Aquatics

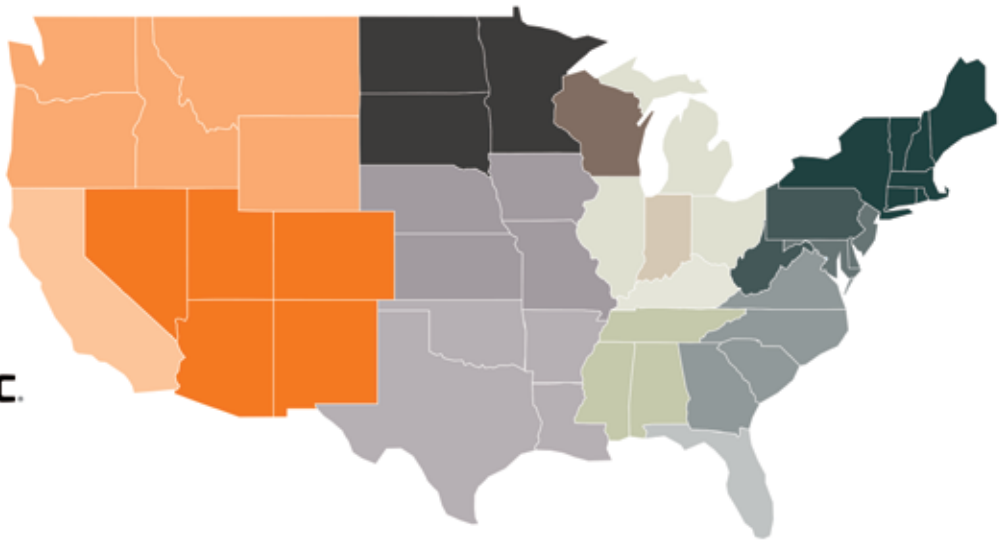
WINTER SPECIAL 2023

A Publication of the Florida Aquatic Plant Management Society

FROM COAST TO COAST, HELENA IS YOUR FULL-SERVICE WEED MANAGEMENT PARTNER

Helena Agri-Enterprises, LLC has the People, Products and Knowledge to assist with your management of nuisance aquatic vegetation. Contact a Helena representative in your area to learn more.

KINETIC.
INDUCE.
DYNE-AMIC.
KAMMO PLUS.



TRYCERA.
OPTIMA.
HARDBALL.
DLZ.

OR, WA
Scott Tweedy | 509.961.2621
TweedyS@HelenaAgri.com

ID, MT, UT, WY
Rick Erickson | 530.434.3381
EricksonR@HelenaAgri.com

CA
Shaney Emerson | 530.434.3381
EmersonS@HelenaAgri.com

AZ, NV
Paul Goolsby | 602.206.5288
GoolsbyP@HelenaAgri.com

NM
Dan Blaeser | 575.644.3060
BlaeserD@HelenaAgri.com

CO
Judd Fitzgerald | 303.913.2574
FitzgeraldJ@HelenaAgri.com

AR, LA, OK, TX
Kelly Duffie | 281.415.7301
DuffieK@HelenaAgri.com

KS, ND, NE, MO, SD
Mark Person | 816.560.5448
PersonM@HelenaAgri.com

MN, WI, IA
Mike Maine | 507.517.4992
MaineM@HelenaAgri.com

CT, NH, NY, MA, ME, RI, VT
Sean Kennedy | 802.558.4009
KennedySR@HelenaAgri.com

OH & IN
Chad Allen | 614.604.2854
AllenCM@HelenaAgri.com

IL, KY, MI
Mike Leach | 517.257.9263
LeachM@HelenaAgri.com

AL, MS, TN
Greg Wall | 662.312.0510
WallG@HelenaAgri.com

FL
James Boggs | 863.557.0076
BoggsJ@HelenaAgri.com

GA, KY, NC, SC, VA
Geer Dubose | 803.480.1425
DuboseG@HelenaAgri.com

DE, NJ, MD
Nick Adams | 770.365.8360
AdamsN@HelenaAgri.com

PA, WV
Jon Cuny | 724.602.1510
CunyJ@HelenaAgri.com

DISTRIBUTOR/AGENT
Atticus | Bayer | BASF
Biosafe Systems | Corteva
Nufarm | SePRO | Syngenta | UPL

HELENA
People...Products...Knowledge...

Aquatics
WINTER SPECIAL 2023 Volume 45, Number 5

First place winner of the
Vic Ramey photo contest
Skippy Fair for "Helianthus Trail"

Contents

Committees

Aquatics Magazine Advertising
Angie Huebner
USACE Invasive Species Management Branch

Auditing
Keshav Setaram

Awards
Scott Glasscock
Disney Pest Controlt

By-Laws
James Boggs Jr.
Branch Manager
Florida IVM
Helena Agri-Enterprises, LLC

Education and Outreach
Jason Cull
Operational Manager
Lee County Hyacinth Control

Governmental Affairs
Matt Phillips
Florida Fish and Wildlife Conservation
Invasive Plant Management

Historical
Andy Fuhrman
Allstate Resource Management, Inc.

Local Arrangements
Bill Torres
Nathalie Visscher

Merchandise
Monty Montgomery
Allstate Resource Management

Nominating
Lyn A Gettys
Associate Professor
UF/IFAS Fort Lauderdale REC

Program
Sam Sardes
Aquatic Territory Manager
UPL OpenAg Environmental Solutions

Resource Demonstration
James Leary
Assistant Professor
UF/IFAS Center for Aquatic and Invasive Plants

Scholarship
Keshav Setaram

Vendor
Wykle Greene
Syngenta

Website
Angie Huebner
Invasive Plant Management

Letter from the President

Matt Phillips

As I write this letter we have just concluded a very successful 47th annual training conference and are already planning for next year's conference. I would like to thank Lynn Gettys for her leadership this past year and to all the membership for putting their trust in me to lead the organization for this upcoming year. We have a very active board that helps to keep this organization going and I appreciate all of their service to the FAPMS as well. The only thing missing is you! Any member in good standing can sign up to be on one of our standing committees. We have many to choose from including Education and Outreach, Governmental Affairs, Aquatics Magazine and Advertising, Auditing, Awards, Resource Demonstration, Vendor, By-laws and Web site. If any one of these speaks to you, even just whispers, please do not hesitate to reach out and volunteer. There will be someone to help you get involved. The more members that we have participating actively in the organization the lighter all of our loads are and that means a lot in these busy times.

This year's program was very informative and provided valuable CEUs in the categories of aquatics, natural areas, right of way and core to help maintain your certifications. We also went paperless for the very first time to file CEUs. The process went over without a hitch so kudos to you all for adapting so quickly to the new process! We hope this will result in easier and faster processing for your CEUs.

Our ability to adapt and use technology has moved our stewardship of Florida's natural areas to new heights and moved the bar as to what successful aquatic plant management looks like. One area that I would like us all to focus on is the ability to tell our story in the noise of social media. There are people out there attempting to tell our story with little or no knowledge of aquatic plant management and unless we counter this misinformation it is viewed as the "truth". Anyone associated with aquatic plant management knows it is not, and we need to renew our efforts to get accurate and correct information to the general public and policy makers. The fact is, we are protecting our native plant communities by conducting some of the best management practices to prevent invasive species from having a negative impact on our native habitats.

Lastly, this organization is only as vibrant as its members and we are going to need everyone to take a look at what they might offer to this organization to make a difference in people's lives. The continued health of our native aquatic habitats depends on each of us making a contribution. Please consider what you might contribute so that we may continue to make this a great stewardship organization! I look forward to everything we are going to do together this year and hope that you would feel free to contact me or one of our board members with any ideas or suggestions you might have.

Sincerely,

Matt Phillips, FAPMS President
(850)567-0044

Aquatic Hitchhikers:
Preventing the Spread of Giant Salvinia

Background

Giant salvinia, (*Salvinia molesta*) is a free-floating aquatic fern native to Brazil that was introduced to the southern United States in the 1960s. Today, it is classified as a Federal Noxious Weed, making it illegal to transport between US states without a permit. So far, the plant has been reported in 13 states with the largest infestations in Texas and Louisiana. Giant salvinia has also been detected multiple times in other states including Florida; however, it has been eradicated due to rapid response actions by natural resource agencies. States like Florida need to stay vigilant to keep giant salvinia from establishing in natural areas. Researchers and boaters alike can help prevent this plant's spread and keep our environment clear of this botanical menace.

Giant salvinia has a unique shape and interesting texture, making it attractive to ornamental gardeners and aquarium hobbyists alike. Unfortunately, it is also one of the most invasive aquatic plants in the world. Giant salvinia reproduces vegetatively and is known to double in size in as little as four days. When disturbed, its fronds can easily fragment and float away to infest new locations. Giant salvinia not only spreads outward across the water's surface, but can also grow upward, forming dense mats. Due to these characteristics, giant salvinia easily outcompetes both emergent and submersed native plants. Monotypic stands of giant salvinia that block sunlight penetration in the water column frequently result in very low dissolved oxygen levels that negatively impact fish and other aquatic fauna. Additionally, mats of giant salvinia impede water flow and recreational use of water bodies. Specifically, these mats can prevent people from swimming, fishing, and boating. They can also disrupt infrastructure when growing in canals, intakes for irrigation, and hydropower reservoirs.

How can we help?

Everyone who enjoys Florida's lakes has an important role in maintaining the natural beauty and balance of the environment. It is crucial to educate boaters on proper preventative measures to take when enjoying the outdoors. Since giant salvinia can spread from small fragments, it can easily cling to boats, trailers, fishing nets, and other equipment and then be unknowingly transported and spread elsewhere. When leaving a lake, boaters should take care to inspect the sides of the boat, the trailer, and the boat bunk itself for clinging plants, and hose them off as needed. When fishing, it is important to inspect any nets or equipment upon leaving the lake. These practices should also be done before entering a new lake. Since giant salvinia is not yet established here in Florida, rigorous prevention of its spread is critical. Once an invasive is established, eradicating or managing it becomes quite costly and tedious compared to preventative methods. If everyone does their part, we'll be able to keep Florida clear of giant salvinia, maintaining the functionality, ecology, and beauty of our lakes.

Our research

An often-overlooked aspect when inspecting boats for invasive hitchhikers are the trailer bunks that the boat is stationed on. It seems intuitive that no plant could survive and spread after being crushed by a boat between trips. However, invasive species are often impressive in their ability to survive and reproduce. At the Center for Aquatic and Invasive Plants in Gainesville, Florida we designed a study to investigate how long giant salvinia can survive while being crushed by boat bunks, and if the boat bunk material influences moisture retention.

To do this, we set up three simulated boat trailers containing bunks made of different materials. Each boat was represented by a 250-gallon tub filled with water to add weight onto the bunk, simulating the pressure of a common bass boat on a trailer. The bunks were made of planks covered in plastic, wood, or carpet. We placed

Fig 1: Giant salvinia quickly forms thick, dense mats that cover the water's surface. Photo credit: Corrina Vuillequez

Fig 2: Map of giant salvinia reports in the United States, 2023. Image credit: University of Georgia EDDMapS.

giant salvinia in-between the planks, and placed the tub on top, so that the plants were crushed by the weight of the "boat". We then removed and evaluated groups of giant salvinia at different time intervals, recording the weight and mortality. At these time intervals, we moved giant salvinia from the bunk into recovery tanks to mimic them being released into a new lake. We then monitored their growth and survival over time.

Preliminary results indicate that plastic boat bunks slow water evaporation from the salvinia underneath them, extending their survivability. Our observations suggest that giant salvinia may be able to survive up to 8 days of being crushed by a boat on a plastic bunk! Due to increased surface area within the textures, carpet and wood seem to absorb more moisture from the plants, drying them out faster. It appears that giant salvinia may be able to survive up to four days being crushed on these materials. Once our analysis is complete, we plan to publish our results to spread further awareness and education about the scope of this issue.

Conclusions

Overall, our study indicates that giant salvinia is resilient in stressful conditions and determined to survive transport to new water bodies. As enjoyers of Florida's lakes, it is especially important to be vigilant when traveling to new waters, and to educate others about proper prevention methods as well. Boaters should always check their boat and equipment for hitchhiking plants between trips. Our research suggests that it may also be necessary to let the boat sit out of water for at least a week after traveling to salvinia-infested waters to make sure there can be no surviving plants squished under the boat. It may seem extreme, but the more we pay attention to this issue now, the less of a problem it's likely to be in the future. With a united effort between researchers and boaters, we can make sure Florida's waters are beautiful and functional for years to come!

***Corrina Vuillequez**, (cvuillequez@ufl.edu), Graduate Student, Agronomy Department, Center for Aquatic and Invasive Plants, University of Florida, Gainesville, FL.*

***Benjamin P. Sperry, Ph.D.** (bpsperry@ufl.edu), Principal Investigator, USACE-ERDC/UF IFAS, Center for Aquatic and Invasive Plants, University of Florida, Gainesville, FL.*

Fig 3: Our experimental setup for studying giant salvinia survivability. Top row: These water-filled tubs represent the weight of boats on a boat bunk. The white planks below them are lined with wood, carpet, or plastic to represent different boat bunk materials. In-between the planks lie groups of giant salvinia, our hitchhiker. Bottom row: Our recovery greenhouse — After being crushed in boat bunks, the giant salvinia is monitored for survivability in recovery pots. This represents the introduction of the plant to a new waterbody. Photo credit: Cayla Romano

How to Find, Record, and Track Your Aquatic CEUs?

Many of you may remember taking your aquatic exam and loathe that day. You CAN renew by retesting, but I am sure you would rather forget your boat plug back at the shop than take that test again. This leaves only one additional pathway in Florida to renew those certificates, continuing education units (CEUs). Keeping track and knowing where to find them is essential, so we will review that here so you can answer Dude Where's My CEUs?

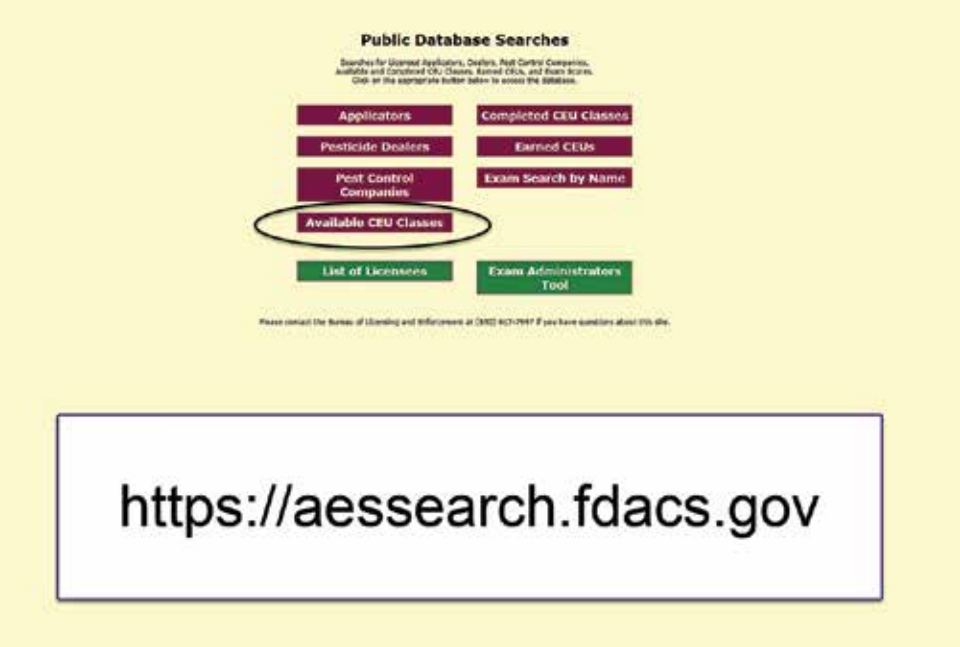


Figure 1. Click Available CEU Classes to see what is available.

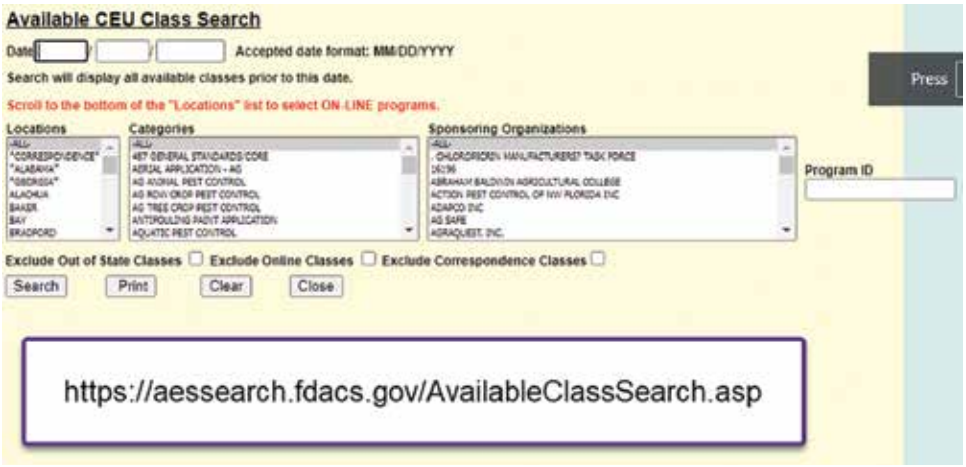


Figure 2. There are lots of ways to search, narrow down what you are looking for.

Knowing how many CEUs you need seems confusing and it varies from category to category. Our office has a handy document that walks through each license and just how many CEUs are needed: **https://edis.ifas.ufl.edu/publication/PI292**. Downloading the PDF will ensure you can click all the links and make it to your category. This will tell you what you need to get your license in the first place, what you need to keep it, and how much all that will cost. For aquatic licenses you will need 4 CEUs in Core and 16 CEUs in Aquatics.

Once you know how many CEUs are needed, its time to find opportunities to get those CEUs. Our office has an entire catalog that can be taken anytime and at the comfort of your own home: **https://ifas-pest.catalog.instructure.com/**

Simply search by your category and the courses that meet those requirements will pop up. We have TONS of Aquatic CEUs on offer. These CEUs can be convenient, but attending an in-person training is one of the best ways to learn. This allows you to interact with other applicators and learn from the best educators around through our county extension network. The main **https://aessearch.fdacs.gov/** is going to be your starting point for CEUs and many other things we will discuss.

From there search the available CEU classes and narrow in on the type and location you are after. Narrow down your dates, location, type of training, even who is offering the training, UF/IFAS Extension for the WIN!

After attending the best training EVER from UF/IFAS, what do you do to ensure that you got credit. If you attended a training from UF/IFAS it is highly likely they loaded attendance for you (more on that in a moment), and you don't need to do anything else. Isn't UF/IFAS the best? I might be a

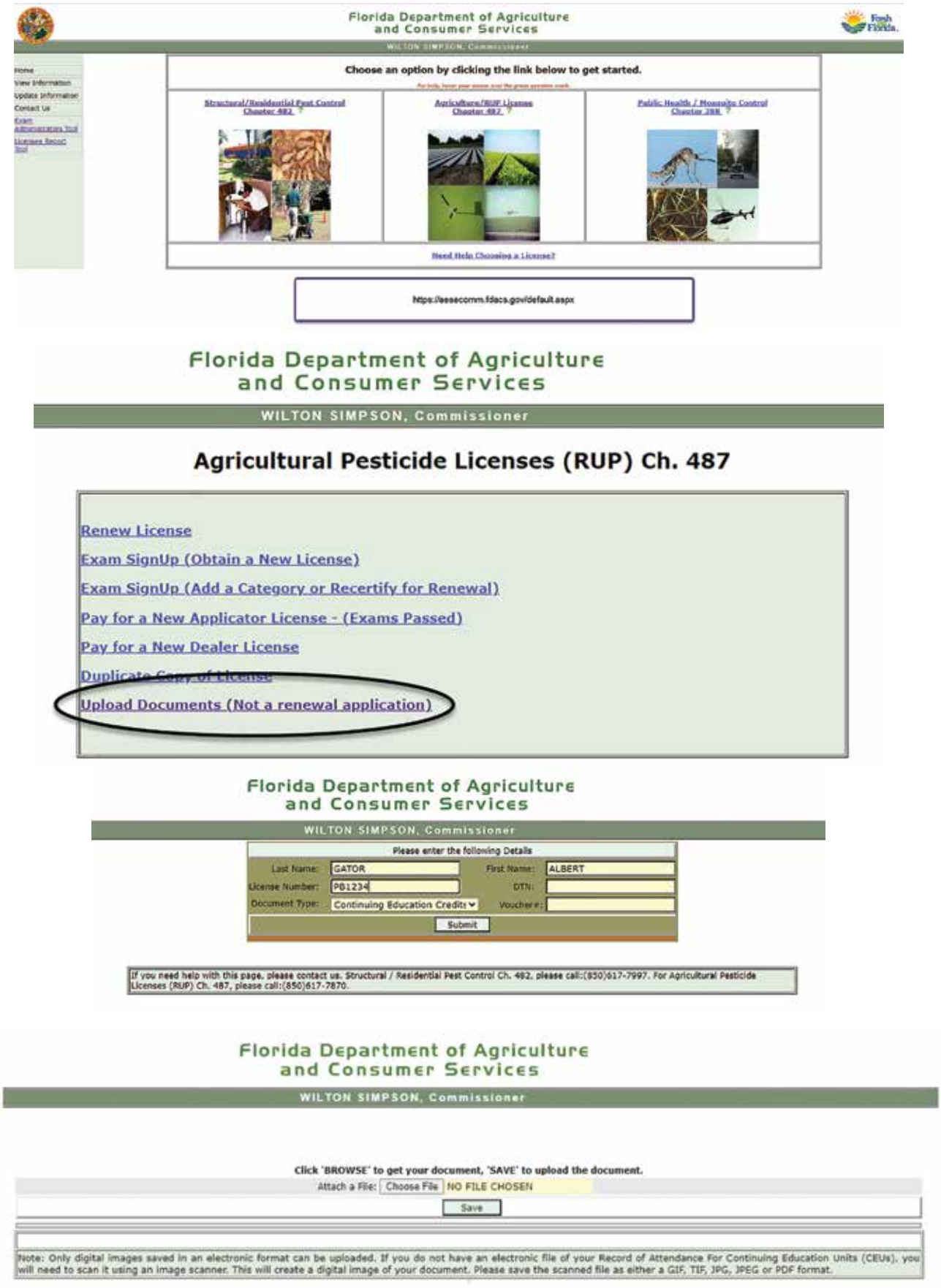


Figure 3. Load your CEU form that you scanned or you downloaded from your online course.

little biased, but that doesn't make me wrong 😊. For larger trainings or those unaware, you might simply be handed a CEU form that you must now keep track of and get to FDACS so your credit can be counted. If you are worried about losing that form, or worried the mail will lose your form, good news there is a better way. You can upload the form yourself, right after you get it! No more waiting 4 years only to find they are missing, eaten, or stolen, we've heard it all.

Go to the **https://aesecomm.fdacs.gov/Default.aspx** and then select your Chapter. From there you can go down to "Upload Documents" and now you can upload a digital version of your forms. That's it, CEU are held ready for renewal. If you have forgotten your license number, you can look it up on the **https://aessearch.fdacs.gov/** and select **"Applicators" (https://aessearch.fdacs.gov/PersonSearch.asp)** and put in your first and last name. It's important to note this does NOT automatically mean you are renewed, you will have to pay and let them know you want to renew when it is time. This just means you don't have to worry about that form getting lost.

You took my advice and went to a UF/IFAS training, most likely at your local county extension office and your credit was uploaded for you (Thanks again UF/IFAS). How do you confirm this and keep track of just how many CEUs you have? Go back to **https://aessearch.fdacs.gov/** and choose "**Earned CEUs**" (**https://aessearch.fdacs.gov/EarnedCEU.asp**). Type in your license number and your programs attended will be revealed. From there you can click any of those programs and it will give you details on how many CEUs and in which category. If you are like me, I sure hope you aren't, and have like 10 categories, this is important. Knowing where you are on your CEUs can ensure you don't have to scramble at the end to find CEUs.

There you have it, you now know how many CEUs you need, where to find them (UF/IFAS right???), how to upload them, and how to check how many you have. This makes it easier to focus on what the CEUs are really for, which is helping you learn more about your profession to be a safer more effective applicator. So the next time you are scrambling to renew and saying Dude Where's My CEUs, this should help keep you up to date and ready to go!

Earned CEUs

Program ID:	Program Title:	Max CEU:	Sponsor Name
31783	OLD WEST HALLOWEEN EDITION LIMITED PESTICIDE AND CEU REVIEW	4	VOLUSIA COUNTY EXTENSION SERVICE

Detail

Program ID:	Program Title:	Max CEU:	Sponsor Name
31784	OLD WEST HALLOWEEN EDITION LIMITED PESTICIDE AND CEU REVIEW - PART TWO	2	VOLUSIA COUNTY EXTENSION SERVICE

Detail

Program ID:	Program Title:	Max CEU:	Sponsor Name
36066	NON-MOSQUITO ARTHROPODS	1	UF IFAS PESTICIDE INFORMATION OFFICE

Detail

Program ID	Program Title
31783	OLD WEST HALLOWEEN EDITION LIMITED PESTICIDE AND CEU REVIEW

Category name	Approved CEU
DEMONSTRATION AND RESEARCH	2
ORNAMENTAL AND TURF PEST CONTROL	2
PRIVATE APPLICATOR AG PEST CONTROL	2
COMMERCIAL LAWN AND ORNAMENTAL	2
LIMITED CERTIFICATION COMMERCIAL LANDSCAPE MAINT.	2
LIMITED CERTIFICATION LAWN AND ORNAMENTAL	2
4&7 GENERAL STANDARDS/CORE	2
4&2 GENERAL STANDARDS/CORE	2
LIMITED URBAN FERTILIZER	2

Brett Bultemeier, Assistant Extension Professor, UF/IFAS Pesticide Information Office bwbult@ufl.edu, https://pested.ifas.ufl.edu/ (website) https://blogs.ifas.ufl.edu/pesticideinformation/ (blog)

Applicators Corner

Invasive Eelgrass?

Dr. Jason Ferrell,
University of Florida, Center for Aquatic and Invasive Plants

Eelgrass, *Vallisneria americana*, is a highly desirable submersed native plant. It provides structural habitat for fish, forage for waterfowl, and is a preferred food source for manatees. Since the benefits of this plant are extensive, and it is beloved by many recreational users, resource managers have been transplanting eelgrass for decades in an attempt to revegetate a wide variety of aquatic sites. Unfortunately, many of these restoration efforts ultimately proved unsuccessful as the plants often didn't establish and expand as anticipated. This led to multiple efforts across agencies and universities to find eelgrass ecotypes that would more consistently establish and expand after transplanting. A plant ecotype is a population of a particular plant species that has evolved distinct traits in response to specific environmental conditions that make it well suited within a localized habitat. The result of this work was several named cultivars (e.g. 'Rockstar') that were grown in nurseries and sold for restoration projects all over the country.

Agencies are planting eelgrass and the restoration efforts have been proving more successful than ever before. But in 2016, reports came in that Lake Guntersville, a 70,000-acre impoundment on the Tennessee River, was experiencing significant issues with overgrown and problematic eelgrass. Extensive mats of floating leaves, sometimes two feet thick, were lodging against the dam, it was clogging water intakes at the power plant and creating issues with navigation. Why is the eelgrass, suddenly, acting like a weed? Again, researchers were brought in to figure out why this native plant is behaving so badly.

When the efforts began to find an eelgrass that would more consistently establish itself in the wild, everyone assumed that all eelgrass in North America was *Vallisneria americana* – the wonderful native. What wasn't fully appreciated is the fact that there are actually 18 species of *Vallisneria*, with specific ones being native to Australia, Asia, India, and North America, many of which had been sold in the aquarium trade as simply "eelgrass". With this knowledge, the question became: since researchers specifically sought, and found, more aggressive eelgrass – that was easier to establish, did they inadvertently select a non-native species for our restoration projects?

Eelgrass growing in Merrit's Mill Pond (Jackson County, FL 2023).

Since these different *Vallisneria* species look similar, or even identical in the field, lab analyses were required to accurately identify them. It was soon determined that the aggressive eelgrass on Lake Guntersville was not native at all; but rather a hybrid of two non-native Vallisneria species (*V. spiralis* x *V. denseserrulata*). Considering that Florida has been planting eelgrass for decades, what have we been planting?

This led the FWC Fish and Wildlife Research Institute to initiate a study to sample and genetically evaluate eelgrass at dozens of sites across the state. While the vast majority of the samples proved to be native eelgrass (*Vallisneria americana* or *Vallisneria neotropicalis*), nine samples were the non-native hybrid of *V. spiralis* x *V. denseserrulata* (Gorham et al. 2021). Since then, at least one site in the state has been confirmed to be infested with *V. spiralis*, which is native to Africa.

So where does this leave us? Well, we have documented that much of the eelgrass in Florida is native – which is good. But, there are some sites that contain eelgrass that is non-native. Unfortunately, we don't yet know if these non-native eelgrasses are going to behave and provide forage and habitat for Florida wildlife, or if they are going to misbehave and become problematic like in Lake Guntersville.

In the meantime, we need everyone to start paying close and particular attention to eelgrass beds across the state. If you see patches that appear to be rapidly expanding, or are being generally problematic, please reach out to your state or Federal agency/university partners so we can get samples and determine which species is present and whether action needs to be taken. Since all waterbodies are unique, Florida may never have issues with non-native eelgrass like we are observing on Lake Guntersville, but only time will tell.

This article was written by Dr. Jason Ferrell, professor and director of the UF/IFAS CAIP. Questions or comments can be sent to caip@ifas.ufl.edu.

Literature Cited

Gorham, Siobhan, Seifu Seyoum, Bradley T. Furman, Kelly M. Darnell, Laura K. Reynolds, Michael D. Tringali. 2021. Molecular detection of a non-native hybrid eelgrass, Vallisneria spiralis Linnaeus (1753) × V. denseserrulata Makino (1921), in the southeastern United States. Aquatic Botany. https://doi.org/10.1016/j.aquabot.2021.103445

2023 Florida Aquatic Plant Management Society Training Conference

The gang's all here!

The 2023 FAPMS training conference was held in St. Petersburg from October 16 through 19 and it was another great success. We had excellent attendance, with 266 registered participants at our 47th annual meeting. FAPMS went paperless at the 2023 conference and it went very smoothly! This wouldn't have been possible without tons of work by **Jason Cull** running the eventScribe app and by **Brett Bultemeie**r for setting up QR codes for digital CEUs. As always, **Jennifer Myers** and **Stephanie Walters** ensured the conference was a success by making sure everyone stayed on task, and we really couldn't do it without them! Thanks too to **Scott Glasscock** for making sure the prize drawings and awards ceremony went smoothly. In addition to the informative program developed by program chair **Ben Sperry**, we once again had duck races, the Vic Ramey photo contest, a fishing tournament, and a cornhole contest, all of which support FAPMS scholarships.

Hannah Brown and Matt Phillips

We had several excellent poster submissions that were presented at the poster reception on Tuesday afternoon, and **Hannah Brown** won first place for "Evaluation of Concentration-Exposure Time Combinations on Subsurface Treatments of Imazamox on Waterhyacinth and Waterlettuce". Second place went to **Jonathan Glueckert** and third place was awarded to **Amber Riner**.

Cornhole tournament

The fishing and cornhole tournaments were held on Tuesday night during the President's Reception at The Tavern at Bayboro, just a few blocks from our host hotel. The fishing tournament had three prize categories; **Skippy Fair** took the "most fish" category, while **Tim Harris** won "first fish" and "longest fish" with a 14" entry. First place in the *highly competitive* cornhole tournament was taken home by **Ryan Grow** and **Wykle Greene**. **Jon Lane** and **Matt Phillips** won second place, and third place went to **Joe Malone** and **Chad Edmund**.

Duck races

The duck races took place in the hotel pool on Wednesday before the Awards Banquet. We had excellent participation and a number of "lucky ducks" won big! Duck race winners were as follows:

Blue ducks: First place: Jennifer Bishop (prize: Costa sunglasses)
Second place: Daniel Pitts (prize: Big Joe bean bag)
Third place: Bill Tomlinson (prize: $100 gift card)

Yellow ducks: First place: Bob Monk (prize: RTIC cooler)
Second place: Robert Ragans (prize: binoculars)
Third place: Daniel Pitts (prize: $100 gift card)

See pages 16-17 in this issue of Aquatics for the winning entries

The Vic Ramey photo contest had more entries than ever before, so a big shout-out and thanks to everyone who participated!!! Winners were as follows:

Aquatic Scene
First place: **Skippy Fair** for "Helianthus Trail"
Second place: **Bobby Siler** for "A Striking Florida Afternoon"
Third place: **Jennings Lyng** for "Find Your Happy Place"

Aquatic Operations
First place: **Jennings Lyng** for "Port Mayaca Luck"
Second place: **Lee Martin** for "Just the Tip"
Third place: **Cody Beeson** for "Stuck in Muck"

Lee Martin, Lyn Gettys, and Colin Lewis

We were fortunate to have several applicator papers at FAPMS this year. **Lee Martin** won first place in the applicator paper contest for his presentation "Invert Spray System: Renewing an Old Technology" and **Colin Lewis** was awarded second place for "Taking Flight, Again: Where We Were, What's Changed, and Where We're Going".



Left to Right: Jennings Lyng; Jeff Holland; Tim Harris

During the Awards Banquet, **Jennings Lyng** of Applied Aquatic Management was crowned Plant Manager of the Year in recognition of his years of work focused on aquatic plant management and restoration. **Jeff Holland**, recently retired from Reedy Creek Improvement District, was given the President's Award for his many years of service to the profession and to the Society. He has been a member of FAPMS for a very long time and has served on the FAPMS Board of Directors, the Awards Committee, and as editor of *Aquatics* magazine. The Michael D. Netherland Exemplary Colleague Award was awarded to **Tim Harris**, who recently retired from the US Army Corps of Engineers, in appreciation of his selfless display of friendship and optimism in the pursuit of knowledge and understanding of aquatic plant management. Tim is a long-standing member of FAPMS (he managed the program for the annual meetings for many years and served as Society President in 2013), and we're grateful for his sunny disposition and years of service!

The Chest of Cheer door prize was won by lucky ticket holder **Alex Holmes**, and the winner of the grand prize (an awesome grill!!!) was **Tom Warmuth**.

We thanked outgoing Past-President **Lyn Gettys**, Editor **Amy Giannotti**, and Directors **Alex Onisko**, **Jay Ferrell**, and **Jason Cull** for their service, and welcomed **Matt Phillips** as our new President, **Jason Cull** as our new President-Elect, and **Marshall Snyder**, **Jake Thayer**, and **Joe Malone** as our new Board Members.

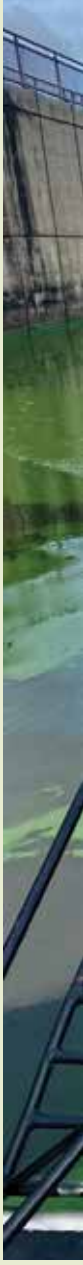
Respectfully submitted by Lyn Gettys, FAPMS Past-President

Matt Phillips – 2023-2024 FAPMS President and Corn King

The next FAPMS conference will be October 7-10, 2024 in Daytona Beach – make plans to join us! For more information, please visit our website at https://fapms.org/


NUTRIEN

Winners Of The Vic Ramey Photo Contest



Left:
Aquatic Scene
First place: **Skippy Fair** for "Helianthus Trail"

Second place: **Bobby Siler** for "A Striking Florida Afternoon"

Third place: **Jennings Lyng** for "Find Your Happy Place"

Above and Right:
Aquatic Operations
First place: **Jennings Lyng** for "Port Mayaca Luck"

Second place: **Lee Martin** for "Just the Tip"

Third place: **Cody Beeson** for "Stuck in Muck"

2023 Update from the FAPMS Scholarship and Research Foundation (SRF), Inc.

William L. Maier, Jr.
Memorial Scholarship

Paul C. Myers
Applicator Dependent Scholarship

The FAPMS SRF is please to share with the FAPMS membership that there were three applications submitted for the Paul C. Myers, Applicator Dependent Scholarship and all three were accepted and provided differing levels of scholarships.

The recipients are:

- Hanley Renney, daughter of Jerry Renney
- Ashlyn Foster, daughter of Shane Foster
- Lane Holmes, son of Larry Holmes
- This year the William L. Maier, Jr. Memorial Scholarship was announced (provided every other year on odd years) and there were three very well qualified graduate students who submitted applications. The FAPMS SRF scholarship committee agreed that all three students would be provided scholarships based on their work within aquatic plant management.

The recipients are:

- Hannah Brown, University of Florida, Subsurface herbicide management techniques to control water hyacinth and water lettuce.
- Daniel Canfield, University of Florida, Hydrilla tuber sprouting research to stimulate and target hydrilla tuber banks.
- Amber Riner, University of Florida, Machine learning for training convolutional neural networks to detect water hyacinth from unmanned aerial system imagery.

With the support of FAPMS and all of it's members through raffle tickets, duck sales and attendees to the annual training conference, the FAPMS SRF has awarded a grand total of $164,750.00 in scholarships. It is such a pleasure to be able to offer these scholarships to the applicator dependents and the graduate students to support research and the next generation.

Check the FAPMS Website for details regarding the current Myers' scholarship application which is due on June 1, 2024. https://fapms.org/scholarships/myers-scholarship/

Submitted by Kelli Gladding, FAPMS SRF Secretary/ Treasurer on behalf of Keshav Setaram, FAPMS SRF President

Giant Salvinia (*Salvinia molesta*) Found in St. Johns River Basin

On November 1, 2023, Florida Fish and Wildlife Conservation Commission (FWC) received a report that *Salvinia molesta* had been identified in a City of Jacksonville stormwater pond less than a mile from the St. Johns River. Since then, FWC and the US Army Corps of Engineers (Corps) have been mounting an Early Detection Rapid Response effort to determine the extent of the population and work to eradicate it.

A contractor hired by the City of Jacksonville to control aquatic vegetation in the City's 258 stormwater ponds first identified an infestation of "Salvinia" in a stormwater pond off of St. Augustine Road in September of 2023 (see photo). It was treated with flumioxizan on September 30, 2023, but since there was no indication of which species it was, supervisors assumed it was the widespread *Salvinia minima* (common salvinia). When supervisors returned to the pond a month later (November 1) to monitor whether the treatment was successful, they recognized that it was actually *Salvinia molesta*, not *Salvinia minima* and

COJ stormwater pond on 9/30/23 prior to initial treatment of *Salvinia molesta*
Photo credit: City of Jacksonville

COJ stormwater pond 36 days post treatment on 11/5/23

Two areas downstream of the stormwater pond where *Salvinia molesta* has been sighted (second photo shows the growth form of *Salvinia molesta* in brackish waters of Craig Creek)

Top: Accordion-like growth pattern of *Salvinia molesta* when it is growing in dense infestations

Close up of hairs of *Salvinia molesta* on the left showing the egg-beater hairs and *Salvinia minima* on the right showing the forked hairs

reported it to FWC.

FWC shared the information with the Corps since the pond location is just down the street from the Corps' Jacksonville District office. On Monday, November 5, Corps biologists visited the site and confirmed the population and also noted that there were giant salvinia plants along the lip of the outfall structure of the pond, as well as in the pool at the bottom of the outfall pipe. The biologists reached out to City of Jacksonville staff to determine where the outfall pipe drained and identified 2 other locations that also had *Salvinia molesta* plants present. The first was a concrete lined ditch where the underground outfall pipe first empties (see photos) and the second was Craig Creek, a tributary of the St. Johns River.

The plants that were located in Craig Creek did not show the robust accordion-like growth that is typical of dense *Salvinia molesta* infestations. Instead, the plants had a growth form that looked very similar to *Salvinia minima*, but with slightly larger leaves. The distinguishing characteristic between *Salvinia molesta* and *Salvinia minima* is the shape of the hairs on the surface of the leaves, so you will need a hand lens or magnifying glass. *Salvinia mimima* has hairs that fork into a spreading, 4-pronged structure, but in *Salvinia molesta*, the forked hairs curve back together at the tip, forming an egg-beater shape. A hand lens was used to confirm that the plants in Craig Creek had the egg-beater hairs that are characteristic of *Salvinia molesta*. It is suspected that the slightly brackish conditions in the creek have stunted the growth of the plants, but it is unclear if it is enough to kill them. Researchers with the Corps of Engineers and the University of Florida's Center for Aquatic Invasive Plants will be doing additional research to address this question.

The Corps has taken over control responsibilities for the pond, as well as the outfall areas. A boom has been placed around the outfall structure in the pond to prevent any additional plants from getting into the tributary. The Corps did an additional treatment with flumioxizan on 11/20/23. Conditions have been too windy to safely get airboats out on that section of the river to do additional surveys. However, once conditions allow for it, we plan to survey areas of the St. Johns River up and downstream of the Craig Creek tributary to see if we find any additional plants. Systematic surveys have also started assessing the other 257 COJ stormwater ponds to determine if any *Salvinia molesta* could have been spread on equipment. We encourage people to be on the lookout for this plant (particularly in stormwater ponds in gated communities and other private ponds) and report it to Mariah McInnis (Mariah.McInnis@myFWC.com) or Jessica Spencer (Jessica.E.Spencer@usace.army.mil) if you do find it. We will continue to work with our partners to contain and eradicate this population.

This article was written by Jessica Spencer, US Army Corps of Engineers.

Monitoring Herbicide Symptoms on Water Hyacinth (*Eichhornia crassipes* [Mart.] Solms) with Unoccupied Aerial Systems (UAS)

Introduction

Water hyacinth (*Eichhornia crassipes* [Mart.] Solms; hyacinth) is a free-floating plant native to South America that was introduced to North America in 1884 (Wunderlich 1962). Originally desired for its ornamental qualities in water gardens, it quickly became a major problem in the St. John's waterway. Hyacinth forms dense mats that limit navigability of water ways, damage infrastructure, harbor disease vectors, decrease water quality, and reduce biodiversity (Holm et al. 1977, Villamagna and Murphy 2010). With a long history of reducing infestation levels, starting in the 1950s, hyacinth is currently able to be managed economically at feasible levels, but continues to be one of the biggest aquatic plant management challenges in Florida (Joyce et al. 1984).

The standard practice for controlling hyacinth is with foliar applications of fast-acting herbicides sprayed from a boat (Gettys 2021). Diquat and 2,4-D have been the standard active ingredients for decades, but other slow-acting herbicides such as carfentrazone, florpyrauxifen-benzyl, glyphosate, and penoxsulam are also known to be effective (Enloe et al 2018, Mudge and Netherland 2014.). Fast-acting, contact herbicides are often preferred by applicators that can show symptoms within hours of treatment (Wersal and Madsen 2010). However, slow-acting herbicides may be more effective. Methods that can detect symptoms of efficacy earlier could increase the adoption of slower acting herbicides.

Herbicides alter the physiological function of the plant causing morphological changes leading to death. Chlorosis and necrosis are commonly observed symptoms of a herbicide treatment, with color change in the leaves and petioles from green to yellow and brown resulting from a depletion in chlorophyll. This color progression can be measured with optical sensors (i.e., cameras) that measure reflected light within the visible range of wavelengths that can be used for remotely sensing plant injury (Abrantes et al. 2021, Robles et al. 2010). True color images are created by a composite of red, green, and blue (RGB) wavelengths (i.e., bands) that allow visualization of these symptoms. With digital images, RGB bands can be transformed in different ways to create vegetation indices (VI) used to measure "greenness" correlating with chlorophyll content (Abrantes et al. 2021, Lieu et al. 2021, Lussem et al. 2018).

In 2016, the FAA established rules for operating civilian unoccupied aerial systems (UAS; i.e., drones) in national airspace. Since then, over 800,000 drones have been registered with over 40% used for commercial activities (faa.gov). This has greatly expanded opportunities for mapping large areas including aquatic environments. Most consumer-grade UAS are equipped with RGB cameras on a gimbal that can record high resolution imagery from the air, presenting a comprehensive, birds-eye perspective of large areas. Each image is made up of millions of pixels and every pixel has reflectance values of red, green and blue bands that can be transformed into VI maps of herbicide treatment areas. In this study, we evaluate the Triangular Greenness Index (TGI) to assess herbicide symptoms of hyacinth treated with six different herbicides over a six-week period and compared this with a more traditional visual rating of percent control.

Materials and Methods

Mesocosm Study

An outdoor mesocosm study was conducted at the University of Florida, Center for Aquatic and Invasive Plants in Gainesville, Florida (29.7204°, -82.4179°) in March 2023 (Fig. 1). The study was conducted in 121 L mesocosms, spaced 1 m apart, each filled with well-water amended with 12g of soluble fertilizer (24-8-16, Miracle-Gro® All Purpose Plant Food, Scotts Company, Marysville, OH, USA) and 2.2 g chelated iron (Grow More Iron Chelate 10%, Grow More, Gardena, CA,

Table 1. Herbicides and rates used in the study.

Treatment	Rate 1	Rate 2	Source
2, 4-D	2.20 kg ha^{-1}	4.48 kg ha^{-1}	2,4-D Amine, Alligare LLC, Opelika, AL, USA
diquat	2.20 kg ha^{-1}	4.48 kg ha^{-1}	Tribune™, Syngenta Crop Protection LLC, Greensboro, NC, USA
carfentrazone	0.47 kg ha^{-1}	0.95 kg ha^{-1}	Stingray®, Sepro Corporation, Carmel IN, USA
florpyrauxifen-benzyl	0.19 kg ha^{-1}	0.38 kg ha^{-1}	ProcellaCOR™, Sepro Corporation, Carmel IN, USA
glyphosate	2.20 kg ha^{-1}	4.48 kg ha^{-1}	Roundup® Custom, Bayer CropScience LLC, Research Triangle Park, NC, USA
penoxsulam	0.20 kg ha^{-1}	0.39 kg ha^{-1}	Galleon® SC, Sepro Corporation, Carmel IN, USA

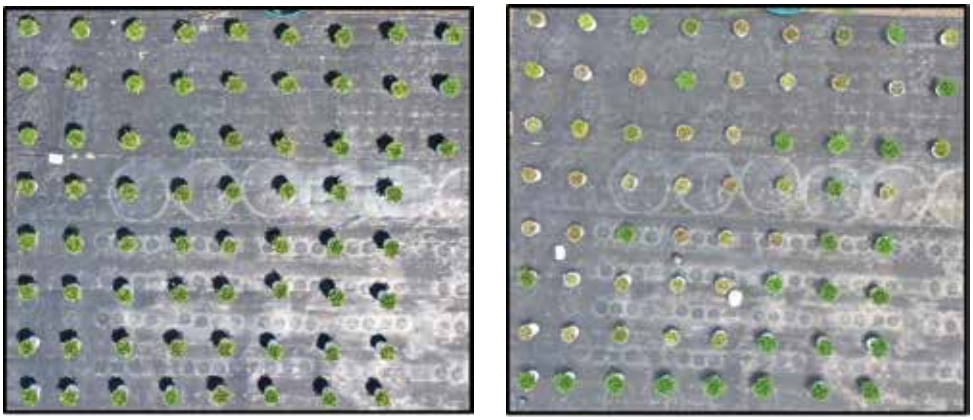


Figure 1. Downward view of experimental site with mesocosms at 30m above ground level (0.76 cm px-1). Note the gray scale standard in each image.

USA). Five individual ramets were selected from maintained cultures and grown out to capacity in each mesocosm one month before treatment.

The study was completely randomized with six different active ingredients applied at two different rates plus an untreated control with four replications per treatment (Table 1). All herbicide treatments included a non-ionic surfactant at 0.25% (v/v; Induce®, Helena Agri-Enterprises, Collierville, TN, USA). Herbicides were applied on 4/14/2023 with a Teejet 8002 flat-fan nozzle, (TeeJet® Technologies, Spraying Systems, Wheaton, IL, USA) from a CO2 pressurized backpack sprayer calibrated to deliver 935 L per ha (i.e., 100 gallons per acre).

Data Collection

An experienced observer recorded visual percent control once a week, on a scale 0-1 based on overall conditions of size, density and color. Images were captured once a week for six weeks after treatment (WAT) at noon with a Hasselblad L1D-20c (RGB) 20-megapixel CMOS optical sensor positioned over the center of the entire experiment at 30 m above ground level (AGL) to produce a ground sampling distance (GSD) of 0.76 cm px-1 (Fig 1).

Image Processing

Color corrections were performed post-process for all images adjusting the RGB values against a grey scale reflectance standard of known values using ImageJ (U.S. National Institutes of Health, Besthesda, MD) and GIMP (The GIMP Development Team, 2019) software. Corrected images were imported as georeferenced TIFF files in QGIS (QGIS Development Team 2023; v.3.26.3). Circular polygons were created to uniformly clip the hyacinth within each mesocosm. Zonal statistics were used to calculate the average RGB values of each mesocosm then used to calculate TGI (Fig. 2). The raster calculator was used to perform TGI transformations with the following equation (Hunt et al. 2012):

$$TGI = G - 0.39R - 0.61B$$

The TGI equation calculates indeterminant (unitless) values of green (G) reflectance against the proportional values of red (R) and blue (B).

Data Analysis

Visual observations were arcsine-square root transformed to improve homogeneity of variance before analysis. Both TGI and visual data were subjected to repeated-measures ANOVAs for each treatment. Mean separations between time steps were performed using Tukey's HSD ($\alpha = 0.05$). Simple linear regressions were performed to model TGI against visual measures. All statistical applications were performed in R (R Core Team 2023).

Visual Percent Control

2,4-D, diquat (DQT) and carfentrazone (CFZ) are fast-acting contact herbicides that have been widely used for hyacinth control since 1959, 1962, and 2004, respectively. These herbicides have been shown to provide > 80% control within 4 WAT at rates similar to the high rates used in this study (Langeland et al 2009, Mudge and Netherland 2014, Koshnick et al 2004). Weeks after treatment had a significant effect on visual control ($p < 0.05$) for all

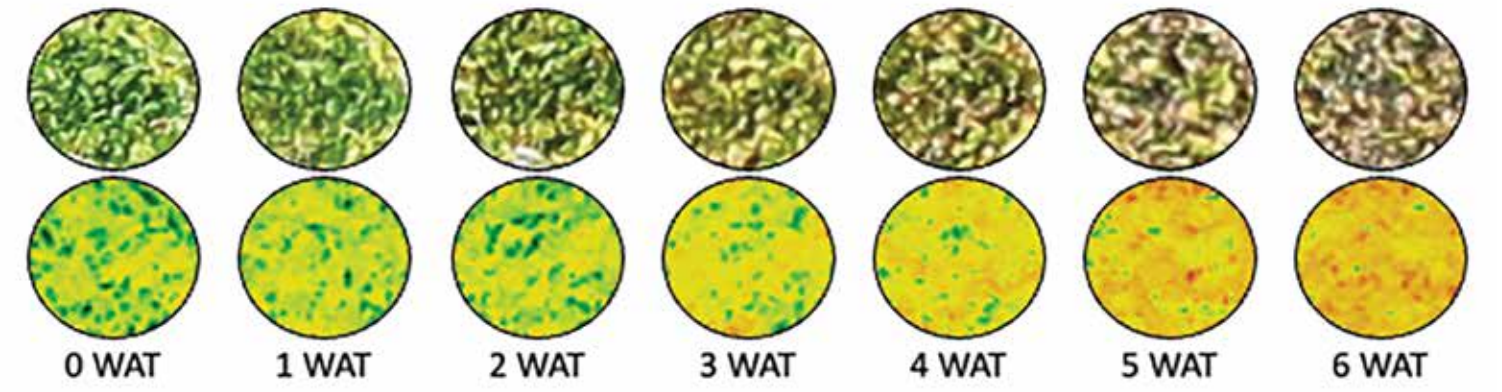


Figure 2. True-color (above) and corresponding TGI (below) rasters of a mesocosm with progression of herbicide symptoms on hyacinth observed over 6 weeks after treatment.

contact herbicide treatments at both rates (Fig. 3). Visual control was over 50% at 1 WAT but not significantly different at 6 WAT for all contact herbicide treatments, except for the high rate of CFZ. There was significant recovery for DQT and 2,4-D at the low rates (2.24 kg ha-1) but was not significant for the high rates (4.48 kg ha-1).

Glyphosate (GLY), penoxsulam (PNX) and florpyrauxifen-benzyl (FPB) are newer slow-acting systemic herbicides that have been used for hyacinth control since 1997, 2007, and 2018, respectively. These herbicides have been shown to provide > 80% control within 6 WAT at rates similar to the rates used in this study (Kyser et al 2021, Mudge and Netherland 2014, Wersal et al. 2010). Weeks after treatment also had a significant effect ($p < 0.05$) on percent control for all systemic herbicide treatments at both rates (Fig. 3). Percent control was significantly lower at 6 WAT than at 1 WAT, and all high-rate treatments exhibited percent control >75% by 6 WAT. The lower rate of FPB was the only systemic herbicide to exhibit regrowth with a significant decrease in percent control at 6 WAT not different than 3-5 WAT.

Triangular Greenness Index

The trends exhibited by visual percent injury were also similar for TGI. There was a significant weeks after treatment affect ($p < 0.05$) on TGI for all treatments (Fig. 4). The TGI values for 2,4-D treatments at 0 WAT and 6 WAT were not significantly different, DQT and CFZ treatments at 6 WAT were lower than 0 WAT but higher than some of the intermediate weeks. This indicates a complete recovery in "greenness" for 2, 4-D and partial recoveries in DQT and CFZ.

The TGI values at 6 WAT were significantly lower than at 0 WAT for all systemic herbicides, at both rates. The PNX and GLY treatments, along with the low rate of FPB, had TGI values that were either lower or not significantly different than the previous week, indicating a slower, but continuous progression in the loss of "greenness". This

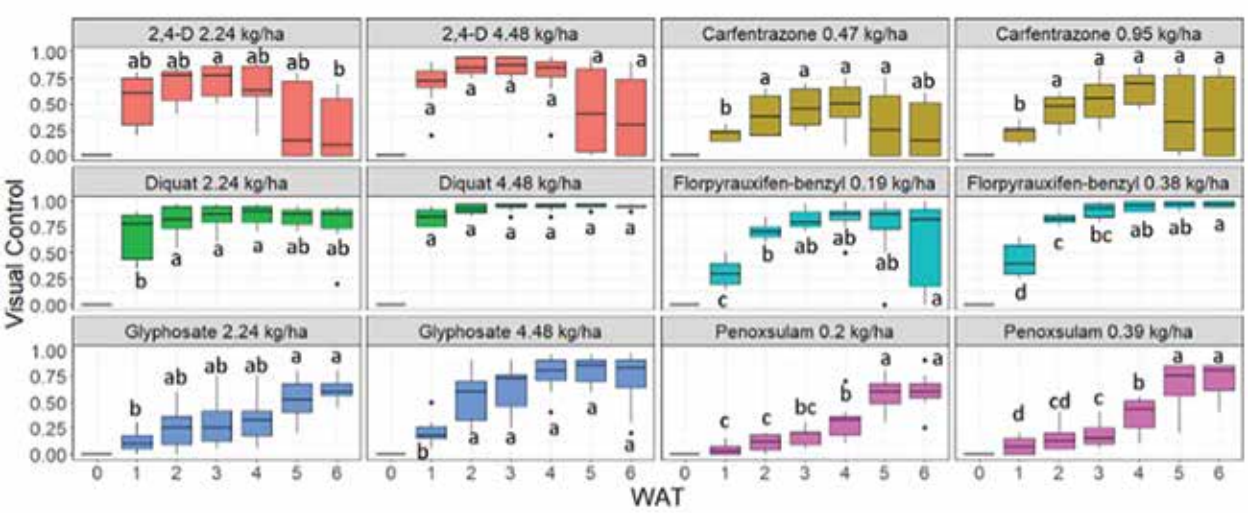


Figure 3. Boxplots of visual percent control over weeks after treatment (WAT). Box, line and whiskers are the interquartile range (25-75th percentile), median (50th percentile) and range (95th percentile) values, respectively. Letters that are the same are not significantly different between dates for each treatment ($p < 0.05$)

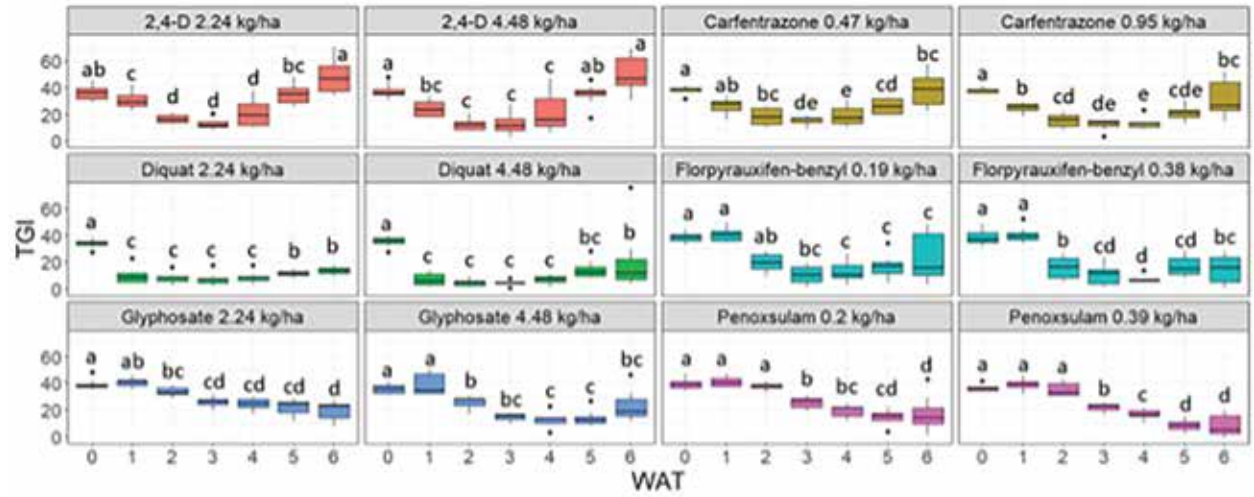


Figure 4. Boxplots for TGI over weeks after treatment (WAT). Box, line and whiskers are the interquartile range (25-75th percentile), median (50th percentile) and range (95th percentile) values, respectively. Letters that are the same are not significantly different between dates for each treatment ($p < 0.05$)

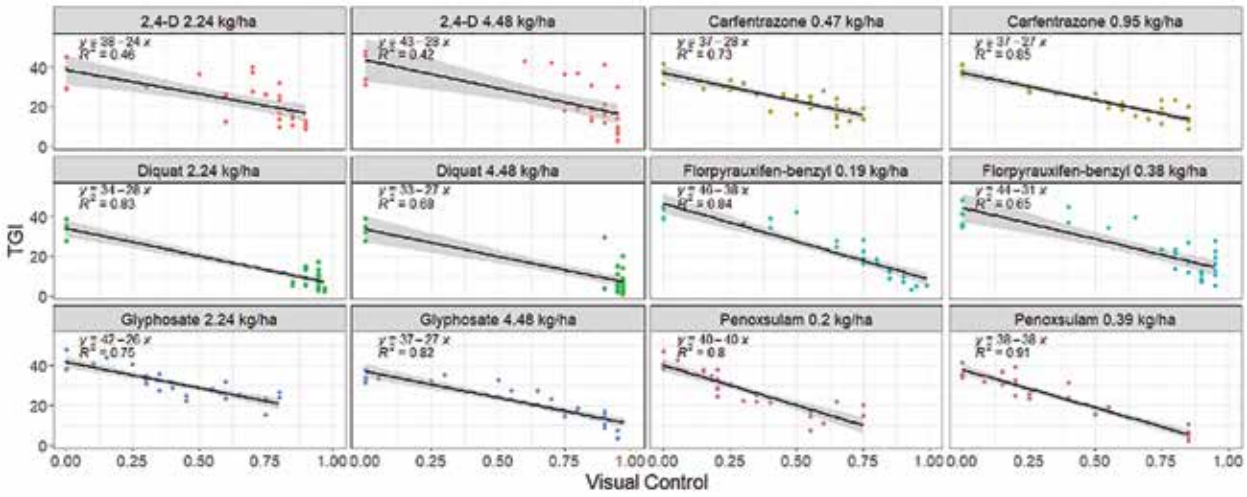


Figure 5. Linear fit of TGI values with percent visual control for each herbicide. The grey band represents a 95% confidence interval.

same trend should have been observed for the high rate of FPB except for contamination by lemna observed skewing TGI values at 5 and 6 WAT.

Linear Models

For all treatments, TGI exhibited significant negative linear relationships ($p < 0.05$) with visual percent control, with R2 values ranging between 0.42 and 0.91. In this study, the y-intercept represents the TGI value at 0% visual control at 0 WAT and exhibited a range of 33-46 across treatments. Variability can be expected with hyacinth considering that healthy, actively growing plants are constantly shedding old petioles to grow new ones that would appear as a mixture of green, yellow and brown pixels. Slopes also varied across treatments. However, all of the models predicted TGI values to be < 18 when visual control is > 90%.

Conclusions

Raster TGI values corresponded well with traditional visual estimations of herbicide control on hyacinth at the mesocosm scale. Empirical TGI measurements had lower variance than the more subjective observation. However, UAS derived TGI values are less reliable at discriminating vegetation from other confounding artifacts, i.e., algae and lemna contamination, without visual inspection. While visual assessments are tried and true at the mesocosm scale, this is often impractical at the field scale. Vegetation indices calculated from aerial surveys offer a reproducible method for creating quantifiable, high-resolution data with greater efficiency and comprehension.

By *Amber Riner[1], Jonathan Glueckert[1], Corrina Vuillequez[1], Mike Durham[3], Candice Prince[1], Benjamin Sperry[3], Amr Abd-Elrahman[2], James Leary[1]*

Affiliations: *(1) UF IFAS Center for Aquatic and Invasive Plants, Gainesville, FL (2) UF School of Forest, Fisheries, and Geomatics, Gulf Coast Research and Education Center, Wimauma, FL (3) US Army Corps of Engineers, Gainesville, FL*

References

Abrantes, T. C., Queiroz, A. R. S., Lucio, F. R., Mendes Júnior, C. W., Kuplich, T. M., Bredemeier, C., & Merotto Júnior, A. (2021). *Assessing the effects of dicamba and 2,4 Dichlorophenoxyacetic acid (2,4D) on soybean through vegetation indices derived from Unmanned Aerial Vehicle (UAV) based RGB imagery.* International Journal of Remote Sensing, 42(7), 2740–2758. https://doi.org/10.1080/01431161.2020.1832283

Enloe, S. F., Sperry, B., Leary, J., & Ferrell, J. (2022). Efficacy of Herbicide Active Ingredients against Aquatic Weeds: SS-AGR-44/AG262, rev. 5/2022. EDIS, 2022(3). https://doi.org/10.32473/edis-ag262-2022

Gettys, L. A. (2014). Waterhyacinth*: Florida's Worst Floating Weed: SS-AGR-380/AG385, 9/2014. EDIS, 2014(7).* https://doi.org/10.32473/edis-ag385-2014

Holm, L.G., D. L. Plucknett, J.V. Pancho, and J.P Herberger. 1991. *The World's Worst Weeds; Distribution and Biology.* Malabar, FL; Krieger 609p.

Hunt E. R., Doraiswamy C. P, McMurtrey J. E., Daughtry C. S. T., Perry E. M., Akhmedov B. (2013) *A visible band index for remote sensing leaf chlorophyll content at the canopy scale, International Journal of Applied Earth Observation and Geoinformation*, 21: 103-112,

Joyce, J.C. and W.T Haller. 1984. *Effect of 2,4-D and gibberellic acid on waterhyacinths under operation conditions.* J. Aquat. Plant Manag 22:75-78

Kyser, B. Guy, Madsen D. John, Miskella John, and O' Brien Jon. *New herbicides and tank mixes for control of waterhyacinth in the Sacramento–San Joaquin Delta*, J. Aquat. Plant. Manage, 59s: 78 -81, 2021

Langeland K, Netherland M, Haller W. 2009. *Efficacy of herbicide active ingredients against aquatic weeds. University of Florida, Institute of Food and Agricultural Sciences.* SS-AGR-44. http://edis.ifas.ufl.edu/pdffiles/AG/AG26200.pdf.

Lussem, U., Bolten, A., Gnyp, M. L., Jasper, J., & Bareth, G. (2018). *EVALUATION OF RGB-BASED VEGETATION INDICES FROM UAV IMAGERY TO ESTIMATE FORAGE YIELD IN GRASSLAND.* The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences, XLII–3, 1215–1219. https://doi.org/10.5194/isprs-archives-XLII-3-1215-2018

Mudge CR, Netherland MD. 2014. *Response of giant bulrush, water hyacinth, and water lettuce to foliar herbicide applications.* J. Aquat. Plant Manage. 52:75–80

Wersal, R. M., & Madsen, J. D. (2010). *Journal of Aquatic Plant Management. Combinations Penoxsulam and Diquat as Foliar Applications for Control of Waterhyacinth and Common Salvinia: Evidence of Herbicide Antagonism*, 48(21–25).

Wunderlich, W. E. 1962. *History of water hyacinth control in Louisiana.* Hyacinth Control J. 1:14-16

Villamagna, A. M., & Murphy, B. R. (2010). *Ecological and socio-economic impacts of invasive water hyacinth (Eichhornia crassipes):* A review. Freshwater Biology, 55(2), 282–298. https://doi.org/10.1111/j.1365-2427.2009.02294.x

NATURALLY NATIVE:

Submitted by: Kelli Gladding, Biological Scientist with the University of Florida, IFAS, Center for Aquatic and Invasive Plants.
Photo credit: *Saururus cernuus*, Damien Rockwood with the City of Casselberry in Seminole County, Florida
Featured Plant: Lizards Tail- *Saururus cernuus*

Our native plant spotlight this issue of Aquatics is Lizards Tail, *Saururus cernuus* and has also been referred to as water-dragon. This wetland plant species is native to eastern North America, with range extension from eastern Canada down to Florida and west to Texas. It is listed as an "obligate wetland" plant which means it is typically found in wetland habitats, such as marshes, swamps and along the edges of ponds and streams. It thrives in moist to wet soils and is often seen growing in shallow water.

Lizards tail is an herbaceous perennial plant that grows 2-3 feet in height from a below ground rhizome and gets its common name from the large (6-8 inches in length) and showy white spike inflorescence that bloom in spring and summer. The leaves are heart-shaped (cordate) or arrow-shaped. When the leaves are crushed, it has a citrus type of aroma and is used in shoreline revegetation projects and ornamental industry.

Historically, this plant was used by Native Americans for its medicinal properties that provided uses as an anti-inflammatory. The rhizomes or root structures were mashed up as a poultice and then applied to soothe inflammation of the breasts and back along with calming fevers and other body aches.

A common non-native competitor with *Saururus c.* is wild taro (*Colocasia esculenta*) as both of these species compete for similar obligate wetland habitats. This invasive wetland species has a similar heart shaped leaf but can grow far more aggressively and much larger than the native Lizards tail. Wild taro is also listed as a FISC (Florida Invasive Species Council) Category I- which indicates that this species is invading and disrupting native plant communities in Florida, such as our native Lizards tail. Management of wild taro provides habitat

for our native wetland species to thrive.

For more information on Lizards tail (*Saururus cernuus*) and other aquatic plants, please visit the Center for Aquatic and Invasive Pants website: https://plants.ifas.ufl.edu/

Kelli has been a biological scientist with UF/ IFAS CAIP for four years and has been involved with aquatic plant management efforts in Florida for twenty years. She is a past president of FAPMS and is currently the Secretary/Treasurer for FAPMS Scholarship & Research Foundation k.gladding@ufl.edu

We want to hear from YOU! Submit your favorite native plant column to Kelli and to spotlight your regional chapter.

Calendar of Events

Regional Chapter Conference Dates – 2024

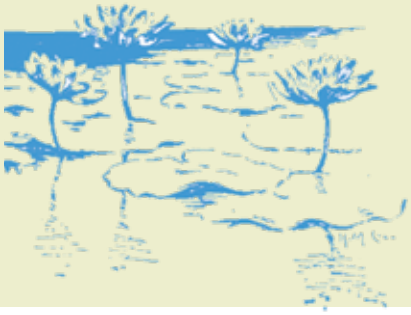
January 9-11, 2024
25th Annual Northeast Aquatic Plant Management Society
Wentworth by the Sea
New Castle, NH
https://www.neapms.org

February 26-29, 2024
44th Annual Midwest Aquatic Plant Management Society Conference
Hyatt Regency Downtown
Columbus, OH
https://www.mapms.org/conferences/2024-conference/

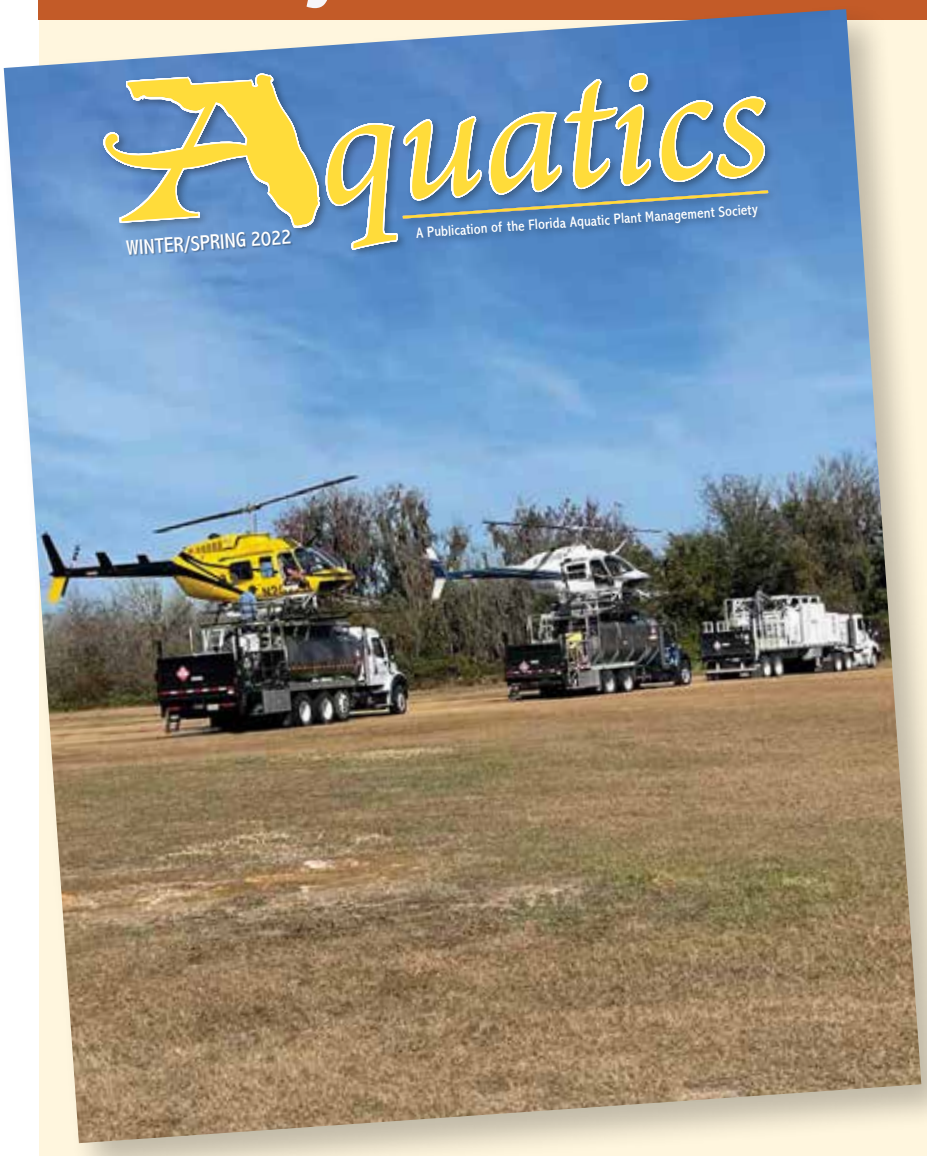
March 18-22, 2024
Western Aquatic Plant Management Society Annual Conference
Tropicana Las Vegas
Las Vegas, NV
https://wapms.org

Fall 2024
MidSouth Aquatic Plant Management Society
Chattanooga, TN
https://msapms.org

Fall 2025
MidSouth and Texas chapters plan to hold a joint conference
Location is TBD
https://msapms.org
https://www.tapms.org



It Pays to Advertise



- **Aquatics is circulated to approximately 2000 environmental managers, landscape managers, governmental resource managers, and commercial applicators.**
- **Aquatics is a resource for the people who buy and use aquatic products and services.**
- **Advertising in Aquatics magazine is a profitable investment compared to other magazines.**
- **Your advertisement not only provides the reader with pertinent information, but your support helps maintain the quality of this publication.**

Aquatics Magazine
Advertising Point of Contact

Angie Huebner
USACE Invasive Species Management Branch
701 San Marco Blvd, Jacksonville, FL, 32207-8175
863-990-7090
Angie.L.Huebner@usace.army.mil

PRESORT STANDARD
US POSTAGE
PAID
PERMIT #592
PONTIAC, IL