A Q U A P H Y T E

A Newsletter about Aquatic, Wetland and Invasive Plants

Center for Aquatic and Invasive Plants (CAIP)

with support from

The Florida Fish and Wildlife Conservation Commission, Invasive Plant Management Section

UF | IFAS Extension UNIVERSITY of FLORIDA

Volume 34 Number 1 Spring 2017 **Gainesville, Florida** **ISSN 0893-7702**

A Look Inside

At the Center

By William Haller, Acting Director, Center for Aquatic and Invasive Plants

I believe that in past issues of AQUAPHYTE, I have mentioned that change in personnel, students and staff is the nature of higher education, and 2016 may have set a record. Dr. William (Bill) Overholt retired last summer from his Entomology Faculty position at the Indian River Research and Education Center in Fort Pierce. He had a distinguished career working on insect ecology and biological control of invasive weeds in Africa prior to his coming to UF/IFAS and working for a decade. He worked on the Osceola County Environmental Protection Agency project (2005-2010) searching for insects feeding on hydrilla in east Africa, worked on several other weeds such as Phragmites, Brazilian pepper (*Schinus terebinthifolius*), cogongrass (*Imperata cylindrica*) and, most recently, air potato (*Dioscorea bulbifera*). We congratulate Bill on his retirement, thank him for all his cooperation on the annual UF/IFAS Short Course and other IFAS programs, and wish him well in the future.

Congratulations also to at least two graduate students who have finished their degrees. Heather Van Heuveln finished her Master's degree with Dr. Greg MacDonald working on seed biology and control of Chinese tallow. Jon Gosselin finished his Master's degree on the biology of Illinois pondweed (*Potamogeton illinoensis*) with me in December and returned to his home state of New Hampshire just prior to the major northeastern snowstorms in mid-January 2017.

Katie Walters, Coordinator of the CAIP Invasive Plant Education Initiative and Plant Camp for Teachers for several years, resigned to pursue her Master's degree at the University of Georgia. Fortunately, we were able to hire Dehlia Albrecht to quickly assume Katie's duties and plan for the 2017 Plant Camp, as well as developing some new initiatives. Both Katie and Dehlia are highly motivated and are largely responsible for the continued success of the Education Initiative which is part of the CAIP's Information Office, coordinated by Karen Brown.

Speaking of the CAIP Information Office, I want to make our readers aware of an exciting new project that was just completed by this productive team. The CAIP is fortunate to have an endowment fund, thanks to several generous supporters, and we wanted to use the proceeds this year to do something new. It was decided to develop a poster on aquatic invasive plants that might grab the attention of secondary school science students to interest and inform them of potential future opportunities to study in this field. I wanted to thank our donors and to recognize the contributions of Mindy Lighthipe, the botanical artist on this project, and the CAIP Information Office for overseeing this project. See more about the poster on page 6.

Also in 2016, the UF/IFAS Administration authorized employment of three faculty positions related to the CAIP. The first new hire is Dr. Carey Minteer who has arrived at the Indian River Research and Education Center (Fort Pierce) to become an Assistant

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Notes from the Enloe Lab

By Stephen Enloe, Invasive Plant Extension Specialist, Center for Aquatic and Invasive Plants

Greetings from Gainesville. 2016 and 2017 have been extremely busy in the Enloe Lab. We have several projects rolling along on a wide array of both aquatic and upland species. One of the primary projects is the current evaluation of graminicides (grass specific herbicides) for control of aquatic invasive grasses in Florida. Following approval of Experimental Use Permits for sethoxydim (2015) and fluazifop-p-butyl (2016), we have established test plots near Okeechobee, Bonita Springs and Clewiston to examine the effectiveness of these grass specific herbicides for torpedograss (*Panicum repens*) and paragrass (*Urochloa mutica*) control. To date, selectivity data collected indicate

Field work on paragrass and torpedograss from C-139 annex. Can anything stop this grass?

these graminicides do not negatively impact aquatic non-grass species including other monocots, and would provide a good alternative to glyphosate and imazapyr. Early efficacy results have indicated sequential applications can control torpedograss when applied in the late spring and fall. However, the length of control, especially in relation to water levels, has yet to be determined. We are continuing these studies and initiating new projects on West Indian marsh grass (*Hymenachne amplexicaulis*) control on the Kissimmee River this summer.

On the Old World climbing fern (*Lygodium microphyllum*) front, 2016 marked the hire of Jonathan Glueckert at the Center; a field biologist whose focus is solely on Old World climbing fern biology, ecology, and management. Jonathan has already established over 260 OWCF research plots across south Florida at a number of sites on public and private lands. The initial focus area is evaluation of new herbicide technologies to improve control and reduce non-target damage. Additionally, Jonathan is examining the use of drone technology to detect Lygodium patches and assist in pre- and post-treatment data collection. The drone has been extremely useful to date and its contributions will increase. Jonathan will also be examining the utility of a new drone capable of herbicide application, the DJI Agras Spraying Drone. Jonathan's position is largely due to the extremely generous support of the Florida Fish and Wildlife Conservation Commission (FWC), South Florida Water Management District, and Arthur A. Marshall Loxahatchee National Wildlife Refuge.

Regarding *Ludwigia* research, Dr. Colette Jacono and graduate student Afsari Banu have been making considerable strides on characterizing the morphological differences between *Ludwigia grandiflora* and *Ludwigia hexapetala*. Previous taxonomic efforts have not provided clear distinctions and many aquatic managers have struggled to properly identify these closely related species. In early growth studies, we have also found high levels of auto fragmentation in *L. grandiflora*. This has not been previously characterized and we have initiated new studies to quantify its role in invasion success. Afsari also has studies underway examining differential herbicide susceptibility between the two species. Early dose response work has found certain *L. grandiflora* populations to be less sensitive to both glyphosate and imazamox. The FWC has been instrumental in providing support for this work.

Graminicide research: Left side is untreated. right side received an airboat treatment of one of the graminicides.

On the coral ardisia (*Ardisia crenata*) front, we have been working closely with Dr. Pat Minogue and his post-doc, Richie Cristan, at the IFAS Quincy Research and Education Center and Dr. Brent Sellers at the Range Cattle Research and Education Center in Ona. We have been examining four different formulations of triclopyr (yes, we now have four!), imazamox, and flumioxazin in backpack foliar trials. Initial results suggest that not all triclopyr formulations have provided comparable activity and the addition of flumioxazin does not improve control. Probably even more importantly, application volume and good coverage are absolutely critical, and commonly used

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Update on APIRS

By Karen Brown, Coordinator, Educational Media/Communications, Center for Aquatic and Invasive Plants

When the **Aquatic and Invasive Plant Information Retrieval System (APIRS)** was begun in the 1980s, the name of our parent research center was the Center for Aquatic Weeds (and the sign on our building still says so). The focus of APIRS was on compiling a collection of published research and literature on aquatic weed control, particularly water hyacinths and hydrilla. End users in those years were field operations personnel and agency managers in the United States and in developing countries lacking the research capabilities available in the US. At that time, we were funded by the US Agency for International Development and, later, the US Army Corps of Engineers, thanks to giant rafts of aquatic weeds blocking our state's navigable waterways.

In those days, we wrote letters to researchers requesting reprints of their research, joined professional societies to obtain their journals, and scoured UF libraries and other research centers for citations. We had a lot more personal rapport with researchers, especially those we wrote to who, in turn, were interested to learn and make use of the APIRS database. We performed and printed requested literature searches and mailed them to researchers.

But in the early 1990s, a large shift in our collection of literature was beginning to take place. Invasive plants in publicly owned natural areas grew into a problem in Florida beginning with melaleuca (*Melaleuca quinquenervia*) in the Everglades National Park. The Florida agency charged with aquatic weed management was also then charged with managing invasive plant species in these upland natural areas. Our funding shifted to what is now the Florida Fish and Wildlife Conservation Commission (FWC). The name of our research center changed to the Center for Aquatic & Invasive Plants. The nonprofit Florida Exotic Pest Plant Council was formed and their first newsletter featuring a list of the 23 "most invasive species" appeared in 1991. It also announced Dr. Ken Langeland's new extension publication, *Exotic Woody Plant Control*, which presented control methods for Australian pine (*Casuarina equisetifolia*), Brazilian pepper (*Schinus terebinthifolius*), Asiatic colubrinae (*Colubrina asiatica*), and melaleuca. Two books were also announced: *Ecology of Biological Invasions of North America and Hawaii* (Mooney and Drake 1986) and *Biological Invasions: A Global Perspective* (Drake, et al. 1989). Chinese tallow (*Sapium sebiferum* [*Triadica sebifera*]) and carrotwood (*Cupianopsis anacardioides*) were recognized as "possible" new invasive exotic plant species; both are now known as major problems and are FLEPPC Category I species. In 1999, the UF/IFAS Invasive Plant Working Group was formed to address the issue of the Agronomy faculty referring to non-native species as invasive at the same time the Ornamental Horticulture faculty were recommending the same species for landscape uses. The UF/IFAS Assessment of Non-Native Plants in Florida's Natural Areas was created to use "literature-based assessment tools to evaluate the invasion risk of non-native species that occur in the state, new species proposed for introduction, and novel agricultural and horticultural selections, hybrids, and cultivars." This tool was to be used by all UF/IFAS faculty to determine invasiveness. The goal of the UF/IFAS Assessment is to "reduce non-native plant invasions in Florida and throughout the Southeast US for protection of natural and agricultural areas." Aquatic and natural area invasive plants saw greater recognition and action by other state and federal agencies as well.

In 1995, we went online and thus began the successive changes that revolutionized our world and most everyone else's. Today the mission of APIRS is still to support research into the biology, ecology, and management of aquatic weeds by continuing to add materials to the database. But the volume of literature seemed to explode between then and now, as did the awareness and problems associated with invasive species. Research interconnections grew and we were collecting on more and more species in more and more areas of research. Modeling, mapping and risk assessments evolved rapidly with the advancement of technology. Invasion science journals appeared but peer-reviewed invasive plant literature remained scattered among hundreds of journals, meeting proceedings, and books.

So the landscape and technology changed but our mission has not, except for the range of information collected. While we once collected everything we could find on all aquatic plant species, we now focus on aquatic invasive plants and invasive plants in natural areas of Florida and the southeastern US. Our mission is still accomplished through the collection and citation of peer-reviewed research and gray literature that supports research and management activities on invasive plant species in Florida. Examples of gray literature include Aquatic Plant Management Society (APMS) symposium proceedings and position statements, theses and dissertations, state and federal agency publications and reports (Florida Fish and Wildlife Conservation Commission field surveys, Florida Water Management District research reports, US Army Corps of Engineers—Aquatic Plant Control Research Program reports, etc.) The database is still a free searchable database accessible from the UF/IFAS Center for Aquatic and Invasive Plants website.

Target users are still researchers and managers working on invasive plant species in Florida's aquatic and natural areas, including professional researchers, natural resource managers and biologists, agency personnel, field personnel, and other stakeholders in resource management. Other users

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Florida Invasive Plant Education Initiative & Curriculum Update

By Dehlia Albrecht, Coordinator, Education Initiative, Center for Aquatic and Invasive Plants

The Florida Invasive Plant Education Initiative was created in 2005 to provide educators with the information and resources needed to teach students about the harmful impacts of invasive plants on our natural areas and neighborhoods. Since then, the Education Initiative has offered top-notch workshops, lesson plans, and educational resources for teachers and informal educators throughout the state of Florida.

Plant Camp 2016 Report

Thanks to our sponsors, presenters and teacher participants, another successful Plant Camp was held from June 20th-24th, 2016. Teachers from across the state traveled to Gainesville for this truly unique, hands-on learning experience. Presenters from the UF/IFAS Center for Aquatic and Invasive Plants (CAIP) and affiliated departments, state agencies, and the private sector provided informative sessions throughout the week. This was the 11th such workshop put on by the joint efforts of UF/IFAS CAIP and the Florida Fish and Wildlife Conservation Commission (FWC). A lot has changed over the years, but our focus has always been to create an exciting, novel and interactive learning experience on the topic of invasive plants and their management. After the workshop, teachers are provided with lesson plans, materials, and continuing support to introduce this important topic in their classrooms and to teach it with confidence! Over 300 teachers have attended our workshops and, in turn, have taught approximately 78,000 students over the past years!

Plant Camp attendees learn about aquatic plant management during their field trip to Lake Tohopekaliga in central Florida

Each year, teachers are given a pre- and post-test and survey to determine attitude changes and knowledge gains. The pre- and post-test includes eleven knowledge-based questions and 4 opinion-based questions that are identical on both tests. Of the knowledge-based questions, the majority showed a positive percent gain from pre- to post-test. The largest gains were on the definitions of native and non-native (78% and 46% respectively). Additionally, a multi-component question on the various facets of biological control showed substantial knowledge gains on three of the five components (24%, 27%, and 82%).

The survey asked the teachers' opinion on methods of invasive plant management – chemical, mechanical, biological, and physical. Below are graphs that illustrate the difference in survey responses from the pre- and post-test for the question, "Please indicate whether you favor or oppose the use of the following methods for invasive plant control." Blue indicates pre-test scores, while red designates post-test scores. For both biological and chemical control, many participants' opinions changed from pre- to post-test to favor these types of control methods. Teachers' written responses expand on their changing opinions:

"All of these methods are needed. Before plant camp, I had no idea how much had to be considered when dealing with invasives – how much it costs, area, how everything interacts, that some invasives are "wanted" and that [all] has to be taken into account."

"I have a greater understanding of the forethought, research and careful methods of herbicide use and bio-agents."

Participants were also asked to rate their opinions on the importance of teaching about invasive species, their plans to implement Plant Camp curriculum, and any obstacles to implementation. Out of the 22 teachers who completed a post-workshop survey in 2016, 18 felt "prepared to implement the lessons learned at Plant Camp" and 2 felt "maybe" prepared. The remaining 2 participants did not respond to the question. All 22 participants indicated that they planned on implementing invasive species curriculum in their classroom within the next 6 months. The 3 most common teacher needs were: "More time to revise current curriculum to include what I learned at Plant Camp," "More flexibility in my curriculum," and "More money for supplies." The Education Initiative continues to support these teachers once Plant Camp is over, with free materials available on loan and by developing and updating lesson plans.

Lakeville – A Natural Resource Management Activity

One way we continue to support Plant Camp teachers is by visiting their classrooms and implementing lessons on invasive species with their students. For the past 5 years we have received funding through FWC to visit classrooms across the state each year to implement *Lakeville – A Natural Resource Management Activity*. *Lakeville* teaches students about ecosystems, natural resource management, and civic responsibility. Three "sessions" make up the *Lakeville* Unit, each designed to encourage critical thinking while enhancing students' environmental knowledge. Sessions 1 and 2 provide students with background information and Session 3 brings it all together in a fun game-show style activity that gives students a chance to use their persuasive debate skills and

make management decisions about a local freshwater habitat. Through the course of the *Lakeville* unit, students learn how social, political, and environmental concerns all must be considered in order to make management decisions. The goal is to prepare students for their future role as citizens and environmental stewards. Students take pre- and post-tests to measure knowledge gains after participating in the *Lakeville* activity. In the last school year, we saw an average gain of 24% overall.

Continuing to Spread Beyond Florida

Last year we provided an update on efforts to spread our invasive plant curriculum outside of Florida. This year, the Aquatic Plant Management Society (APMS) sponsored two teachers from Tennessee to attend Florida Plant Camp, with the goal of taking information back to their districts to establish aquatic plant management outreach efforts. The Tennessee Valley Authority then led their very own two-day Plant Camp that was co-sponsored by APMS, the Aquatic Ecosystem Restoration Foundation, and the MidSouth Aquatic Plant Management Society. The Tennessee Plant Camp taught basic plant identification techniques and aquatic and terrestrial plant science, as well as aquatic plant management tools and methods to elementary through high school teachers. This workshop provided Tennessee teachers with the background and materials to teach students about the environmental and economic impacts of invasive species in and on local lands and waters.

New National Silent Invaders video!

Thanks to generous sponsorship from the Aquatic Plant Management Society (APMS), we were able to develop a national version of our Silent Invaders video. Silent Invaders is an audio-visual presentation used to provide background information on native, non-native, and invasive plants for Plant Camp and *Lakeville* and is also used with other lesson plans provided by the CAIP Education Initiative. The national version of Silent Invaders will be an extremely beneficial tool to teach about invasive species and to continue to expand Plant Camp and *Lakeville* into other regions. The video is now available on the CAIP Education Initiative website and will be added to the Aquatic Plant Management Society website soon.

A new and improved Education Initiative website!

The Education Initiatives' website recently went through a major overhaul. Our website provides educational materials and lesson plans to educators and also offers a wide variety of information and audio-visual presentations for students. Our redesigned site has a new look and better organization for our educators. Be sure to check it out at

plants.ifas.ufl.edu/education

Outreach – We're Pulling for Bats!

The Education Initiative participates in many outreach events throughout the year, but this past year we co-hosted an exciting new local event in partnership with the City of Gainesville Parks, Recreation and Cultural Affairs Department's Gainesville Greenway Challenge, and the Florida Invasive Species Partnership (FISP). The event, "We're Pulling for Bats!," was held in recognition of Bat Week, (October 24th-31st, 2016), which is dedicated to celebrating bats and all of the benefits they provide to the ecosystem and to humans through pollination and pest control. Invasive plant removal events were encouraged to help improve habitat and food for bats (and other wildlife). Almost 60 volunteers dedicated their Saturday morning and removed 16 large garbage bags of invasive coral ardisia and camphor from Hogtown Creek Headwaters Nature Park in Gainesville, Florida! We thank our co-hosts for their help with this event, Lubee Bat Conservancy for donating a beautiful bat house as a grand prize, and of course, our amazing volunteers for their hard work and dedication!

Meet our newest Education Initiative team member and FWC partner!

The Education Initiative welcomes our newest team member, Dehlia Albrecht. Dehlia coordinates the Florida Invasive Plant Education Initiative, including the organization and preparation for our annual educator workshop (Plant Camp) and the preparation and dissemination of Education Initiative curricula about invasive plants for grades 2-12. She also assists with other outreach efforts at the Center for Aquatic and Invasive Plants. Dehlia earned Bachelor's degrees in Psychology (Benedictine University) and Biology (Aurora University) and holds a Master of Science in Entomology and Nematology from the University of Florida. She has had experience in curriculum development and assessment, teaching in formal and informal educational settings, public outreach, evaluating program outcomes, and in conducting both biological field and laboratory research. Dehlia is passionate about teaching and learning, particularly in the field of environmental education.

The Education Initiative would also like to welcome the newest member in our FWC partnership, Wei "Samantha" Yuan! Samantha is the Research and Outreach Manager and Contract Administrator for the FWC Invasive Plant Management Section. We are happy to have Samantha on board and look forward to working with her on Plant Camp and other education and outreach efforts!

The CAIP Invasive Plant Education Team
Dehlia Albrecht, Program Coordinator
Lynda Dillon, Program Assistant
Italo Lenta, Project Assistant
Charlie Bogatescu, Web/IT Specialist
caip-education@ufl.edu

At the Center, continued from page 1

Professor in the Entomology/Nematology Department. Carey will develop research and extension programs on the biological control of invasive weeds, of which she has extensive experience. Dr. Minteer's master's and doctorate work at the University of Arkansas was directed towards the biological control of spotted knapweed (*Centaurea stoebe* subsp. *micranthos*). For the past two-plus years, she has conducted research at the USDA-ARS Invasive Plant Research Laboratory in Davie, Florida. She has been largely responsible for providing leadership in the rearing and releasing of *Megamelus scutellaris* for biological control of water hyacinth (*Eichhornia crassipes*). See more on Dr. Minteer on page 15.

A new position in Applied Algology also was approved and is located at the UF/IFAS Fort Lauderdale Research and Education Center. Following an extensive national search, Dr. Dail Laughinghouse accepted the position and began work in January 2017. Dail conducted research on blue-green algae for his Bachelor of Science degree in Brazil, then studied "Algal Turf Scrubbers™", receiving his PhD from the University of Maryland in 2012. Since then, he has conducted post-doctoral research in Belgium, Norway, and at the Smithsonian Institute in Washington, DC, as well as other institutions. See more about Dr. Laughinghouse on page 14.

We look forward to collaborating with both of these experienced new faculty members and welcome them to the IFAS invasive weed control team.

In the summer of 2016, Jonathan Glueckert, a biologist with extensive field experience with invasive plants, was hired by Dr. Stephen Enloe to work exclusively on the biology and management of Old World climbing fern (*Lygodium microphyllum*) (OWCF). Jonathan works out of the U.S. Department of Interior's Loxahatchee National Wildlife Preserve and receives extensive support from the South Florida Water Management District and the FWC Invasive Plant Management Section. Old World climbing fern is one of the most invasive plants in South Florida and hopefully this intensive effort will lead to more cost efficient and environmentally sound management programs. We welcome Jonathan to the program and wish him great success on this project.

Finally, I want to acknowledge and thank all the faculty, staff and students who have contributed so much to the CAIP since its formation in 1978. We could not have developed such a widely recognized Center without hundreds, if not thousands, of interested stakeholders throughout this country and overseas. This is likely my last few months as Acting Center Director since two candidates will be interviewing for the CAIP Director position in April 2017. I fully expect to remain close to the CAIP and continue to work on special projects. How I pursued this career is a "whole 'nother" story, but I would not change a thing in my past, largely due to the great people I have had the pleasure to work with.

William Haller, Ph.D.
Professor
whaller@ufl.edu

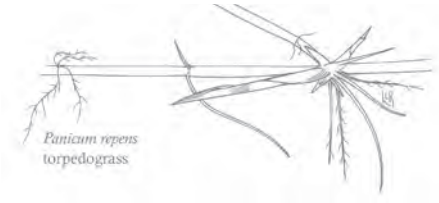
Notes from the Enloe Lab, continued from page 2

This is no way to start the day!
Invasive grass research at C-139 Annex, south of Clewiston.

backpack application volumes of 40 GPA have not worked well. This work is ongoing throughout 2017 and we will be initiating new studies. Once again, many thanks to FWC for supporting this work.

Be on the lookout for new updates from Cody Lastinger's doctoral research on novel approaches to hack-and-squirt individual plant treatments. Cody has examined ultra-low application volumes of aminocyclopyrachlor and aminopyralid applied in individual hacks to eight different invasive tree species in Florida. We are finding that these herbicides may be game changers for hack-and-squirt work, increasing efficiency and reducing herbicide used. This work is in partnership with Dr. James Leary at the University of Hawaii, who pioneered this technique.

Finally, as always, many thanks go out to Carl Della Torre, Andrew Gocek, Kate LeGros, and Sherry Bostick for their outstanding contributions in the greenhouse and lab. We could not do it without you!



Stephen Enloe
Associate Professor
sfenloe@ufl.edu

INVASIVE PLANTS
1. Alligatorweed (*Alternanthera philoxeroides*) - an emersed plant native to South America
2. Water lettuce (*Pistia stratiotes*) - a free-floating plant; nativity disputed
3. Torpedograss (*Panicum repens*) - a wetland grass native to Africa, Asia, Europe
4. Water hyacinth (*Eichhornia crassipes*) - a free-floating plant native to Brazil
5. Giant salvinia (*Salvinia molesta*) - a floating plant native to South America
6. Hydrilla (*Hydrilla verticillata*) - a submersed plant native to Africa, Asia, and Europe

NATIVE ANIMALS
7. Largemouth bass (*Micropterus salmoides*)
8. Yellow-bellied slider (*Trachemys scripta scripta*)

INSECTS
9. Alligatorweed flea beetle (*Agasicles hygrophila*) - a biological control agent introduced to control alligatorweed
10. Dragonfly - a beneficial native insect that eats mosquitos
11. Dragonfly nymph - a casing after emergence
12. Mosquito - an insect pest that can harm humans and animals; it can breed beneath dense aquatic weed infestations

For more information on the above species, visit the University of Florida / IFAS Center for Aquatic and Invasive Plants website: **plants.ifas.ufl.edu**

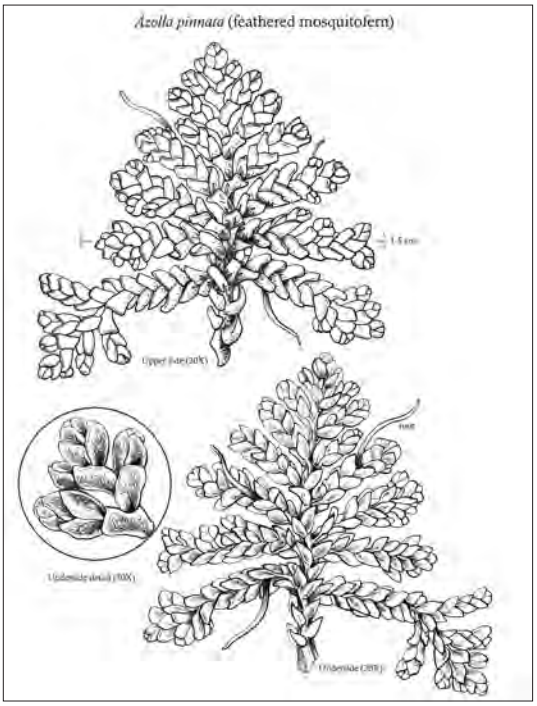
Please check out our new educational poster, **Protect Our Waters – Stop the Spread of Invasive Plants**. We are excited to have this new product for educators and aquatic plant management enthusiasts. This 18" x 28" poster was conceived and executed by the CAIP Information Office and botanical illustrator Mindy Lighthipe. Mindy put her outstanding talents to use in depicting 6 of Florida's most invasive aquatic plants. As you can see, she also incorporated insects (including one successful biological control agent) and some native animals impacted by invasive plant infestations.

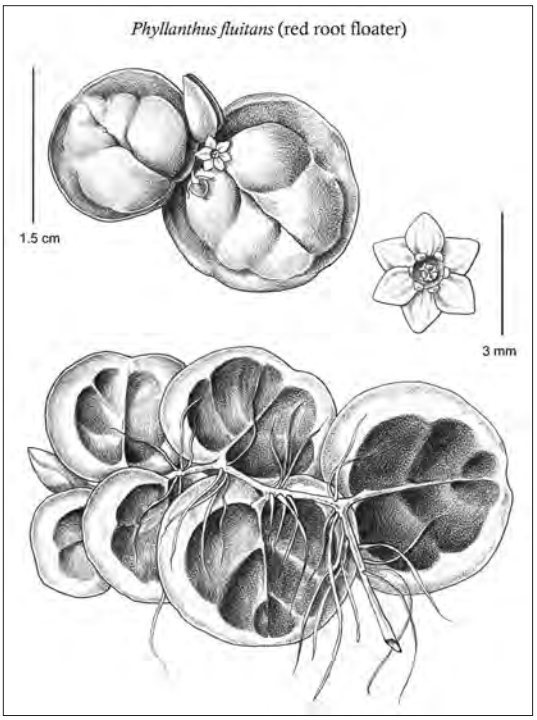
The poster was made possible with funds from the CAIP Endowment Fund. The main intent of the poster is to provide an attractive visual aid on aquatic invasive plants for secondary school students to make them aware of this subject and hopefully spark an interest. Laminated copies of the poster will be provided to Plant Camp and other Florida teachers for classroom use; non-laminated copies will be made available to aquatic plant management training and research conference attendees, and others interested in this subject.

Mindy is a professional artist with certification in botanical illustration from the New York Botanical Gardens. She teaches Scientific Illustration at the University of Florida and had a solo exhibition at the Florida Museum of Natural History. Learn more about her work at www.MindyLighthipe.com.

New Botanical Illustrations

The Center had the good fortune to receive funding for additional botanical illustrations to add to our collection (see plants.ifas.ufl.edu/plant-line-drawings/ for the full collection). Botanical illustrator Mindy Lighthipe was hired to provide these three new line drawings of invasive species threatening Florida's waterways. Dr. Colette Jacono provided botanical expertise, courtesy of Dr. Stephen Enloe. The Florida Aquatic Plant Management Society (FAPMS) graciously provided funding.





Tropical American watergrass, *Luziola subintegra*: a. Wide open sheaths connect the leaf to the main stem; note the long membranous ligule where the leaf joins the sheath; b. Female flower stalk; c. Male flower stalk; d. Female flower with stigmas protruding; e. Male flower with anthers free; f. Branching seed stalk; g. Fruit (seed) enclosed in lemma and palea, having lost interveinal tissue.

See articles featuring these illustrations in the following issues of *Aquatics* magazine, the official publication of the Florida Aquatic Plant Management Society (FAPMS).

A Giant Watergrass from the American Tropics by Colette Jacono. Aquatics Vol. 38(1):12-16. Spring 2016.
Taking a Second Look at Floating Ferns by Colette Jacono. Aquatics Vol. 38(2):18-23. Summer 2016.
Update of Red Root Floater, *Phyllanthus fluitans*, by Michael Sowinski. Aquatics Vol. 39(1):in press. Spring 2017.

Produced by UF / IFAS Center for Aquatic & Invasive Plants. Funded by FAPMS, Inc.

Dr. Lyn Gettys at Orlando Wetlands Park in Christmas, FL, setting up plots for bulrush restoration research funded by the Florida Fish & Wildlife Conservation Commission's Aquatic Habitat Restoration/Enhancement in a collaboration with the City of Orlando and the University of Florida. With Ian Markovich (left), Dr. Gettys (center) and Kyle Thayer (distant right). December 2016.

Update on APIRS, continued from page 3

still come from around the country and the world to use the APIRS database.

Collection of materials on aquatic and invasive plant species is based on the Florida Prohibited Aquatic Plants List, the Florida Noxious Weeds list, the UF/IFAS Assessment of Non-Native Plants in Florida Natural Areas, the Florida Exotic Pest Plant Council (FLEPPC) Category I and II Lists of Invasive Plant Species (2017), and the Federal Noxious Weeds list. APIRS personnel also search for published invasive plant research from areas with similar climates to Florida including the southeastern US; with similar invasive plant species such as Australia and South Africa; and from the native ranges of some of the most problematic species (e.g., Asia). In addition to the most recently published studies, the collection and cataloging of retrospective literature continues, especially when a new invasive species is identified.

All relevant literature found is cataloged using our own categories and keywords and cited in the APIRS database. Full text of publications is not provided although we hope to change that soon by providing PDF files of non-copyrighted materials.

Is APIRS still relevant? We believe so. Most people think that everything is readily available online but this is not always the case. Many journals charge for access, or are only available to university affiliated library patrons; many older items (reports, proceedings, etc.) were never made available to the public – online or otherwise. We physically possess many items that are not available online, and care is taken to preserve these items and secure them for future researchers. In contrast, many older items that were once unavailable are now being scanned and placed online and we can now access and catalog them in APIRS. We also receive literature collections from retiring researchers that often contain valuable materials that we archive and catalog for the database. And we are up to date. We have more than 1,000 citations to literature published in 2016 and, as of this writing (3/30/17), we have almost 40 published in 2017.

APIRS is now back online after undergoing the massive transfer of 93,000+ individual records, most of which have been checked, refined and finalized. The new APIRS system now has more modern database conventions with advanced searching and sorting options. Usability issues have not been fully repaired, however, so users are encouraged to request literature searches of APIRS by contacting APIRS Coordinator, Karen Brown, at kpbrown@ufl.edu. To use the database yourself, go to ***plants.ifas.ufl.edu/apirs***

Note: Please see **From the Database** on pages 10-13 for recent additions and/or items of particular interest in the APIRS database. We also ask researchers to search APIRS for your own publications (simply enter your last name in the Authors field and hit the search button) and notify or send us missing items that would be relevant. In this way, we all benefit from the Aquatic Plant Information Retrieval System.

Ecology of Biological Invasions of North America and Hawaii. Ed. By H.A. Mooney and J.A. Drake. Springer-Verlag, New York, 1986.

Biological Invasions: A Global Perspective. Ed. By J.A. Drake et al. John Wiley & Sons, New York, 1989.

UF/IFAS Assessment of Non-Native Plants in Florida's Natural Areas, *assessment.ifas.ufl.edu*

Karen Brown
Information Office Coordinator
kpbrown@ufl.edu

APIRS Staff
Lisa Olsen, Reader/Cataloger
Anne Taylor, Library Assistant

FROM THE DATABASE

The APIRS database now contains almost 95,000 annotated citations to the aquatic and wetland plant literature and to the literature on aquatic and natural area invasive plant species in Florida. A small sample of recent additions to the APIRS collection is provided below. References cited include peer-reviewed research articles, government reports, books and book chapters, dissertations and theses, and gray literature such as abstracts from proceedings. To obtain full-text of citations, contact your nearest academic library or search online.

For a literature search from APIRS, contact Karen Brown at **kpbrown@ufl.edu**

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Go-To Guy for Algae Bloom Solutions

By Jack Payne, Senior VP for Agriculture and Natural Resources, UF / Institute of Food and Agricultural Sciences

Dail Laughinghouse wants to keep CNN from returning to Florida communities to get more pictures of green slime.

He's an algae slayer. And he saw a dragon in the footage of last summer's bloom. It so happened that the timing of the images coincided with a help-wanted sign at the University of Florida's Institute of Food and Agricultural Sciences. UF/IFAS sought the state's first applied phycologist, an algae scientist, to work at the Fort Lauderdale Research and Education Center.

Laughinghouse saw a huge opportunity for science to keep our communities healthy, the water surfaces clear, and the crisis-chasing media away. Yet the slime will return, and he intends to be the go-to guy for the science of solutions. As another UF/IFAS scientist said, we want Laughinghouse to be the expert CNN will call in search of explanations to go with their images.

He'll also be the guy you go to for what to do next and for information on how to make these episodes less frequent and less acute. Universities get lampooned for our obsessions with what look like esoteric things. Those little things, like algae, can get big quickly. So we need specialized knowledge of those little things.

That's why, when UF/IFAS got state funding for a new weed scientist, we hired a phycologist.

Esoteric? You bet. The Phycological Society of America reports about 300 professional members.

And you're unlikely to meet many folks at parties who boast, as Laughinghouse did in his application, "I am well known in the cyanobacterial community." In fact, one of his new bosses at the Ft. Lauderdale Research and Education Center joked that Laughinghouse's expertise is so unusual that it's kind of like speaking Klingon.

Speak he does, rapidly, enthusiastically, and with a sense of urgency about the work he'll do in the local area, state and beyond.

He'll tell you about staying up late in his bedroom as a 19-year-old looking at algae under a microscope because he couldn't get enough of it. He can tell you about how he's looked at algae near both poles and in the tropics, in his native Brazil and in Washington, D.C., where he was contracted as a senior algae scientist at the Smithsonian Institution.

He says without a trace of irony, "Algae is not just my job. It's my passion."

It wasn't immediately evident to us university types where to place Laughinghouse. We eventually slotted him in the UF/IFAS agronomy department, where he can work with crop scientists on the relationship between nutrient loads and algae.

Laughinghouse will also be affiliated with the UF/IFAS Center for Aquatic and Invasive Plants, where he can collaborate with experts who can help him slay algae without threatening water purity with too much or the wrong kind of algaecides.

UF/IFAS's job is to address problems with science. In many locations around the state, that means algae science. Success would be for Laughinghouse to be welcomed into your community as an honest broker of science, not someone who's coming in to point his Ph.D. finger in blame. In fact, we hope Laughinghouse's science can be a bit of a social salve as well. He arrives knowing full well that there are deep divisions over whose responsibility it is for preventing and controlling algae blooms in Florida.

That's a policy question, and people are entitled to their opinions and ideologies to guide their approaches. They're not entitled to their own facts. My vision is that the work of Laughinghouse, UF/IFAS algae ecologist Ed Phlips, and partner research agencies will provide a common understanding of the problem. Ideally, that will help create consensus around political, social, and economic solutions.

The state Legislature invested in an expansion of UF/IFAS expertise, and has given us latitude in determining what type of expertise we need. We didn't wait for images of the algae bloom to announce that need loud and clear. Laughinghouse will be looking at algae, blooms or not, through a microscope and knee-deep in swamps.

Success means you'll be seeing a lot less algae on our waterways, and a lot less on your computer and television screens.

Contact Dail Laughinghouse, Ph.D.
Assistant Professor
hlaughinghouse@ufl.edu

This article was originally published online in the Sun Sentinel, March 1, 2017, at sun-sentinel.com

New UF/IFAS Scientist Focuses on Biological Control

By Robin Koestoyo

Carey Minteer, a research professor with expertise in the use of biological controls to manage invasive plants, has joined the University of Florida Institute of Food and Agricultural Sciences. Florida has the most invasive species in the country, with 28 ports of entry, including seaports, airports and train stations.

Minteer, who is also an expert in geographic information systems, is based at the UF/IFAS Indian River Research and Education Center in Fort Pierce, Florida. She is collaborating with Professor James Cuda, UF/IFAS Extension agent Ken Gioeli and other scientists to fight the state's most noxious weeds, including the Brazilian peppertree, one of Florida's most widespread invasive plants.

"Dr. Minteer has demonstrated effectiveness in investigating the biological control of invasive weeds in the central U.S.A. and Florida," said Ronald Cave, UF/IFAS Indian River REC interim director. "Her expertise in biological control is strengthened with her knowledge of sophisticated mapping technology for spatial analysis of large infestations, thereby bringing a new dimension of research capability to the laboratory."

Minteer joined the UF/IFAS laboratory after two years of working as a postdoctoral research entomologist with the U.S. Department of Agriculture's Agricultural Research Service Invasive Plant Research laboratory in Fort Lauderdale. There, she led efforts to study and address south Florida's water hyacinth and water lettuce problems.

Cave said Minteer's familiarity with geographic information systems, or GIS, brings the most innovative invasive species research technique to the UF/IFAS Fort Pierce laboratory. "With GIS mapping platforms, I can use satellites to collect spectral signatures from plants, or light spectrums," said Minteer. "I can select a large swath of land and collect data about the extent of an infestation of an invasive species and, over time, monitor changes in that infestation."

The science involved in the biological control of invasive plant species is sophisticated, and when successful, saves millions of dollars annually because the need for expensive mechanical removal and, or, chemicals is either obsolete or greatly reduced, Minteer said. "Sharing the safety and efficacy of biological control with the public is important to me so they can understand what an amazing tool it is to protect their parks and natural areas," she said.

Minteer completed a Ph.D. in entomology, with a minor in GIS, in 2012 at the University of Arkansas. She earned a master of science in biology in 2007, also at the University of Arkansas. At the University of Central Arkansas, Minteer earned a bachelor of science in biology in 2000.

Contact Carey Minteer, Ph.D.
Assistant Professor
c.minteerkillian@ufl.edu

Upcoming Meetings

April 12 - 14, 2017
Florida Exotic Pest Plant Council Annual Conference
Melbourne, Florida
fleppc.org

May 8 - 11, 2017
UF / IFAS Aquatic Weed Control Short Course
Coral Springs, Florida
conference.ifas.ufl.edu/aw

May 9 - 11, 2017
North American Invasive Species Forum
Savannah, GA
invasivespecies2017.org

June 6 - 9, 2017
Florida Lake Management Society Symposium
Captiva, Florida
flms.net

July 16 - 19, 2017
Aquatic Plant Management Society Conference
Daytona Beach, Florida
apms.org

October 16 - 19, 2017
Florida Aquatic Plant Management Society Conference
Lake Buena Vista, Florida
fapms.org

October 22 - 26, 2017
20th International Conference on Aquatic Invasive Species
Fort Lauderdale, Florida
icais.org

November 6 - 9, 2017
North American Lake Management Society Symposium
Denver, Colorado
nalms.org

Teacher field trip on Lake Tohopekaliga - Plant Camp 2016
Photo by Harvey Halprin

AQUAPHYTE

AQUAPHYTE is the newsletter of the Center for Aquatic and Invasive Plants (CAIP) of the University of Florida / Institute of Food and Agricultural Sciences (UF/IFAS). Support for CAIP is provided by UF/IFAS and the Florida Fish and Wildlife Conservation Commission, Invasive Plant Management Section.

AQUAPHYTE is sent to managers, researchers and agencies in numerous countries around the world. Comments, announcements, news items and other information relevant to aquatic and invasive plant research are solicited.

Inclusion in **AQUAPHYTE** does not constitute endorsement, nor does exclusion represent criticism, of any item, organization, individual, or institution by the University of Florida.

EDITOR: Karen Brown, kpbrown@ufl.edu

UF IFAS UNIVERSITY of FLORIDA

University of Florida
Institute of Food and Agricultural Sciences
Center for Aquatic and Invasive Plants
7922 NW 71st Street, Gainesville, FL 32653-3071 USA
caip-website@ufl.edu • plants.ifas.ufl.edu