates a research approach that incorporates multiple scales and applicator tools, from backpack sprayers to airboats to helicopters.

The tools of torpedograss management have unfortunately become a little like an old juke box with only two songs, and everyone already knows them by heart: glyphosate and imazapyr. Both lack selectivity but are used out of necessity to treat grass problems. However, the need for selectivity is still paramount and would be highly useful to aquatic managers everywhere. Fortunately, progress is being made on the development of new tools in the form of graminicides. Sethoxydim, registered as TIGR® herbicide, currently has a 24(c) special local needs registration in Florida for aquatic grass control. Historically, sethoxydim has been used for control of many weedy grasses in crop and non-crop settings where its selectivity has been well-established.

Our previous mesocosm studies have verified selectivity for many native aquatic plants including broadleaf cattail (*Typha latifolia*), pickerelweed (*Pontederia cordata*) and California bulrush (*Schoenoplectus californicus*). Additional mesocosm studies have demonstrated that sethoxydim significantly reduces torpedograss biomass. However, there has been a real need to scale up research to the field level and answer the questions managers are asking: Is sethoxydim comparable to the big two in terms of efficacy? Is timing important? Are repeat treatments needed?

Given these questions, our specific objective was to evaluate sethoxydim efficacy on torpedograss in a variety of aquatic and wetland conditions. We also wanted to examine efficacy using multiple application methods including aerial and ground broadcast, and airboat spot treatments. Finally, we wanted to determine if sequential sethoxydim applications would improve long term control compared to single applications. Here we discuss the first aquatic field studies of sethoxydim for control of torpedograss in the United States.

Four field studies were conducted at three sites (Lakeside Ranch, Bonita Springs, and C-139 Annex) in south Florida from 2015 to 2017. All sites were naturally infested with well-established stands of torpedograss. Across studies, almost all herbicide treatments were repeated at two or more sites. Data collection for each study generally occurred pre- and post-treatment and included visual estimates of live torpedograss cover collected in five to ten 1 m^2 quadrats per plot. Visual estimates of torpedograss percent control were done

Figure 1. Sethoxydim (TIGR 5% v/v) selective control of torpedograss 36 DAT at Lakeside Ranch STA.

at Bonita Springs. Site conditions and herbicide application approaches varied by location and are as follows.

Lakeside Ranch Stormwater Treatment Area (STA). In August 2015, the first field study was initiated at Lakeside Ranch STA on the northeast side of Lake Okeechobee. This STA was originally designed for emergent vegetation and was composed of mixed stands of torpedograss, cattails, smartweeds, climbing hempvine, pickerelweed and other emergent plants (Figure 1). Water depth in the STA was maintained at approximately 18 inches, but some fluctuation occurred during the course of the study.

Twenty-four plots, each 0.5 acres in size, were established for treatment. Treatments included sethoxydim (TIGR) at the maximum labeled broadcast application rate (40 oz/A) and the maximum spot treatment concentration (5% v/v), glyphosate (Rodeo) at 96 oz/A, imazapyr (Habitat) at (32 oz/A), and an untreated control. Both sethoxydim treatments included methylated seed oil (Dyne-Amic) at 1% v/v and the glyphosate and imazapyr treatments included a non-ionic surfactant (Induce) at 0.25% v/v. All herbicide treatments were applied over two days (August 4-5, 2015). Treatments were applied to each plot from an airboat with a handgun spray applicator at 50 GPA. Each plot was treated by making successive passes with the airboat across the plot.

Figure 2. Aerial view of sethoxydim broadcast study at Bonita Springs. Rectangular plots with open water indicate torpedograss control.

Figure 3. Aerial plots at C-139 Annex, just south of Clewiston, FL at 333 DAT. The left side was treated with glyphosate + imazapyr. The right side is an untreated control.

Bonita Springs. A second study was conducted April 2016 to June 2017 near Bonita Springs, Florida (Figure 2). The site was a wetland mitigation site that was seasonally dry in the winter and had a maximum water depth of approximately 30 inches during the summer wet season. The site was a monotypic stand of torpedograss with few other plant species growing in the study area.

Replicated plots with 20 by 30 foot dimensions were established in April 2016. The initial treatments were applied on May 28 and the sequential sethoxydim treatment was applied on June 12, 2016. Treatments were applied with a CO_2 pressurized backpack sprayer equipped with a 10 foot boom at an application volume of 20 GPA.

Treatments included a tank mix of glyphosate (Rodeo at 3 qt/A) plus imazapyr (Habitat at 1 qt/A), sethoxydim (TIGR at 40 oz/A) applied as a single or sequential treatment, and an untreated control. This resulted in an increasing total rate of sethoxydim for the sequential treatment of 80 oz/A. A methylated seed oil was added to all herbicide treatments at 1 qt/A. At the time of initial treatment, torpedograss had started new growth and the sequential treatment was made prior to the beginning of summer inundation. At the sequential application timing, torpedograss was still green to yellow in color and had not desiccated as a result of the initial sethoxydim treatment.

C-139 Annex. The third and fourth studies were conducted at C-139 Annex, a South Florida Water Management District property about 35 miles south of Clewiston. Plots were located within an 800-acre impoundment identified as Pond 3 which historically was a wet prairie that was levied and used for water storage for surrounding orange groves. Water depth

is now strongly seasonal and fluctuates from a dry surface in the winter to approximately 24 to 36 inches in the peak of the wet season. Pond 3 is composed of cypress strands, mixed with open emergent plant communities dominated by patches of cattail (*Typha* spp.) and extensive monotypic stands of torpedograss.

The third study was an aerial application. Twelve plots, ranging in size from 3 to 4 acres, were established across mixed stands of torpedograss and other emergent vegetation. Plots were 90 ft in width and 1,200 to 1,500 ft in length (Figure 3). Three passes were made down the length of each plot with a helicopter sprayer at 20 GPA. Initial treatments were applied on November 4, 2016 and sequential treatments were applied on November 18, 2016. Treatments included sethoxydim (TIGR at 40 oz/A) applied as single or sequential applications, glyphosate (Rodeo at 3.75 qt/A) + imazapyr (Habitat at 2 qt/A) applied as a single treatment, and an untreated control. A methylated seed oil was included in each sethoxydim treatment at 1 qt/A and at 8 oz/A with the glyphosate + imazapyr treatment.

The fourth study was an airboat spot-treatment application which was established in a separate part of the impoundment approximately 0.5 miles away. Six plots, each 36 by 160 ft, were placed in an open area of dense, well-established, torpedograss (Figure 4). These plots were treated by airboat with a hand-gun calibrated to deliver 100 GPA. Sethoxydim (TIGR) was applied at 5% v/v as a single or sequential application. Glyphosate (Rodeo at 3% v/v) + imazapyr (Habitat at 1% v/v) were applied as a single treatment, and an untreated control was included. Treatments were applied by the applicator making one pass down the length of each plot edge, spraying into the plot. This allowed spray coverage across the entire width of the plot in two passes without driving through the plot during treatment. A methylated seed oil (MSO Concentrate with Lecitech) was included with each treatment.

So what have we observed to date? Across studies and locations, sethoxydim provided some control of torpedograss, but performance was variable. Single applications of 40 oz/A initially reduced torpedograss cover at all sites following treatment. However, the length of control varied across studies. At Lakeside Ranch STA, single applications of sethoxydim at 40oz/A reduced torpedograss cover compared to the untreated control throughout the entire study (Figure 5). This was better than the performance of glyphosate alone and similar to imazapyr. At Bonita Springs, single sethoxydim applications resulted in 50% control at 60 DAT but this fell to 20-30% control at the longer term

Figure 4. Airboat spot treatment plots at C-139 Annex. The white plots run down the center of a treated plot.

evaluations (Figure 6). At C-139 Annex, single aerial treatments initially reduced torpedograss cover to 34% at 76 DAT, but the torpedograss recovered and was similar to cover in the untreated control at all later sample dates (Figure 7). Spot treatment applications of sethoxydim at 5% v/v improved torpedograss control initially at Lakeside Ranch STA (Figure 1) and increased the length of control at C-139 Annex (Figure 8).

The performance of sequential broadcast treatments of sethoxydim also varied between locations. At Bonita Springs, sequential applications resulted in excellent torpedograss control at 180 DAT (Figures 8 and 9) while sequential treatments at C-139 Annex did not substantially improve control over single applications (Figure 7). The season of treatment and hydrologic conditions likely played an important role in this difference. For example, the sequential sethoxydim treatment worked well at Bonita Springs at the end of the spring dry season. Shortly following the final sequential treatment, water levels rose quickly and remained high over the summer. This is in contrast to C-139 Annex, where water levels were high at the time of fall treatment and subsided over the winter. The additional water stressor may have helped maintain torpedograss control at the Bonita Springs site.

Finally, glyphosate + imazapyr tank mixes generally outperformed sethoxydim for long term torpedograss control. At Bonita Springs and C-139 Annex, glyphosate + imazapyr applied by aerial or ground broadcast or by airboat provided excellent torpedograss control for the duration of each study (Figures 3 and 4). This encompassed spring, summer and fall applications over a range of hydrologic conditions. The difference in performance with sethoxydim may require a re-evaluation of expected management outcomes and an adjustment in typical treatment / retreatment intervals compared to the currently used commercial standards. However, the selectivity of sethoxydim is clearly a game changer compared to glyphosate and imazapyr, and this should be weighed carefully as management plans are evaluated.

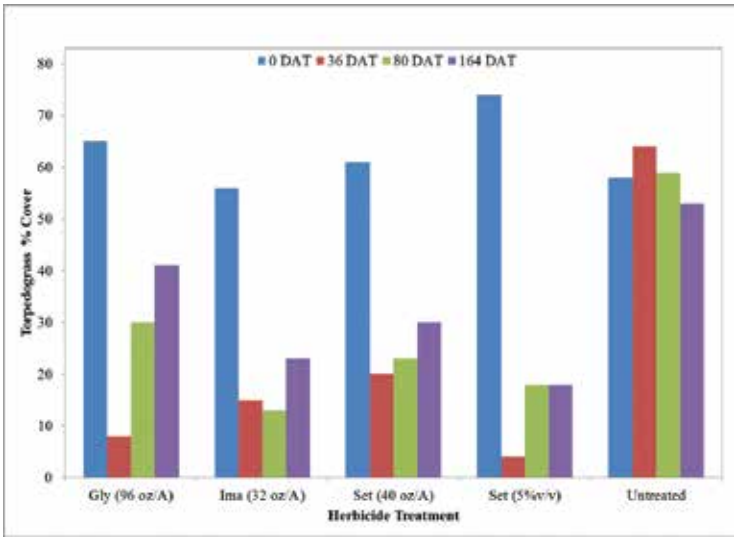


Figure 5. Torpedograss cover response to airboat herbicide treatment over time at Lakeside Ranch STA.

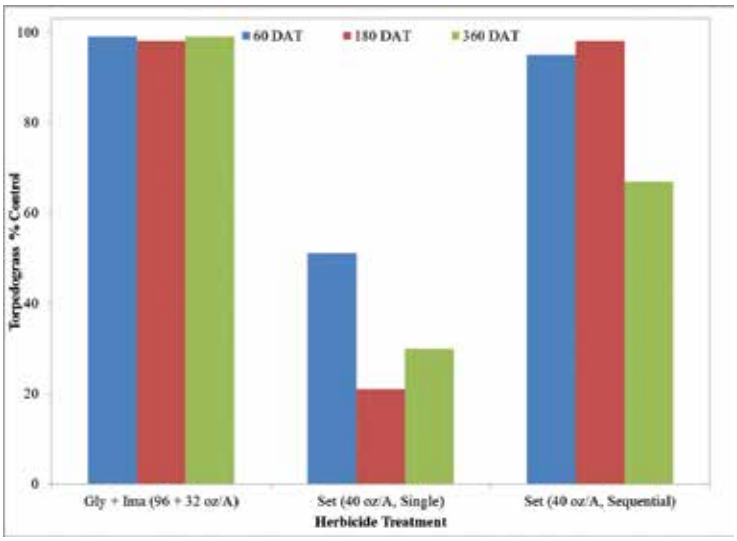


Figure 6. Torpedograss visual percent control with single or sequential late spring ground broadcast applications at Bonita Springs.

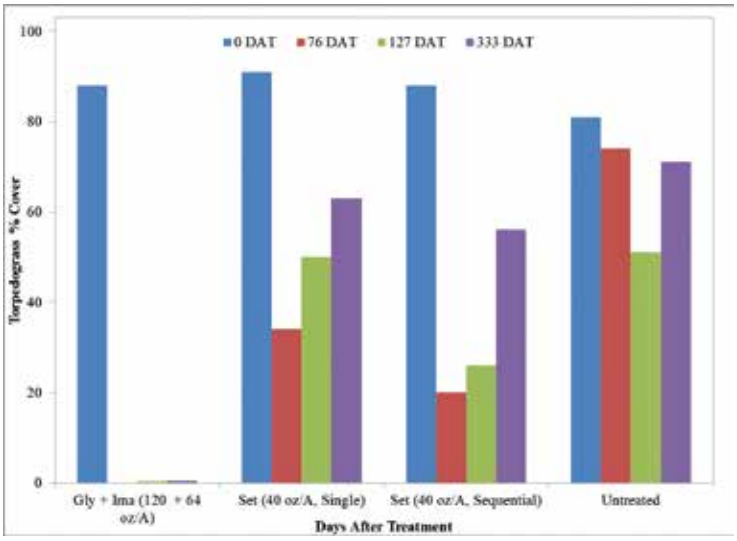


Figure 7. Torpedograss cover response to single and sequential aerial applications at C-139 Annex.

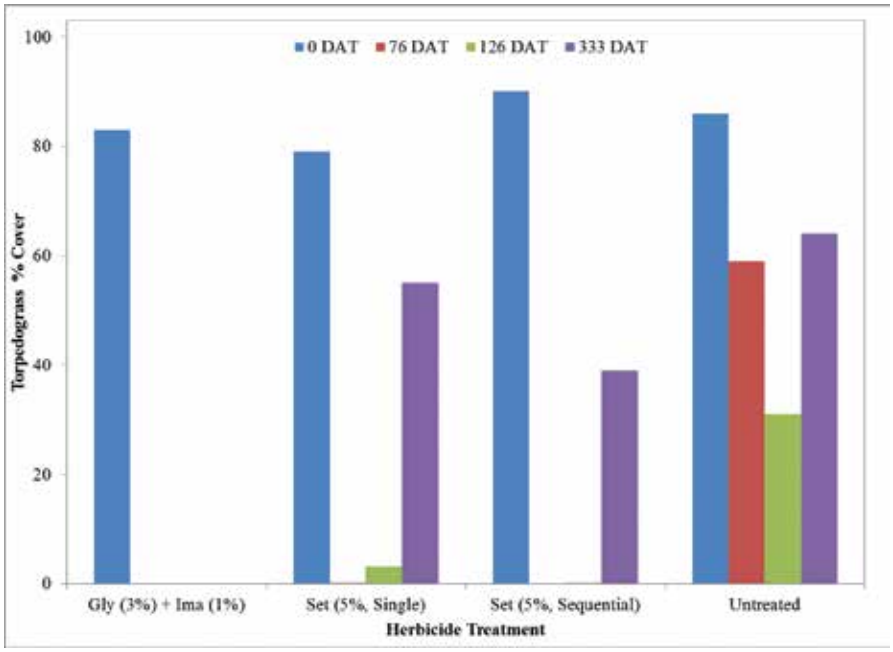


Figure 8. Torpedograss cover response to single and sequential airboat spot treatment applications at C-139 Annex.

Note: This article was condensed from the original journal article: *Enloe, SF, Netherland MD, Lauer DK. 2018. Evaluation of sethoxydim for torpedograss control in aquatic and wetland sites. J. Aquatic Plant Manage. 56:93-100.*

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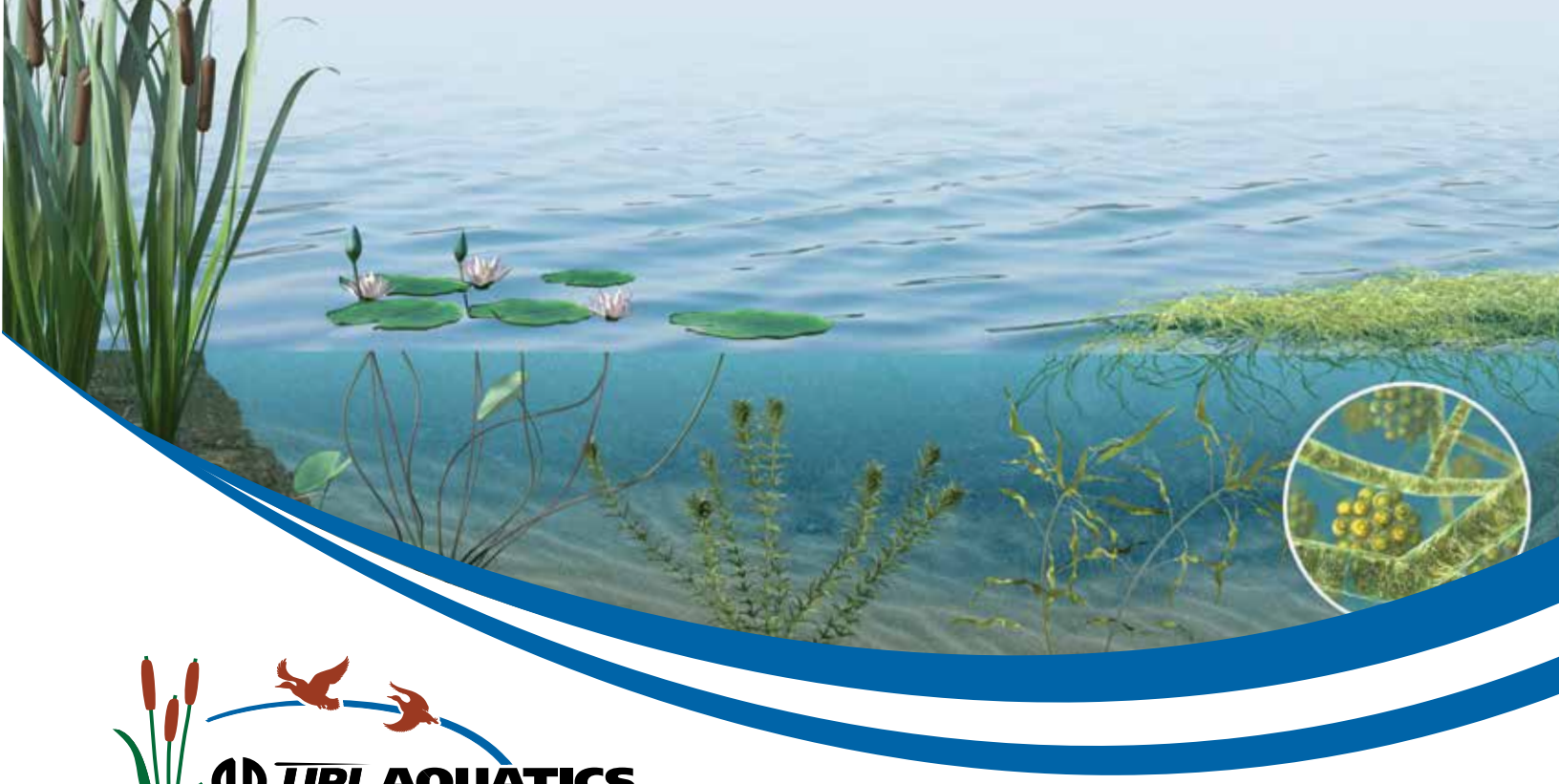
Figure 9. Plot treated with sequential sethoxydim applications at the end of summer following late spring treatments at Bonita Springs.



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EPA Pesticide Personnel Tour Florida Aquatic Plant and Mosquito Control Sites

By Jeffrey D. Schardt

Insight was recently provided for pesticide regulatory personnel from the U.S. Environmental Protection Agency (EPA) and Florida Department of Agriculture and Consumer Services (DACS) into conditions faced by aquatic plant and mosquito managers when applying EPA-registered pesticides. On June 4-8, 2018 the Aquatic Ecosystem Restoration Foundation (AERF) sponsored a tour of aquatic and wetland systems in South and Central Florida. EPA and DACS representatives visited both natural and highly managed areas, observed pesticide applications, and spoke directly with managers and field personnel. Especially important was conveying the unintended consequences of pesticide label language that may be pertinent to large-scale crop management, but may unnecessarily limit small-scale, preemptive, or preventive measures in aquatic plant and mosquito control.

On **Day 1**, information was presented regarding the importance of aquatic plant management to conserve the multiple uses and functions of Florida's 1.25 million acres of public lakes and rivers under the direction of the Florida Fish and Wildlife Conservation Commission (FWC). FWC oversees the annual control of approximately 70,000 acres of aquatic plants, mostly to control invasive species, and most is achieved using EPA- and DACS-registered herbicides.

In addition to natural areas, there is substantial aquatic plant control conducted in the tens of thousands of miles of water conveyance canals managed by the South Florida Water Management District (SFWMD) and numerous aquatic plant and mosquito control districts. SFWMD personnel explained their aquatic plant maintenance programs that sustain water transport and flood protection in the extensive canal system in South Florida while maintaining prescribed levels of vegetation in Everglades restoration and stormwater treatment areas (STAs), and conserving uses and functions within natural areas. The SFWMD manages more than 2 million acres of STAs, natural lakes and rivers, and more than 2,600 miles of flood control canals. Each of these systems is managed with differing objectives.

Canals are kept relatively free of floating and submersed plants that can impede water transport. The STAs are vegetation-based water treatment facilities and require selective vegetation planting and maintenance to conserve prescribed aquatic plant diversity and abundance. Plant management in lakes, rivers, and conservation wetlands ranges from spot herbicide applications to large-scale control of hundreds to thousands of acres to conserve native plants and protect human activities in these systems.

Key points were discussed in advance of field trips for first-hand observation of control operations and interaction with program managers and pesticide applicators during the remainder of the week. Managers stressed the importance for EPA to register multiple herbicide mechanisms of action (MOAs) and active ingredients (ai) with different formulations. This is needed to rotate or combine different MOAs for resistance management. Multiple MOAs also provide options to accommodate control of different target plants, or use in differing water chemistries, water movement patterns, sediment types, and scales of aquatic plant management (e.g., spot vs. large-scale applications).

EPA pesticide regulatory personnel are generally more familiar with crop management logistics and requirements than aquatic systems. In crop management, broad spectrum herbicides are often applied to control multiple weed species growing among 1-2 crop species. When managing aquatic plants growing in natural areas, most often 1-2 invasive plant species must be controlled while conserving dozens of non-target plant and animal species. Also in crop management, a single landowner usually governs the managed area that is designated for a single use. Herbicides can be applied at the most opportune time to achieve the most cost-effective control. Conversely, natural areas are regularly open to the public and can be subject to multiple uses. The timing, scale and method of invasive plant control is strongly influenced to accommodate many stakeholder demands.

Attendees were directed to the University of Florida/IFAS Center for Aquatic and Invasive Plants (UF/IFAS CAIP)/FWC aquatic plant management website (http://plants.ifas.ufl.edu/manage/). The site addresses water use, biological, physicochemical, and climatological considerations made by managers when selecting herbicides for each management operation to provide cost-effective control of target plant species while selectively conserving or enhancing non-target plants and animals. See Appendix 1 for a list of key subjects discussed in relation to EPA herbicide registrations.

Day 2 began with onsite discussions about vegetation management strategies in the STAs and evaluating herbicides in small-scale research ponds. The STAs are used for water storage and supply, and as a filtering system located between the Everglades Agriculture Area to the north and Everglades National Park to the south. Strategic vegetation planting and management lessens water flow and wind-driven mixing in the shallow STAs to reduce turbidity in discharge water. The types, amounts, and locations of aquatic vegetation in the STAs play critical roles in meeting water quality objectives. Herbicides play a significant role in managing aquatic vegetation, especially invasive species, at appropriate levels. Different compounds are needed to control different target plants growing among

Left to right: UF/IFAS CAIP researcher Bill Haller discusses ponds in secure areas where herbicides are evaluated in small-scale natural environments; Jonathan Glueckert demonstrates drone utility for rapid assessment of test plots and vegetation distribution in remote STAs; planting vegetation in the STAs.

different assemblages of desired species.

Participants were taken on an aerial tour over STAs and Water Conservation Areas (WCAs) and viewed wetlands and tree islands in natural states as well as areas heavily invaded by invasive Australian melaleuca trees and Old World climbing fern. The SFWMD guide discussed different herbicides and application strategies applied in conjunction with biological controls released to manage these invasive plants. He stressed the need for evaluating new herbicide compounds for increased efficacy as well as resistance management and selectivity.

Integral to the proper functioning of this system is consistent optimum water flow, requiring frequent maintenance of floating invasive plants (water hyacinth and water lettuce) that can block water movement and clog intake pipes at strategic pumping stations.

Attendees also visited a pump station located among the STAs that regulates water flow for flood control and water supply. Managers emphasized the importance of numerous small-scale herbicide applications to control floating plants that accumulate on cable barriers in the canals. There is discussion regarding implementing label language that limits the numbers of herbicide applications (i.e., 1 to 2 times per year) or the amount of active ingredient that can be applied to an area during a year's time. Floating plants that collect on canal cable barriers, on the edges of canals, or in strategic areas in the STAs may be controlled 3-5 times per year with spot or small-scale applications. This scenario differs from crop management in that only a minute portion of the canal system is managed with herbicides, and water flow and dissipation disperse herbicides from the precise control area.

On **Day 3**, the group began with an airboat tour of the rim canal and marshes on the south end of Lake Okeechobee near Clewiston, with U.S. Army Corps of Engineers (USACE) and FWC aquatic plant management staff. About 12,000-15,000 acres of floating water hyacinth and water lettuce are controlled with herbicides on the lake each year by contractors under supervision and monitoring by FWC and USACE. Like the cables and structures in water management canals seen the previous day, floating plants accumulate along edges of marshes and in the lake's numerous water control and navigation lock structures and

Aquatic plant management contractor controlling invasive water lettuce in a canal (left) upstream of the water pumping station (right) that regulates water flow from agricultural areas before entering the STA and water conservation areas. Water lettuce is frequently managed throughout the year along the canal banks to prevent plant jams in the downstream water control structure.

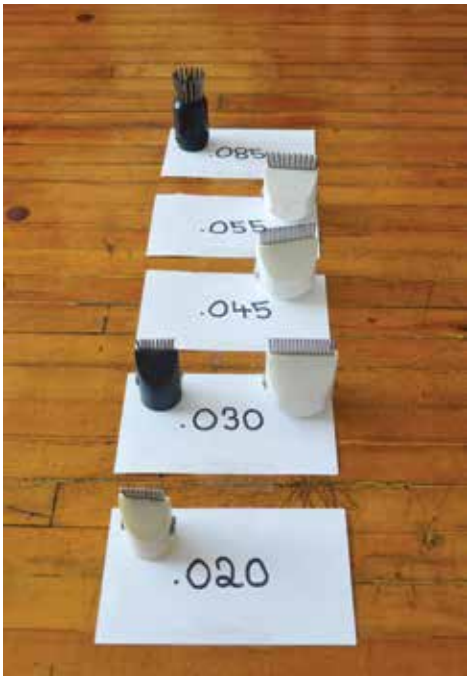
must be managed several times in the same general locations each year. Plants must be selectively managed around endangered Everglades snail kite nesting periods (January-August) as well as waterfowl hunting locations (October-January). Managers again stressed the importance of multiple herbicide active ingredients to control water hyacinth and water lettuce that are almost always growing among native plants that must be conserved for fish and wildlife habitat. Several herbicides registered for hydrilla control since 2005 have also demonstrated in-water activity on water hyacinth (penoxsulam, bispyribac) and water lettuce (flumioxazin) via root uptake from submersed vs. traditional foliar applications. This gives managers more resistance, selectivity, and application options.

The group observed a helicopter loading and application demonstration (Helicopter Applicators, Inc.) before leaving Clewiston. Different nozzle apertures and boom arrays were displayed that aerially apply herbicides ranging from large-scale applications to torpedograss fields covering a thousand or more acres (40ft boom), to spot treating individual melaleuca trees (8ft boom) in remote Everglades locations inaccessible to ground or airboat crews. Pilots emphasized the use of specialized booms (microfoil, thru-valve boom) to minimize herbicide particle drift and allow for precise applications.

Day 4 began at the Lee County Mosquito and Hyacinth Control Districts. Lee County controls a variety of mosquito species in freshwater ponds and lakes as well as in nearly 60 thousand acres of salt marshes. Mosquito control operators recommended that pesticide labels need to consider the life cycles of mosquitoes to allow for applications and reapplications (which may be just a few days apart) at times that are best suited to suppress populations at the lowest levels or to kill juveniles before they become egg-laying adults.

There are nearly 50 different mosquito species in Lee County. The District targets four species; three of which are disease carriers of primary concern. Five active ingredients are available in liquid or granular formulations. Larvicides are applied any time of day; adulticides are applied only at night. The District uses a variety of detection methods including traps, visual inspections, and sentinel chickens. Pesticides are applied selectively only to areas where mosquito populations reach threshold levels. Aerial applications are delivered by airplane and helicopters. Flight paths are controlled by computer over pre-established control polygons determined from ground inspections. The onboard computer activates application when the aircraft enters the polygon and adjusts for forward speed to apply pesticide evenly and only to the target zone. This allows pilots to concentrate on flying, especially important since adulticides are applied at night.

The District also monitors and controls freshwater aquatic vegetation. Floating water hyacinth and water lettuce harbor certain mosquito species (Mansonia spp.) and thrive in the District's hundreds of miles of canals. The District applies biological and chemical controls where appropriate and implements cultural management activities. Grass carp are used



Left to right: Explanation of the various nozzle apertures designed to control droplet size and placement. Support vehicle with self-contained herbicide concentrate and diluent tanks and landing/loading platform.

Aerial application platforms and delivery apparatus operated by Lee County Mosquito Control District.

to assist in controlling the submersed invasive plant, hydrilla, and several herbicides are available to control floating, emergent and submersed plants. Nutrient monitoring and fertilizer abatement regulations are enacted at key times of year to slow invasive plant and algae growth that can harbor mosquitoes. The District is also developing means to sterilize and release male mosquitoes to lessen the frequency of applications and amounts of pesticide to control mosquitoes.

On **Day 5**, the group observed an infestation of submersed hydrilla in 19,000-acre Lake Toho south of Kissimmee. Lake Toho is at the headwaters of the Kissimmee Chain of Lakes and is a USACE Designated Federal Flood Control and Navigation Project. Lake Toho is also a world-class bass fishery and ecotourism destination and supports a significant population of the state and federally endangered Everglades snail kites. FWC and UF/IFAS CAIP staff described the planning process for controlling hydrilla, emphasizing the need for multiple herbicides to use alone or in combination. During peak summer growth, hydrilla stems can elongate by as much as 8-10 inches per day, quickly reaching the surface and forming mats in shallow Florida lakes. Large-scale hydrilla control (1,000-5,000 acres) is generally applied in cooler months from February-April, with spot control (10-100 acres) applied as necessary and as conditions allow, throughout the lake during the rest of the year.

Left: Tour group at the public pier on Lake Okeechobee

FWC biologist Ed Harris explaining aquatic plant management complexities in a multi-use lake.

Harvester removing dense masses of primrose willow from Lake Toho.

As in other systems, target plants, whether floating, emergent or submersed, must be cost-effectively managed under a variety of conditions; in Toho's case, while conserving snail kite nesting and foraging sites, fish and waterfowl habitat, and flood control and navigation functions. No single herbicide active ingredient or management strategy fits all current conditions. Therefore, effective management requires a number of herbicide active ingredients to apply under different water conditions, plant assemblages, and growth stages.

The tour also included observing a mechanical harvesting operation removing dense masses of invasive primrose willow. While harvesting has proven too slow and costly for large-scale invasive plant manage-

Applying a tank mix of flumioxazin and imazamox to primrose willow.

One week after flumioxazin + imazamox application (looking from opposite direction).

ment, it is effective in removing dense submersed and floating masses of emergent plant roots, stems, and rhizomes. The Lake Toho tour ended with observation and discussion with an FWC contractor applying herbicides to early growth stages of invasive primrose willow overgrowing native plant habitat. The applicator advised he was applying a mixture of 4oz of flumioxazin and 32oz of imazamox per acre. This mixture is effective in controlling primrose willow but does not control comingled native grasses important for fisheries. Scattered cattail mixed in with the primrose willow will likely be controlled; however, damage to larger stands of adjacent cattail, important for the endangered Everglades snail kite nesting, is avoided by applying up to the bases of cattail and pre-emptively controlling the primrose willow before it becomes dense and overgrows the cattail.

Jeffrey Schardt (Jeff.Schardt@gmail.com) is secretary of APMS, Inc., and is retired from the Florida Fish and Wildlife Conservation Commission – Invasive Plant Management Section.

Key Subjects Presented by Aquatic Plant Managers

- EPA-registered herbicides are essential, especially for invasive aquatic plant management
  - Provide cost-effective, selective, environmentally compatible management options
  - Biological controls are available to provide some control of some invasive plants
  - Mechanical control is too slow, expensive, and non-selective for large-scale control

- Multiple herbicides with differing mechanisms of action are needed
  - Rotation or combinations are used for resistance management
  - Different herbicides have different efficacy on different target plants
  - Different herbicides have different selectivity on different non-target plants

- Label language for crop or turf management may not work for aquatic plant management
  - Multiple plants are controlled in crops to conserve 1-2 beneficial/non-target species
  - 1-2 invasive plants are controlled among dozens of non-target species in aquatic plant habitats
  - Aquatic plant control usually involves multiple small-scale maintenance applications

- Multiple applications are needed in one area with same compound within one year
  - Language is under consideration to limit the number of applications to a site within one year
    - Floating plants may be controlled, especially spot applications several times
    - Near flood control structures or pumps
    - Near access points, bridges, flood control structures, critical habitat in lakes and rivers

- Newer herbicide registrations are measured as active in ppb vs. ppm
  - Represents a large reduction in amounts of herbicides applied to the environment

- Newer herbicide registrations are active on one plant gene vs. broad spectrum chemicals

- Applicator training/annual certification requirements improve label language adherence

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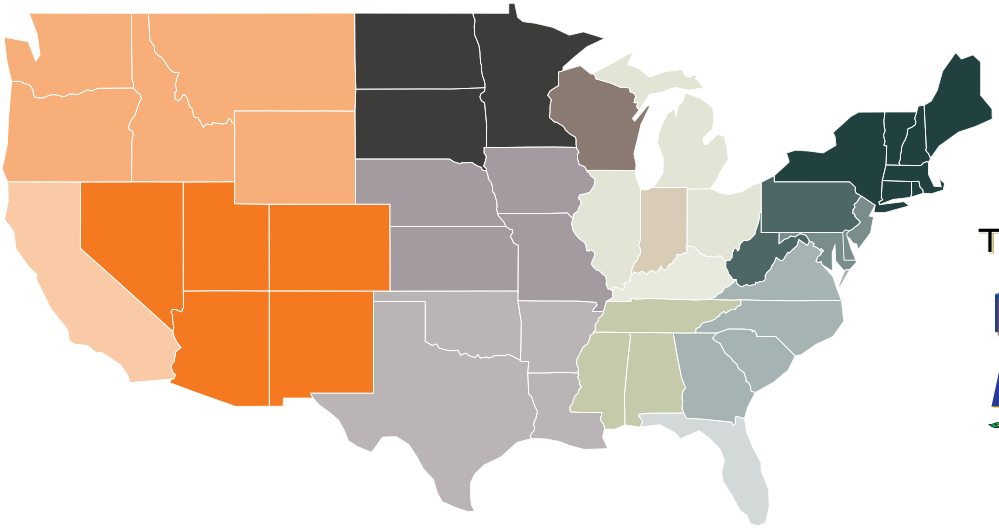

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Invasive Species Highlight: Alligatorweed

(All photos courtesy of Dr. Lyn Gettys, UF/IFAS Fort Lauderdale Research and Education Center)

By Eric Carnall

Alligatorweed (*Alternanthera philoxeroides)* is a perennial plant native to South America. It was first reported in the United States in 1897. Listed as a prohibited aquatic weed in many states, its growth has caused significant economic and ecological damage throughout the southern United States.

Alligatorweed reproduces in North America primarily through vegetative propagation, but seeds have been found as well. Morphologically speaking, alligatorweed can vary based on the surrounding environment; in fact, it has adapted to grow in both aquatic and dry habitats. Typically, this invasive plant can be identified by its elliptical or lanceolate leaves with smooth margins. Leaves are arranged in opposite pairs along the shoots. The shoots form roots at the nodes along a hollow stem which keeps the shoots buoyed in the water—thus forming dense, floating mats. Alligatorweed also forms white flower clusters on a spike which protrudes from the leaf axil.

Alligatorweed flower and leaf node

Alligatorweed. Line drawing provided by UF/IFAS Center for Aquatic and Invasive Plants.

Alligatorweed

The unimpeded spread of alligatorweed can lead to serious problems. Due to its rapid growth rate, the weed can quickly slow or block the drainage of water from canals and ditches, leading to flooding and increased sedimentation. It can displace native plants along banks and in shallow water, which can also eliminate food sources for native animals. It can reduce oxygen exchange, further diminishing native vegetation and possibly leading to a fish kill.

Alligatorweed not only disrupts the balance of aquatic ecosystems, but it can also severely limit recreational activity in lakes and ponds. Fishing and swimming may be negatively impacted by dense mats of growth that can also block boat navigation. These mats also provide increased habitat for mosquitoes, which are an unwelcome addition to an otherwise enjoyable outing on the lake. Additionally, the aesthetics of community and golf course ponds are diminished with the presence of alligatorweed, potentially lowering economic values.

The effective control and management of alligatorweed can be achieved through both biological and mechanical means. The release of the alligatorweed flea beetle in North America is one example of a successful biological control method; it is well-established in many locations in Florida and has reduced weed populations to the point that herbicides are no longer needed. In more northern climates, it can not over-winter and has produced less effective results primarily due to its low concentrations and life cycle. Hydro-raking is an alternate solution. A hydro-rake, which is essentially a floating backhoe with a mounted rake attachment, can collect more than 500 pounds of plant biomass in each scoop and deposit it onshore for proper disposal. Because a hydro-rake works from within the water, it does not impact fragile shorelines. For particularly large infestations, this method can be combined with the application of EPA-registered herbicides. For UF/IFAS control information, see *Efficacy of Herbicide Active Ingredients Against Aquatic Weeds* by Stephen F. Enloe, et al (EDIS Pub #SS-AGR-44) available at http://edis.ifas.ufl.edu/pdffiles/AG/AG26200.pdf

Due to its hollow stems and easy fragmentation, herbicides are recommended to reduce the initial biomass prior to mechanical removal to help prevent additional vegetative propagation. Once management has been achieved, close monitoring of the banks should be maintained to thwart any regrowth of the plant.

Alligatorweed leaves and stem, which is hollow

Ultimately, when it comes to nuisance and invasive species, prevention is key. In most cases, prevention through proactive management is safer for the environment and more cost-effective for communities, municipalities, golf courses and private landowners.

Eric Carnall is an Environmental Scientist with SOLitude Lake Management, ECarnall@solitudelake.com

APMS Honors Aquatic Plant Managers

More than 200 members and guests attended the 58th Annual Meeting of the Aquatic Plant Management Society in Buffalo, New York on July 15-19, 2018. The APMS Annual Meeting provides an opportunity for researchers, managers, and industry representatives to share new information through formal presentations and social events scheduled during the week. The Annual Meeting rotates among the Society's seven Chapter regions highlighting aquatic plant and algae issues prevalent in each region.

APMS President Dr. John Rodgers and Keynote speaker Dr. David Lodge set the tone for the conference addressing the importance of identifying, understanding, and managing invasive aquatic plants and algae. Both emphasized anticipating invasions, creating a responsible action plan that includes research, and implementing the management plan before problems manifest. Catherine McGlynn brought the meeting from the conceptual level to regional management efforts. There were seventeen presentations on assessment and management of aquatic plants and cyanobacteria in the Northeast. A further breakdown of Program content follows: 27 algaecide and herbicide evaluation presentations; 23 presentations on assessing, mapping, and monitoring; 9 presentations related to integrated plant management; and 5 on plant genetics and physiology. Twelve papers dealt exclusively with algae, with a focus on harmful algal blooms (9) and problems related to the macrophytic alga, starry stonewort (3).

Awards

The feature social event during the APMS Annual Meeting is the Tuesday evening Awards Banquet. APMS honors long-term achievements in aquatic plant and algae management as well as ongoing and recently completed research. Following are award recipients for 2018.

Student Presentations

APMS sponsors oral and poster competitions in which graduate and PhD-candidate students present current research. There were 28 student presentations (16 oral and 12 poster) in the competition presented by 24 different students representing nine universities. Cash awards are presented for first ($300), second ($200), and third ($100) place in each presentation category. Tyler Geer from Clemson University placed first in the Student Oral Presentations with his project: *Rapid Response to an Early Detection of Nitellopsis obtusa (Starry Stonewort) in Lake Sylvia, Minnesota, Using a Copper-Based Algaecide.* Jens Beets and Candice Prince, both of the University of Florida, placed second and third, respectively. Photo#1

Andrew Howell of North Carolina State University took first place in the Poster competition with his presentation: *Utilization of Dual Transducers Improves Hydroacoustic Survey Efficiency*. William Prevost of Louisiana State University and Eryn Molloy of North Carolina State University, placed second and third, respectively.

Chris Mudge, Student Affairs Committee Chair (right), presents the first place Student Oral Presentation check to Tyler Geer.

Outstanding Graduate Student Award

Andrew Howell of North Carolina State University received the Outstanding Graduate Student Award for his dedication and commitment to scholarship and consistently going outside his comfort zone to push his skill set in pursuit of his doctoral degree at NCSU.

Andrew Howell (left) placed first in the Student Poster Competition and received the 2018 Outstanding Graduate Student Award.

APMS Graduate Student Research Grant

The Graduate Student Research Grant (GSRG) is the premier education initiative offered by the Aquatic Plant Management Society. The objective is to provide a grant for a full-time graduate student to conduct research in an area involving aquatic plant management techniques (used alone or integrated with other management approaches) or in aquatic ecology related to the biology or management of regionally or nationally recognized nuisance aquatic vegetation.

There were eight submissions for the 2018 GSRG. Eight judges, representing APMS and each of the seven APMS Chapters, evaluated proposals and selected the project submitted by Greg M. Chorak and Ryan A. Thum of Montana State University. Their project submis-

sion: *Identifying Eurasian and Hybrid Watermilfoil Gene Expression Differences in Response to Frequently Used Herbicides for Improved Adaptive Management*, is awarded the two-year, $40,000 GSRG that will run from January 2019 through December 2020.

Vice President Mark Heilman (left) awards the 2018 APMS Graduate Student Research Grant to Dr. Ryan Thum (right) of Montana State University.

Outstanding Research / Technical Contribution Award

Dr. Scott Nissen of Colorado State University received the 2018 Outstanding Research / Technical Contribution Award. He is honored for his leadership and research related to uptake and translocation of aquatic herbicides and his ability to communicate this information to plant managers. He is also recognized for his scientific publication record, commitment to aquatics, and encouraging graduate students to participate in the field of aquatic plant management.

Scott Nissen (left) receives the Outstanding Research / Technical Contribution Award from 2015 APMS President, Cody Gray.

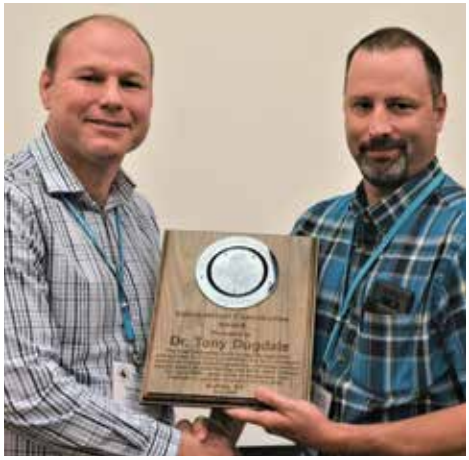
Outstanding Journal Article

The Outstanding Journal Article Award is presented to an author (and co-authors), recognizing research published in the *Journal of Aquatic Plant Management* during the previous year that is unique and will further the science of aquatic plant management. The APMS Editor and Associate Editors vote on this award. A paper by Ryan A. Thum, Syndell Parks, James N. McNair, Pam Tyning, Paul Hausler, Lindsay Chadderton, Andrew Tucker, and Anna Monfils from Montana State University was selected: *Survival and vegetative regrowth of Eurasian and hybrid watermilfoil following operational treatment with auxinic herbicides in Gun Lake, Michigan. J. Aquat. Plant Manage. 55:103-107.*

Ryan Thum (left) receives the Outstanding Journal Article Award from Editor Jay Ferrell.

Outstanding International Contribution Award

Dr. Tony Dugdale of the Department of Economic Development, Melbourne, Australia, received the Outstanding International Contribution Award for developing numerous science-based approaches to managing noxious aquatic plants. He is also acknowledged for



Tony Dugdale (left) is recognized as the 2018 Outstanding International Contributor – presented by 2016 APMS President, Rob Richardson.

Student presenters in the APMS Student Oral and Poster Competitions.

APMS Student Director

Mirella Ortiz from Colorado State University was voted by her peers to serve a one-year term as Student Director on the APMS Board of Directors. The Student Director represents student issues and is a full voting member on the APMS Board.

assembling a great team of researchers that continue to innovate aquatic plant management strategies.

Max McCowen Friendship Award

Mr. John Gardner of Vertex Water Features in Pompano Beach, FL received the 2018 Max McCowen Friendship Award. This award is a special recognition given to an APMS member whose demeanor and actions display sincerity and friendship in the spirit of being an ambassador for the APMS. Criteria include warmth and outgoing friendship, sincerity and genuine concern, gracious hospitality, and positive attitude. John has been a mentor and role model to numerous people in the aquatic plant management industry for more than 41 years and has been a long-term contributor within APMS as well as the Florida APMS Chapter.

John Gardner (left) receives the Max McCowen Friendship Award from Awards Committee Chair, Jay Ferrell.

T. Wayne Miller Distinguished Service Award

Dr. Tyler Koschnick of SePRO Corporation, Carmel, IN received the 2018 T. Wayne Miller Distinguished Service Award, presented to an individual to recognize "Service to the Society and the Profession." Tyler has been an APMS member since 1997, serving on the Board and as President in 2012. He is a frequent advocate for science-based aquatic plant management and has always been an effective ambassador for APMS.

Tyler Koschnick (left) receives the T. Wayne Miller Distinguished Service Award.

President's Award

Two President's Awards were presented in 2018. Ms. Sherry Whitaker was honored for her many years of service to APMS and Regional Chapters. She served on the Board for APMS and has organized and worked the registration desk at the APMS Annual Meeting for many years. Sherry has also served the Midsouth APMS Chapter as President, Treasurer, Director and general caretaker.

Sherry Whittaker receives the President's Award from President John Rodgers.

Dr. Robert Blackburn received the President's Award for more than 50 years of scientific, organizational, and management contributions to aquatic plant control. He served on the APMS Board during the Society's formative years as Director, Editor, Secretary-Treasurer and as APMS President in 1968. As a USDA research scientist, Dr. Blackburn developed products and pioneered aquatic plant management strategies that were applied for decades. Robert Blackburn is founder and President of Future Horizons, Inc., where he has continued to solve water resource problems.

Robert Blackburn (left) receives the President's Award from President John Rodgers.

Honorary Membership

Honorary Memberships were granted in 2018 to two long-term aquatic plant managers. Honorary Members must have been an APMS Member for at least 10 years, be retired from their major field, and have contributed significantly to APMS and aquatic plant control. Thirty-four Honorary Memberships have been bestowed in the 58-year history of APMS.

Mr. David Isaacs was awarded APMS Honorary Membership for his 40+ years of supporting aquatic plant research and operations in Indiana and throughout the Midwest. David is a 17-year member and former Director of APMS. He is a long-term member and supporter of the Midwest APMS Chapter. His insight, reasoning, and business sense made him a valuable

David Isaacs celebrates his APMS Honorary Membership with wife, Laurinda.

resource during recent APMS strategic planning.

Dr. Vernon Vandiver received APMS Honorary Membership for more than 30 years of exemplary education and outreach efforts. Vernon dedicated his career to transferring new technologies, equipment, and herbicide products into instructional formats for program administrators and herbicide applicators. He developed training programs and strategies that increased professionalism and raised the standard of the entire aquatic plant management industry.

Vernon Vandiver (left) receives Honorary Membership from Jay Ferrell.

Other Presentations

Other acknowledgements given during the evening were Outstanding Non-Student Poster, presented to Patrick Goodwin of Vertex Water Features, and Exhibitor Excellence, presented to Jeff Suttner with Airmax, Inc. Outgoing Directors Dr. Brett Hartis of Tennessee Valley Authority and Dr. Ryan Thum of Montana State University were recognized for their three-year service on the APMS Board. Outgoing Student Director, Andrew Howell, was also congratulated for his service on the Board during 2017-2018. The evening culminated with President Dr. John Rodgers of Clemson University transferring the ceremonial gavel to incoming President Mr. Craig Aguillard of Winfield United, Villa Platte, LA.

Jeffrey Schardt (Jeff.Schardt@gmail.com) is secretary of APMS, Inc., and is retired from the Florida Fish and Wildlife Conservation Commission – Invasive Plant Management Section.

Craig Aguillard (left) and John Rodgers exchange service award and gavel.

President John Rodgers (center) thanks outgoing Directors Brett Hartis (left) and Ryan Thum (right) for their service.

LAST CALL FOR NOMINEES: FAPMS Aquatic Plant Manager of the Year Award

Time is running out to nominate your candidate for the **FAPMS Aquatic Plant Manager of the Year Award**. Please think about the aquatic plant manager you respect the most and why. The cash award for this honor is $500. Winners also receive an engraved plaque. Eligibility requirements and the official nomination form are on the FAPMS website under the Awards tab, where you can also view the list of previous winners. You may complete the form online and save it using your name in the filename (for example: YOURNAME-manager_form.pdf). You may also print the form or cut it out of the last FAPMS newsletter and complete it by hand but you must stay within the space provided to allow for uniform evaluation. Extra pages will not be considered. The deadline for submission is September 30th. The winner will be announced at the FAPMS Annual Training Conference Banquet on October 17, 2018.

Please send completed nomination forms to:

Scott Glasscock
Awards Committee Chair
2200 South Service Lane
Lake Buena Vista, FL 32830
Fax: 407-824-7054
Scott.Glasscock@Disney.com

Good luck, Nominees!

Stephen "Monty" Montgomery, 2017 Aquatic Plant Manager of the Year, with 2017 President Andy Furhman.

FAPMS Annual Photo Contest

It's not too late to start taking photos for the Vic Ramey Photo Contest to be held at the 42nd Annual FAPMS Training Conference in Daytona Beach. First, 2nd and 3rd place winners receive a cash prize! The contest was created to promote education, discussion and pride in your work, as well as to have fun. There are two categories: **Aquatic Scene** and **Aquatic Operations**.

Winning photos will be published in *Aquatics* magazine and posted on the FAPMS website if an electronic file is provided. One winner might even get their photo on the next cover of *Aquatics!* For your best shot at a cover photo, hold your camera/phone upright to get a "portrait" photo as opposed to sideways or "landscape."

When printing your photo for the contest, select "ACTUAL SIZE" or "ORIGINAL SIZE" when prompted. Remember to download your best shots onto your computer or a travel drive at full resolution. If you "send them" from your phone, they are automatically compressed and may not print adequately. If you're not familiar with this, ask someone younger than yourself or Google it (don't believe what they say about old dogs!)

Requirements for entry:

- Photos must be taken by a current FAPMS member during the contest year.
- Photos must be submitted as a 5" x 7" or 8" x 10" print, with or without a mat or frame.
- **Back of photo must contain photo category, photographer's name and affiliation, contact number, location in photo, and description or title.**
- **Prizes will be awarded as follows: $150.00 for first place, $100.00 for second place, and $50.00 for third place in each category.**

Photos are judged on category relevance (40%), creativity or artistic impression (40%), composition and arrangement (10%), and focus and sharpness (10%). Judges are selected from attending conference members. Photo entries may be submitted at the registration desk or placed on the designated table but be sure they are labelled first.

Good luck, photographers!

Calendar of Events 2018

October 15 – 18

Florida Aquatic Plant Management Society
www.fapms.org
Daytona Beach, FL

November 5 – 8

MidSouth Aquatic Plant Management Society
www.msapms.org/
Chattanooga, TN

October 30 – November 2

North American Lake Management Society
www.nalms.org
Cincinnati, OH

November 26 – 28

Texas Aquatic Plant Management Society
www.tapms.org
San Antonio, TX

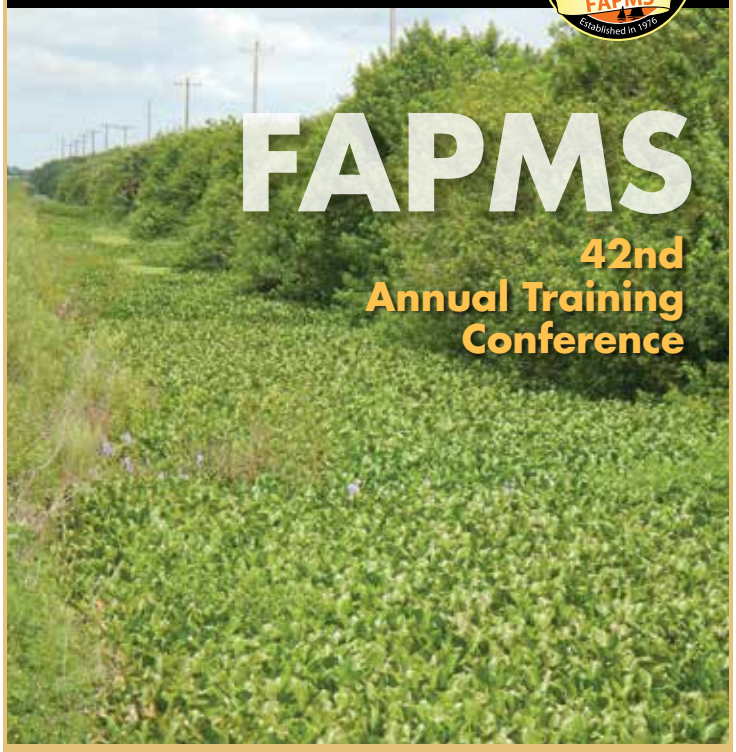
Editor's Note:

This issue of *Aquatics* magazine is my last as editor. Although it is always rewarding to see the finished product, this is my 12th (non-consecutive) issue and each one requires a lot of hard work tied to a computer. I'm retired now, and hard work is no longer in my plans except for pulling weeds from my yard and replacing them with wildlife friendly plants. It's time to sit back and enjoy the birds, bees, butterflies and other creatures that are the fruits of my outdoor labor. I have enjoyed working with everyone associated with *Aquatics* and feel fortunate to have had the opportunity to provide a quality publication to FAPMS and APMS chapter members. My best wishes to whomever my successor will be.

Karen Brown

Florida Aquatic Plant Management Society

Established in November 1976



FAPMS

42nd Annual Training Conference

2018 Annual Training Conference

Join us

October 15-18, 2018

Daytona Beach Hilton

Visit fapms.org for details!

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