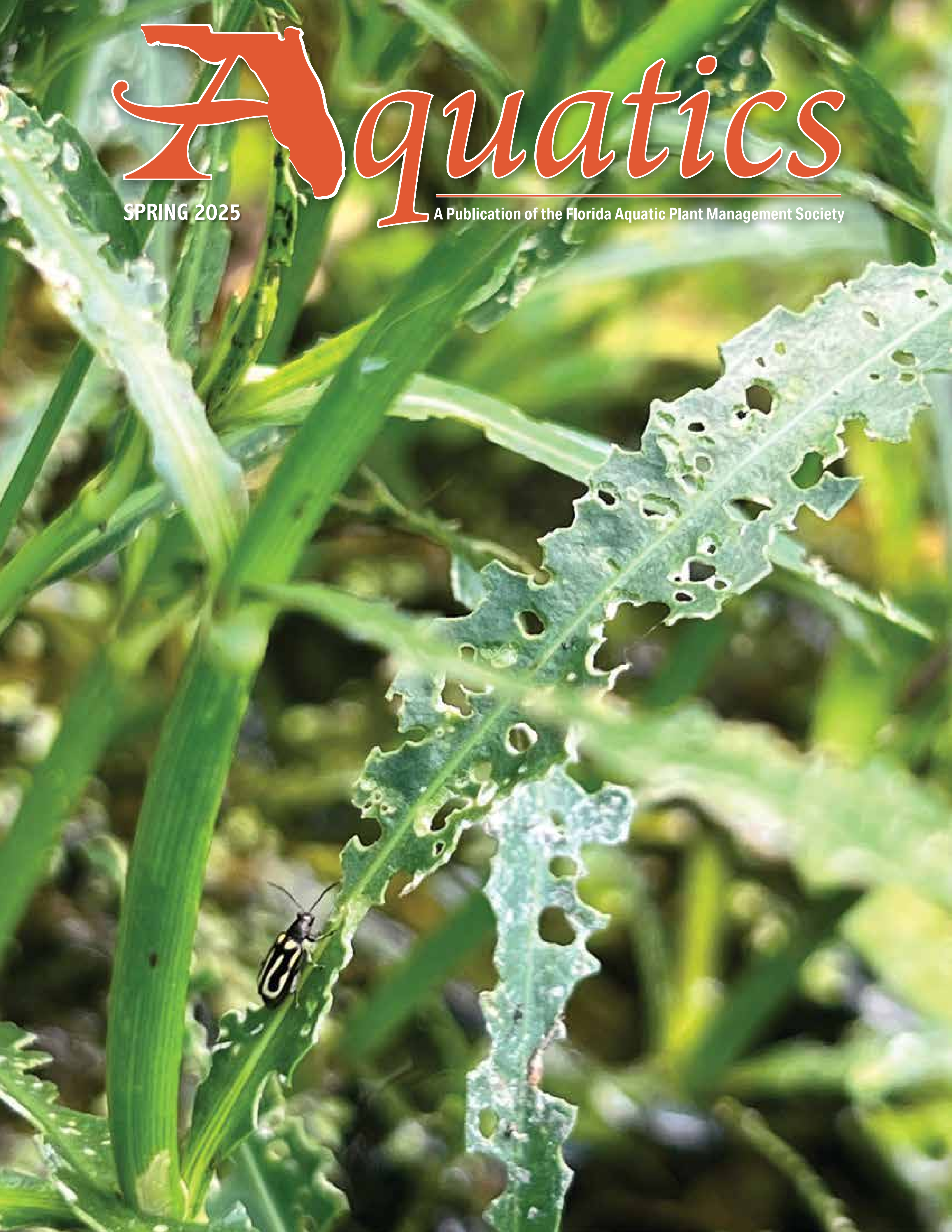
Aquatics

SPRING 2025

A Publication of the Florida Aquatic Plant Management Society



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SPRING 2025

Volume 47, Number 1

"Alligator Weed Flea Beetle in Action" taken by Mariah McInnis, was submitted to the FAPMS photo contest, and was awarded first place in the "Aquatic Operations" category.

Contents

To become a member of FAPMS and receive Aquatics magazine, please visit the website at: www.fapms.org

The vision of FAPMS is to be a leading resource for promoting excellence in the stewardship of Florida's aquatic ecosystems.

Letter from the Editor

Shelby Thomas

Dear Readers,

As spring breathes new life into our landscapes, we're thrilled to bring you an issue that celebrates the vibrant diversity of aquatic ecosystems and the dedicated professionals working to protect them. This edition of Aquatics Magazine is packed with insights, event highlights, and a touch of inspiration from the natural world.

We kick things off with "Naturally Native – Savanna Iris," a feature that explores this stunning native plant's role in aquatic habitats. Understanding and appreciating native species like the Savanna iris is key to preserving biodiversity and fostering resilient ecosystems.

Our recap of the "Florida Aquatic Plant Management Society's 48th Annual Training Conference" offers a look back at a gathering filled with knowledge-sharing, hands-on learning, and invaluable networking opportunities. The event underscored the collective passion and expertise driving aquatic plant management forward.

In "EPA, ESA, and the Changes Coming Your Way," we break down upcoming regulatory shifts and what they mean for those in the field. Staying informed is essential, and this feature aims to equip you with the knowledge needed to navigate evolving policies with confidence.

We're also excited to showcase the creativity within our community through the FAPMS Photo Contest Winners. These images capture the beauty, challenges, and rewards of working in aquatic environments — a visual reminder of why we do what we do.

A few other features round out the issue with quick, yet impactful reads: "How Hydrilla Grows in Five Weeks" provides a rapid-fire look at this aggressive invasive species; the "Northeast Aquatic Plant Management Society Update" keeps us connected to broader regional efforts; and the "FAPMS 2025 Scholarship Announcement" highlights opportunities to support the next generation of aquatic science leaders.

As always, we hope this issue educates, inspires, and strengthens your connection to the aquatic world. Thank you for your ongoing dedication and passion — together, we make a difference. Thank you for your continued dedication to our shared mission. We welcome your feedback, ideas, and stories as we work together to foster healthier waters for generations to come.

Warm wishes,
Shelby Thomas
Editor, *Aquatics Magazine*

Naturally Native

Native plant spotlight:

Common names: Savanna iris or Prairie iris

Scientific name: *Iris savannarum*

by Kelli L. Gladding

Growth habit:

According to the USF Plant Atlas, there are 11 iris species occurring throughout Florida with 8 of them being native and 3 being non-native, although the non-native species have not yet shown to be invasive. The distribution of the majority of these iris plants are located in North Florida and the Panhandle north into the Carolinas. Iris hexagona is a rare species known from just a few counties in Florida to South Carolina. Iris virginica, also known as, Blue-Flag iris, is the second most common in Florida still having a northern and coastal distribution, however this plant is common throughout the US and Canada ranging from Midwest and the Eastern portions of North America. *Iris savannarum*, commonly known as Savanna iris or Prairie iris, is the most common and widely distributed across the Florida landscape. It is composed of multiple lineages which indicates likely interbreeding of this species. The leaf blades range from 2-3' in height and the showy blue/ lavender flower rises above the leaf blades in the springtime. It can grow in dense clumps and the green course-textured foliage is a favorite for shorelines and water gardens. Visit the USF Plant Atlas for taxonomic classification to distinguish between the species along with the USDA Plants Database to observe species specific distribution.

Historically:

Even though Savanna Iris is considered to be toxic, the Native American tribes understood how to remove these toxins from the plant that would cause nausea, vomiting and irritation if ingested improperly. Native healers had specific preparation methods to mitigate these effects and

insects including butterflies and hummingbirds. Due to its toxicity, it is a deer-resistant plant. It is also important for soil and shoreline stabilization to reduce erosion. As this plant thrives in wet environments, it helps to maintain the health of flood-prone areas by acting as a natural buffer against excessive water flow and can sustain through flooding events.

A struggle for habitat:

As Savanna iris likes to grow along the edges of lakes, streams and spring runs, it is a great compliment growing beside other native aquatic vegetation, such as duck potato (*Sagitteria lancifolia*) and pickerelweed (*Pontederia cordata*) that occupy the same niche locations. One of the biggest invasive aquatic plants that challenge these shoreline plants is torpedo grass (*panicum repens*). Torpedo grass is listed by the Florida Invasive Species Council as a Category 1 species; "species that are invading and disrupting native plant communities in Florida." Torpedo grass has the ability to tunnel under the soils of the other shoreline plants creating dense mats of more torpedo grass and chokes out other plants. Torpedo grass will entangle itself within and around emergent plants making management of this species extremely challenging. Hand pulling torpedo grass

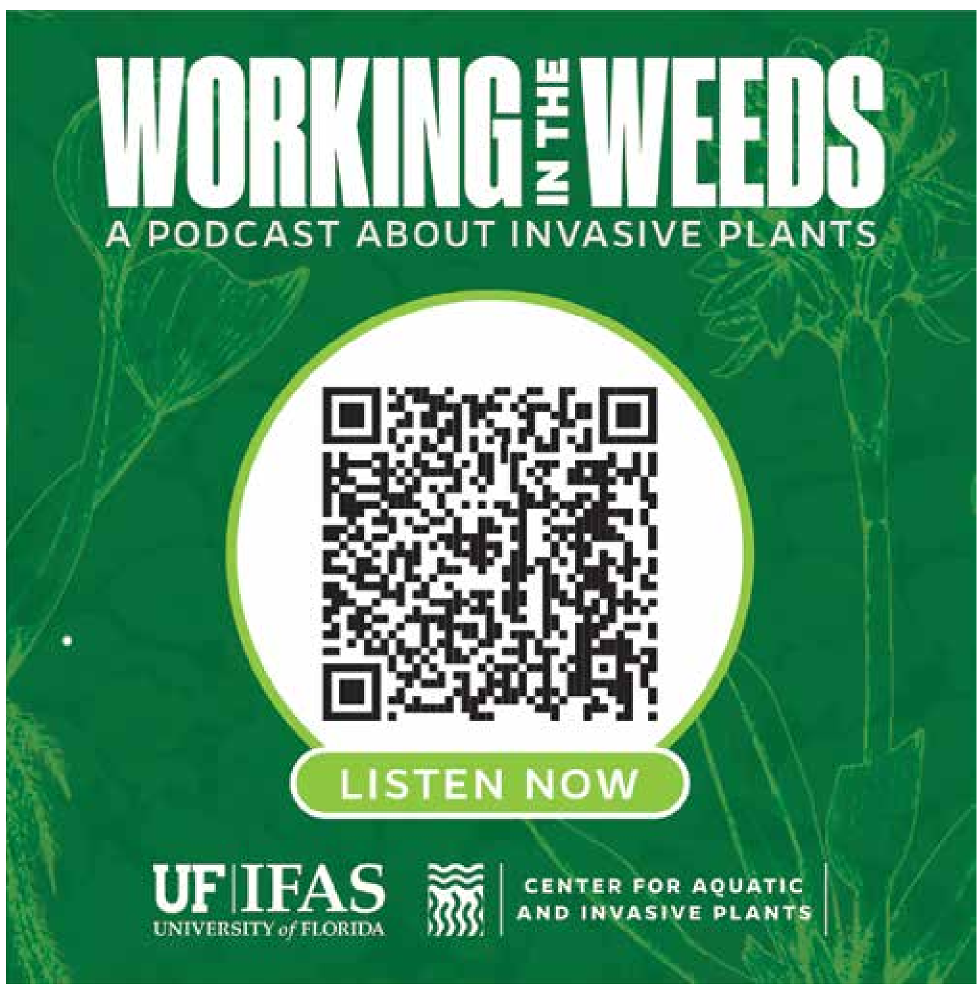
For additional information; please visit the Center for Aquatic and Invasive Plants website: Center for Aquatic and Invasive Plants | University of Florida, IFAS (ufl.edu)

We want to hear from you! Please, submit your favorite native plant column to Kelli and to spotlight your regional chapter. K.gladding@ufl.edu

is extremely difficult and if any of the root structures are missed, it will regrow. Using herbicides to control torpedo grass can be difficult as well due to the potential overspray on the other native plants in the area. There is only one aquatic graminicide registered for use within Florida that has helped with lessening native plant impacts but repeated applications are necessary for control. There are no biological control agents for this plant, making herbicide applications the most common tool for removal and management.

I personally find the Savanna Iris to be one of my favorite shoreline, emergent plants due to the rich blue and lavender colors it produces in the spring. In addition, it doesn't get really tall in landscaping shorelines and is a compliment with other native emergent plants. It seems to be occasionally used in shoreline replanting efforts and it would be nice to see this plant exploited more.

Kelli is a biological scientist with UF/ IFAS CAIP 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 and Research Foundation.



FAPMS 48TH ANNUAL TRAINING CONFERENCE

The FAPMS 48th Annual Training Conference was held December 9 thorough 12 at the Daytona Beach Hilton. This was after the initial dates of October 7 to 10 had to be postponed due to Hurricane Milton. Special thanks to the Board and especially Sam Sardes and her team for buckling down and creating a brand-new program after the date had to be moved. They did a phenomenal job of securing additional speakers and retaining presenters that were originally planned to present in October. Also, no small feat, they were able to secure 15.5 CEUs for the program in very short order so applicators received CEUs to retain their respective licenses. Despite the delay in having the conference, your leadership team runs like a well-oiled machine and the conference went off without a hitch thanks to everyone's flexibility and adaptability!

The program featured talks and discussions on the new non-native eelgrasses that are showing up in a few of our waters and focused on identification and control efforts. We also received several technological updates, including advances in drone applications and AI learning as well as the ever-important industry updates to get the most up-to-date information on various products and technologies. All in all, a very informative and engaging program. Evening events included the student poster session, Presidents Reception, cornhole tournament, special "fishing" tournament, the ever-important duck races and annual awards banquet!

The Tuesday evening poster session was well attended and had about 8 to 10 poster presentations each with a student eager to talk about their respective research and answer any questions you might have. The first-place poster presentation was Johnathan Gluekert with 2nd place going to Corina Vuillequez and Amber Riner getting 3rd place.

The poster session was followed by the cornhole and fishing tournaments that were held in conjunction with the Presidents Reception. Nothing brings people together like good food, good drinks, and some intense but friendly competition! These events were no exception and sparked some good conversation. The winners of the cornhole tournament were Joe Malone & Mike Perez. 2nd place went to the team of James Boggs & Ross Honeycutt. Rounding out the field in 3rd place was the team of Donald Metcalf & Sean Gallagher!

This year's "fishing" tournament needs a little explanation. With the conference being held in December the temperatures were much colder and in Daytona, being able to fish on the pier has been unpredictable. So, keeping with the theme of this year's conference we adapted to the conditions and had our first ever go fish tournament! These were played with new invasive species playing cards that were developed to bring attention to the invasive species that are impacting our wonderful state. I never knew that a "go fish" game could be so intense and competitive. A good time was had by all and our first "go fish" winner was Sarah Pallidino with Taylor West finishing a distant 2nd and TJ Lawson in third. Thanks, and Congratulations to all who participated!

Wednesday evening brought the Awards banquet but not before the world-renowned duck races! Although quite chilly from a passing December front, the ducks were quite frisky and finished the heat races in record time! Your duck race winners are as follows:

- **Blue duck Race; First place: JJ Ferris Second place: Lake Doctors Third place: JJ Ferris**
- **Yellow duck Race; First place: Kamani Davis Second place: Tracy Wood Third place: Jon Sperr**

There was a good showing for the Vic Ramey Photo Contest, and we appreciate everyone who participated! For the category of "Aquatic Scene" winners were as follows:

- **First Place: Alex Dew for "Scenic"**
- **Second Place: Brett Hicks for "Bear Creek"**
- **Third Place: Brett Hicks for "Gator in Hyacinth"**

For the category of " Aquatic Operations" winners are:

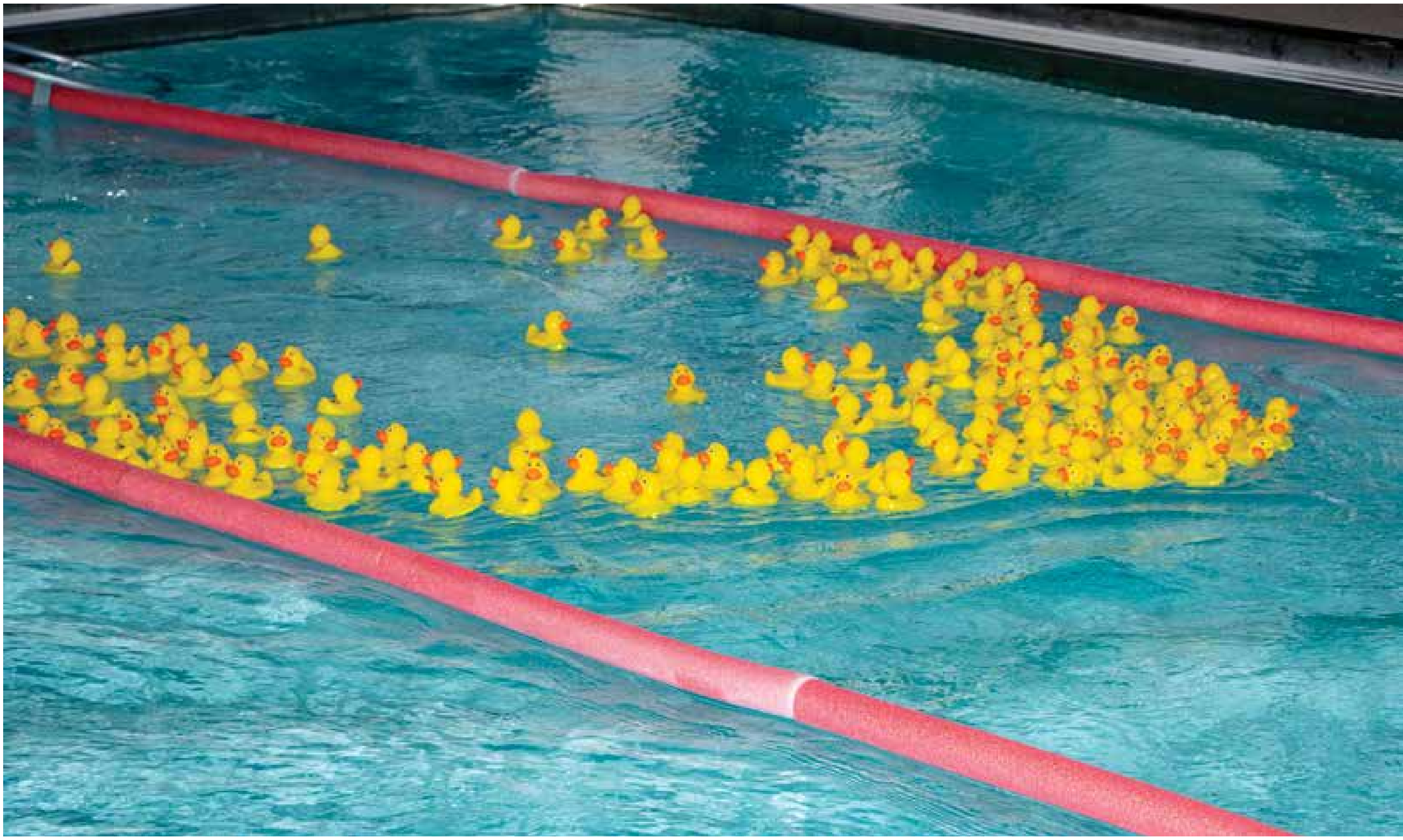
- **First Place: Mariah McInnis for "Alligator Weed Flea Beetle in Action"**
- **Second Place: Jason Cull for "Awaiting Flight"**
- **Third Place: TIE Cody Beeson for "Storm Delay" Brett Hicks for "Bell Lake"**

We had a very good showing of applicator papers this year and appreciation goes to all those who participated. Our winners are as follows: 1st Conrad Oberweger, 2nd Jason Cull and 3rd Justin Lamb.

At the awards banquet and ceremony, we thanked our outgoing board members Brett Bultemeier, Sam Sardes, and

Cornhole tournament

Sharmen Setaram for their service to the society. The awards ceremony could be summed up as the night of surprises as none of the recipients had a clue that they were going to be receiving an award!



World-renowned duck races

Winners of Applicator Papers

William "Billy" Colon was awarded the coveted applicator of the Year award for his work ethic and service to the Lee County Hyacinth Control District. Sam Sardes was awarded the Presidential Award for her service to the society and especially her tireless efforts to make this year's program a tremendous success! Finally, Jon Lane was awarded the Mike D. Netherland Exemplary Colleague Award for his "can do" attitude and personal attention to making the Federal, State and local invasive species partnerships a model for success in our field! We thanked our outgoing and immediate past-president Matt Phillips and welcomed our incoming president, Jason Cull and president elect Sam Sardes. Also welcomed were our 3 new board members Conrad Oberweger, Alex Dew and Wykle Greene.

No awards banquet would be complete without our annual raffle to support the scholarship fund, and this years "Chest of Cheer" winner was David Flaim! Lastly, the training conference was ended with the grand prize drawing awarded to Jamie Eskdale.

The next FAPMS Training Conference will be October 6-9, 2025, at the beautiful Hilton St. Petersburg Bayfront! Please make your plans to join us now! For more information, please visit our website at https://fapms.org

Respectfully submitted by Matt Phillips, FAPMS Past-President

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Jon Lane with Matt Phillips receiving the Mike D. Netherland Exemplary Colleague Award

A Look Back:

Florida Aquatic Plant Management Society's 48th Annual Training Conference


RIGHTS OF WAY
SPECIALTY


Milwaukee

EPA, ESA, and the Changes Coming Your Way

The one constant in life seems to be change, and when it comes to the United States Environmental Protection Agency (EPA), this certainly holds true. The changes taking place are perhaps the biggest that agency has made since its inception. The entire process and standards for getting a pesticide certification are changing, but for most of you all that means is a new manual and exam soon. The bigger change relates to the Endangered Species Act (ESA). That is our focus here.

To understand we must first start with the Federal Insecticide Fungicide and Rodenticide Act (FIFRA). This act is why you must get a pesticide license, follow a label, and all the things we associate with using pesticide products. Originally FIFRA simply ensured that whatever a company claimed was in a jug of product was in there and that it did something. It was protecting the consumer from fraud. However, once it was pulled into the EPA it became about protecting people and the environment. This means the EPA registers every pesticide approved for use in the US and ensures there is a label that gives the instructions for its proper use. When used according to the label EPA ensures there isn't unreasonable risk of harm to people or the environment. It's important to note that isn't zero risk or no risk, simply not unreasonable risk. The key is you must READ and FOLLOW the label.

The ESA is another act that is overseen by different agencies to ensure the protection of species that are at risk of harm/extinction. This act is overseen by the US Fish and Wildlife Service and the Marine Fisheries Service, hereafter "The Agencies". Their job is to assess the things that can cause risk to these endangered species. Their goal is zero risk of harm to the endangered

What is Florida without these amazing creatures. Go Gators!

species. That is a very different set of rules from EPA no unreasonable risk. There is inherent conflict here. This is important as we do have an obligation to protect species AND it can work. Both the American Alligator and the Bald Eagle were once at risk, and I for one don't want to imagine Florida without these majestic and crucial species.

on their website: https://www.epa.gov/endangered-species/epas-workplan-and-progress-toward-better-protections-endangered-species

Most of the EPA's focus has been on agriculture, which is by far the largest user of pesticides in the US. Much of what the EPA is implementing will have no impact on you, the aquatic applicator. So why an entire article about a process that doesn't impact you? Well, it hasn't been an impact on you YET! It won't be long before you will have to use a BLT to check if you are in a PULA. Are you ready for that? Do you even know what that means?

First let's decode the terms. BLT stands

12.0 ENDANGERED AND THREATENED SPECIES PROTECTION REQUIREMENTS

Before using this product, you must obtain any applicable Endangered Species Protection Bulletins (Bulletins) within six months prior to or on the day of application. To obtain Bulletins, go to Bulletins Live! Two (BLT) at https://www.epa.gov/pesticides/bulletins. When using this product, you must follow all directions and restrictions contained in any applicable Bulletin(s) for the area where you are applying the product, including any restrictions on application timing if applicable. It is a violation of Federal law to use this product in a manner inconsistent with its

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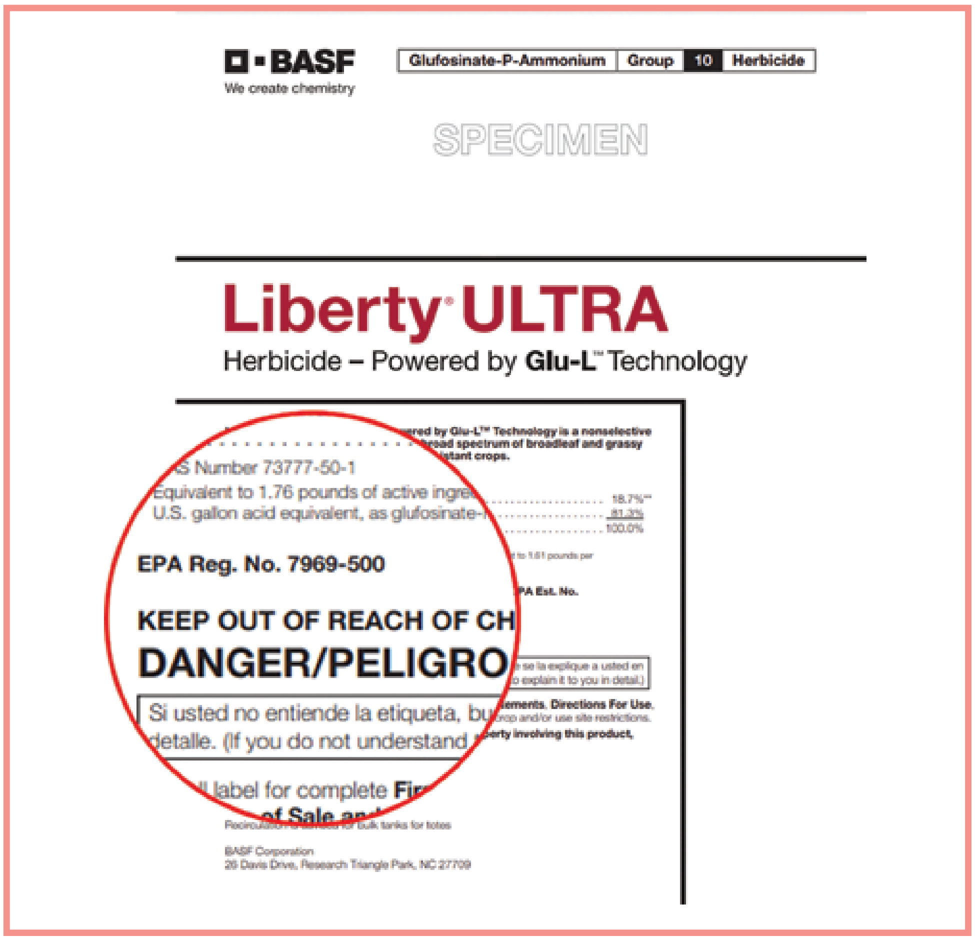
labeling, including this labeling instruction to follow all directions and restrictions contained in any applicable Bulletin(s). For general questions or technical help, call 1-844-447-3813, or email ESPP@epa.gov.

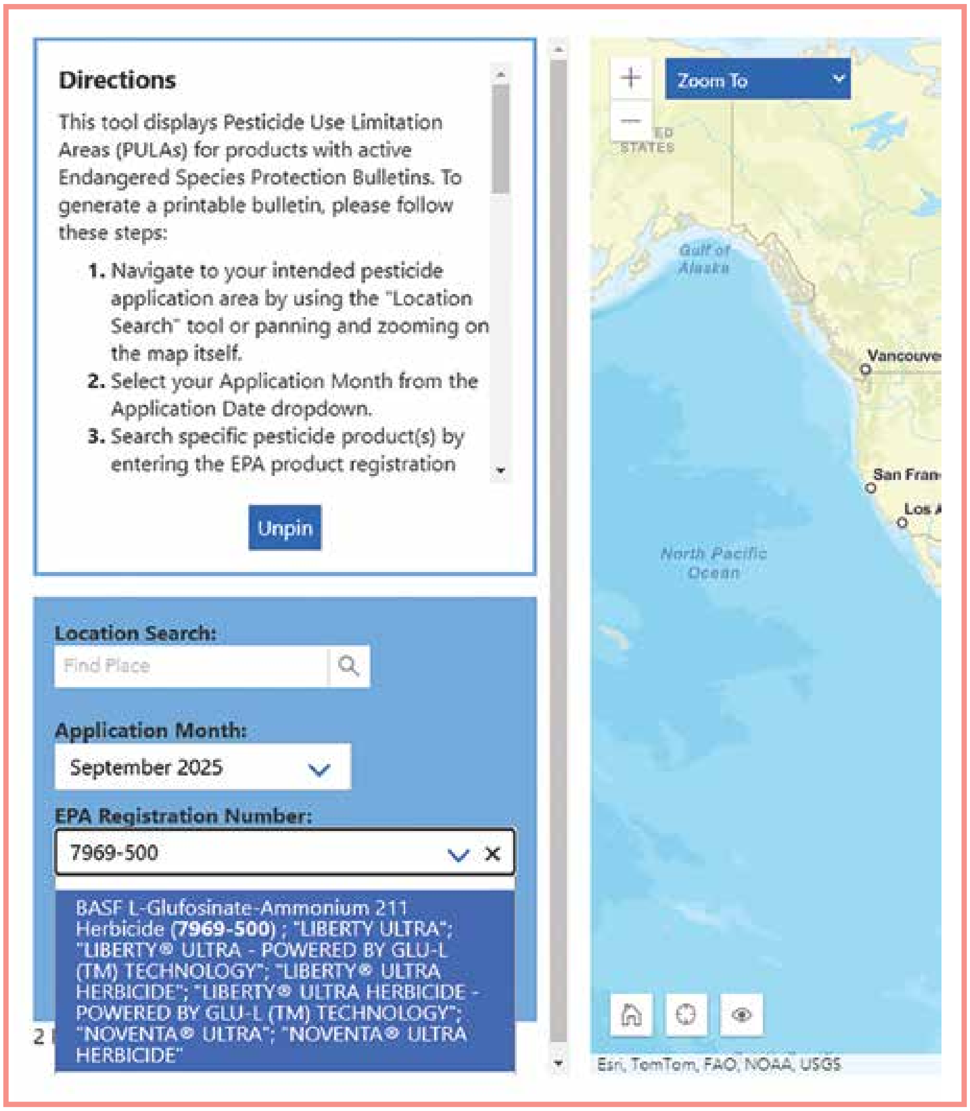
Picture 1: Pesticide label language that directs you to the BLT website. Websites listed on the label count as label!

If the EPA approves a product that does have what they deem a reasonable risk product that could encounter a species ESA says can have zero risk…what is to be done. Well in the past a long and tedious process known as a "consultation" took place. Basically, the EPA would provide a list of products that could come in contact with each endangered species and possibly cause harm to an individual on that list. So, if a pesticide is lethal to a protected plant species for instance, they would tell the Agencies which products these were and basic information about those products. The Agencies would then consider the use of these products and recommend steps to eliminate the risk to a particular endangered species.

You can imagine that takes tremendous time and as a result a massive lawsuit was filed against EPA. The courts, several of them, found EPA to not be in compliance with their duty to protect endangered species and they couldn't use the excuse of being too understaffed or far behind in the process. They were ordered to find a faster way to compliance. This led them to the ESA roadmap, which includes a whole series of actions, you can find more information



Picture 2: The EPA registration number is found on the front of the pesticide label. Use that number in BLT.

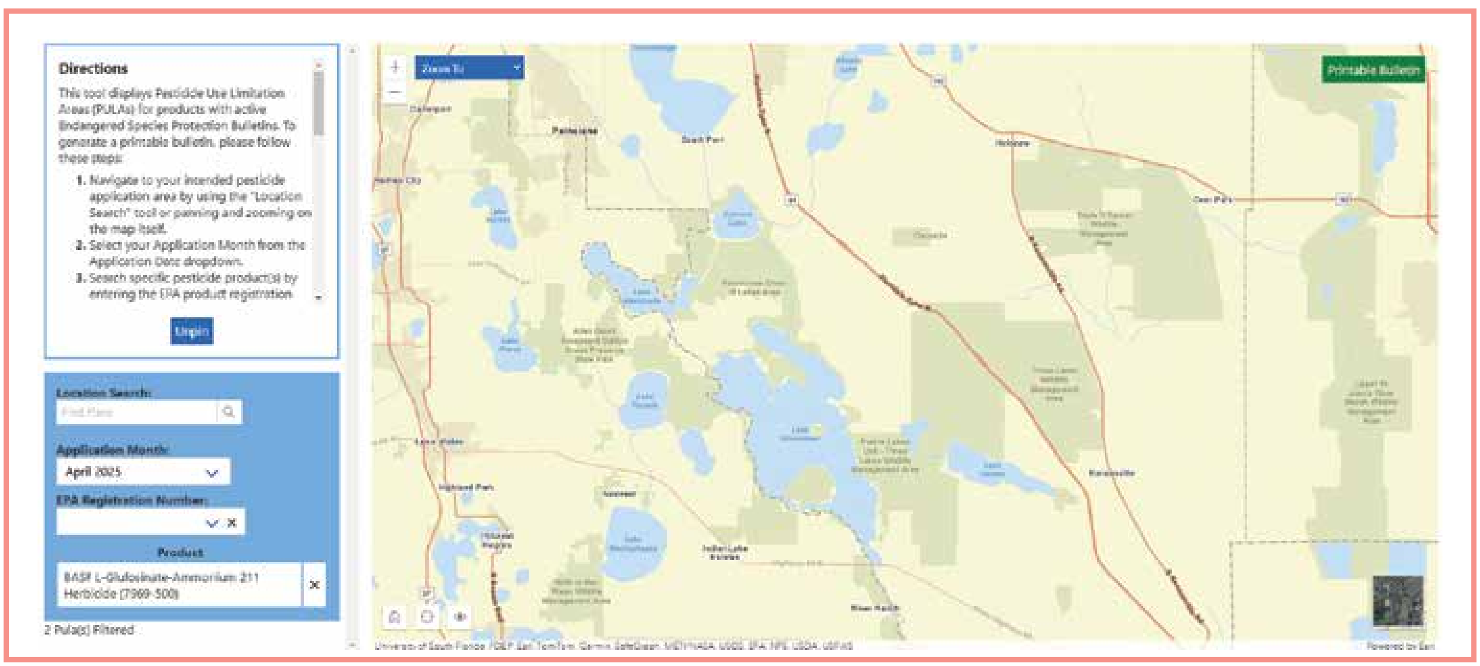


Picture 3: Put the month, EPA registration number into the box on the lower left. This will limit what products pull up, which is important as more products are added.

for Bulletins Live! Two, and it is a website and mapping program that allows you to determine restrictions that go beyond the label. Those restrictions will only apply if you are inside a Pesticide Use Limitation Area (PULA), which can be found on the BLT map. You may be wondering how we know if we are supposed to do that, which is a great question. Like all thing's pesticide safety, you will find it on the LABEL. In the directions for use section, you will be directed to consult the BLT for information about additional restrictions. That the website is listed on the label, that makes is part of the label and just as enforceable.

You looked on your label and saw the Endangered Species language, now what? First think about when you want to treat, because you can check the BLT up to 6 months before a treatment. So, if you are planning now and want to make sure you know what to do you can look up to 6 months forward. Once you check, you don't have to check again before that treatment date…so it pays to look ahead. With that in your mind the first thing to grab from the label is the EPA registration number and take that over the BLT with you. The BLT site can be found here: https://www.epa.gov/endangered-species/bulletins-live-two-view-bulletins

In the menu box on the bottom left select your treatment date, plug in your

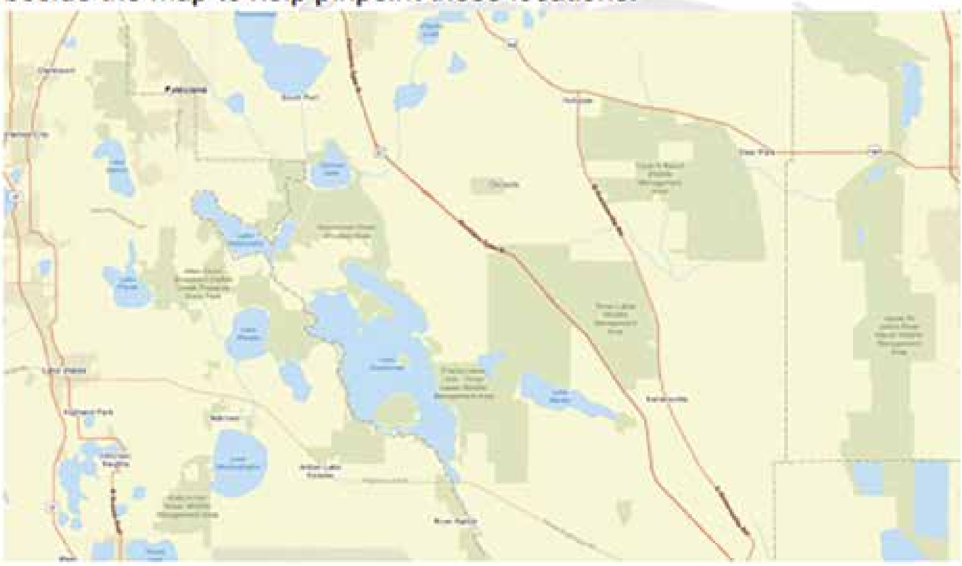


Picture 4: This product does not have an active PULA in this treatment area, capture this for your records in case it changes in the future.

Endangered Species Protection Bulletin

Application Month: April 2025
Product: BASF L-Glufosinate-Ammonium 211 Herbicide (7969-500)

1 Areas where pesticide use must be limited are identified on the map. A legend is located beside the map to help pinpoint these locations.



Legend

Limitation Area

Currently, no pesticide use limitations exist within the printed map view for the month/year and product you selected, beyond the instructions specified on the pesticide label. Follow the use instructions on your label.
Ensure that your pesticide application area is within the printed map view. If it is not, follow the directions on the Instructions Tab to ensure that your pesticide application area is captured within the printed map view.
Please check back if you plan to apply your pesticide in an area outside the map view or in a month and year other than the one for which this Bulletin is valid.

This document contains legal requirements for the use of certain pesticides.
Do not modify any text, graphics or coloration or otherwise alter this document.
ESPP Contact: ESPP@epa.gov Phone: 1-844-447-3813
Date Printed: 3/4/2025, 4:33:19 PM

Picture 5 : The bulletin from picture 4 clearly states there are no additional steps required. Keep this Bulletin for your records for 2 years.

Picture 6: This product does have a PULA in your treatment area, click the "Printable Bulletin" to show your restrictions.

Endangered Species Protection Bulletin

Pesticide Use Limitation Summary Table

Product	AI	Use	Method	Form	Code	Last Update
DREXEL MALATHION 5EC (19713-217)	Malathion (NO INERT USE)	All Agricultural Uses	Aerial spray	Emulsifiable Concentrate	MA5	8/23/2023
DREXEL MALATHION 5EC (19713-217)	Malathion (NO INERT USE)	All Agricultural Uses	Ground spray	Emulsifiable Concentrate	MA5	8/23/2023
DREXEL MALATHION 5EC (19713-217)	Malathion (NO INERT USE)	All Agricultural Uses	Aerial spray	Emulsifiable Concentrate	MA5	8/23/2023
DREXEL MALATHION 5EC (19713-217)	Malathion (NO INERT USE)	All Agricultural Uses	Ground spray	Emulsifiable Concentrate	MA5	8/23/2023
DREXEL MALATHION 5EC (19713-217)	Malathion (NO INERT USE)	Mosquito Adulticide	Aerial spray	Emulsifiable Concentrate	MM3	8/23/2023
DREXEL MALATHION 5EC (19713-217)	Malathion (NO INERT USE)	Mosquito Adulticide	Ground spray	Emulsifiable Concentrate	MM3	8/23/2023

Codes and Limitations Table

Code	Limitation
MA5	During the months of April - September: 1. Apply malathion only when wind is blowing away from dry prairie habitat OR 2.Use a 50-foot ground buffer from dry prairie habitat, and an aerial buffer from these habitats according to application rate: (1) 50 feet for <0.5 lbs ai/A; (2) 75 feet for 0.5 - <1 lb ai/A; (3) 150 feet for 1-2.5 lbs ai/A; (4) 200 feet for >2.5 lbs ai/A. Buffer sizes may be reduced by 25 feet for application rates (1) and (2) if a full swath displacement upwind is used during aerial application. Buffer sizes may be reduced by 50 feet for application rates (3) and (4) if a full swath displacement upwind is used during aerial application. Habitat: Dry prairie habitats are essentially treeless (with few or no trees such as pines or palms), relatively flat areas that support herbaceous plants (e.g., grasses and flowering plants) and shrubs. These areas may become flooded for short periods during the rainy season, but remain dry for the remainder of the year. These habitats may include degraded prairie and rangelands.

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Do not modify any text, graphics or coloration or otherwise alter this document.
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Endangered Species Protection Bulletin

MM3	Where feasible, avoid application from April to September. If avoidance is not feasible or impairs the ability of the mosquito control district or agency to protect the public's health and welfare, coordinate with the local FWS Ecological Services field offices to determine appropriate measures to ensure the proposed application is likely to have no more than minor effects on the species (FWS points of contact are available through the Information, Planning, and Consultation (IPaC) website h ttps://ecos.fws.gov/ipac/). The applicator must retain documentation of the technical assistance and the agreed upon species-specific measures that were implemented.

Picture 7: This Bulletin has two restrictions depending on use pattern. You would identify your restriction and prove you can abide by it.

EPA registration number and ensure the product that comes up is the one you are using. Now zoom in to your treatment area and determine if you are in the PULA (which will be a pink shaded area) and click where you will be treating. If you are in a PULA, the "Printable Bulletin" button on the top right will turn green and you click that to get your bulletin. The Bulletin will tell you what additional things you must do. It might include restrictions on months that you can apply, additional buffers you must include, mixes you can't use, all the way up to banning the use of that product outright in that area. Print that bulletin or create a digital version to keep in your records for 2 years.

That's it, I know it seems overwhelming but its read and follow the label. If the label takes you to the website put in your info, abide by that, and keep your records. Currently there aren't aquatic products that have this language, but it is only a question of time. It is possible that aquatic work, particularly invasive plant control, might be exempt. This is where working with your local APMS chapter, industry groups, and others involved in aquatic plant control is crucial. The EPA is very open to working with groups to find the best way forward and your voice does matter. How much more powerful is your voice going to be if you understand this process. We can all work together to protect our species, protect our waters, and protect yourselves.

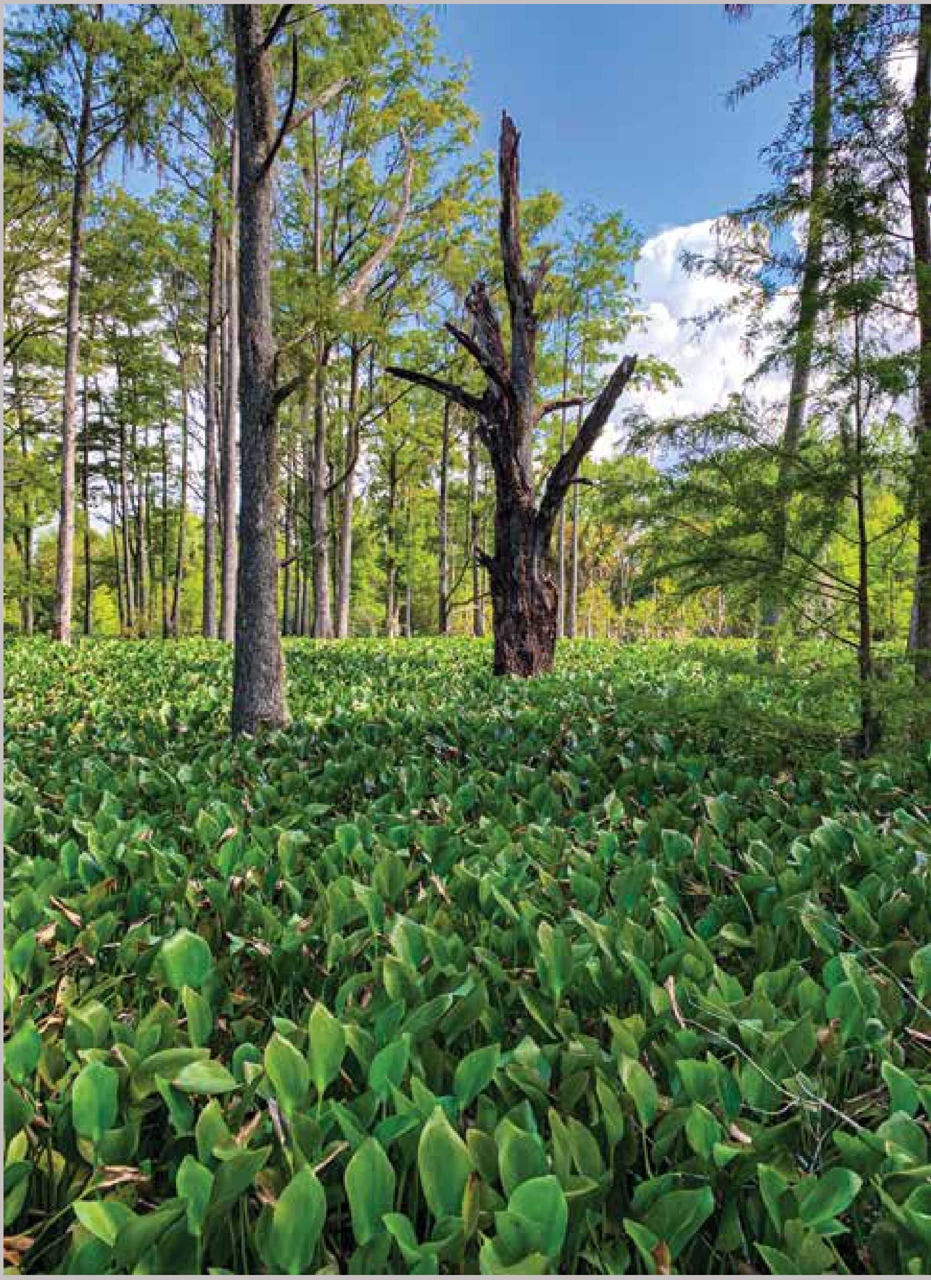
Vic Ramey Photo Contest

Aquatic Scene

First Place: Alex Dew for "Scenic"

Second Place: Brett Hicks

s for "Gator in Hyacinth"



Third Place: Brett Hicks for "Bear Creek"

Aquatic Operations

First Place: Mariah McInnis for "Alligator Weed Flea Beetle in Action

Second Place: Jason Cull for "Awaitin

Third Place: TIE Cody Beeson for "Storm Delay" Br

ng Flight"

rett Hicks for "Bell Lake"

Figure 1. University of Florida Biologist, Kelli Gladding and US Army Engineer Research and Development Center Research Biologist, Michael Durham conducting a point intercept survey.

Hydrilla Infestations: Evolving Strategies in Mapping and Monitoring

Authors: Amber Riner, Jonathan Glueckert, Corrina Vuillequez, Benjamin Sperry

Introduction

Hydrilla [*Hydrilla verticillata* (L.f.) Royle] is an aggressively growing submersed, invasive aquatic plant native to Asia that affects freshwater systems across all continents except Antarctica (Glomski and Netherland 2012, Langeland et al. 1996, Posey et al. 1993). Aquatic herbicides are the primary management technique for hydrilla which require specific concentration-exposure time profiles to be effective (Van and Conant 1988). Water exchange and herbicide dissipation reduce both concentration and exposure time near the target plant.

Given the variability in herbicide efficacy for hydrilla, monitoring is crucial to accurately assess treatment success, refine future strategies, and identify when additional interventions are needed to manage refuge populations (Hauxwell et al. 2010, Sytsma, 2008). The best way to achieve this is by using methods that document the distribution and growth of plants over time (Hauxwell et al. 2010, Sytsma 2008).

The integration of qualitative and quantitative data offers the most comprehensive perspective to support informed management decisions. Such data allows managers to identify ineffective management techniques, potentially reducing management costs over time (Madsen and Bloomfield 1993, Hayek et al. 2010). The importance of frequent surveys lies in their ability to assess differences in plant community structure, population sizes, and responses to treatment over time (Madsen and Wersal 2018, Thayer et al. 2024). Monitoring should be tailored to the management objectives and resources available, with different methods such as field sampling, hydroacoustic surveys, and remote sensing available for practitioners to select a plan that matches their constraints and goals (Madsen and Wersal 2018).

Sampling Design and Survey Type

When planning a hydrilla monitoring survey, the sampling design should align with site characteristics and project objectives to minimize bias, ensure representative data, and facilitate efficient collection (Madsen and Wersal 2018). Sampling designs can be prepared in advance using GIS and deployed via GPS receivers for accurate location tracking. Random sampling, a popular design, involves randomly selecting sampling points and is easy to implement, but may not accurately represent variations within the population. Alternatively, systematic sampling typically

Figure 2. Hydrilla abundance using four-pronged twist rake, ranked on a 0 to 3 scale.

involves selecting the first point randomly and placing subsequent points at regular intervals (Greeson et al. 1971, Schreuder et al. 2004). This approach is easy to plan and ensures even distribution of sampling points across the population. These designs are essential for effectively capturing the spatial distribution of hydrilla and ensuring comprehensive area coverage.

Survey plans such as transects, points, and quadrats can be created in GIS software such as QGIS, ArcGIS, or google earth. They can be uploaded to navigation devices like phones, tablets, depth finders and handheld GPS units, streamlining field navigation and data collection and allowing for repeatability of surveys. In point-intercept surveys, a pre-made grid of points is generated using one of the sampling designs. At each designated point, navigated via GPS, a plant rake is deployed to sample submersed vegetation, providing data that can be used to assess changes in species occurrence over time (Madsen 1996).

Line intercept surveys involve taking measurements at regularly spaced intervals along a straight line. Along these transects, observers can collect presence-absence data, cover estimates, or density and abundance measurements using quadrats placed at each interval (Madsen 1996). A quadrat is a square or rectangle of known dimensions, used in ecological studies to assess species abundance, density, or percent cover within a defined area; quadrats can be pre-designed in GIS or manually constructed from PVC frames.

In Situ Data Collection

At each sampling point, transect, or quadrat, several data collection methods are commonly used for hydrilla, the simplest being visual observations. A four-tined twist rake or a 'frotus' is often deployed to the bottom of the water body, twisted twice, and pulled up to collect submersed plants (Sperry et al. 2021). The collector can then make visual observations based on presence or absence of the species on the rake, as well as their abundance. Abundance is typically ranked on a 0 to 3 scale, with 0 indicating no plants present, 1 indicating a small number of strands, 2 representing multiple strands with visible tines, and 3 indicating a large biomass with no visible tines (Hauxwell et al. 2010).

Figure 3. Dense stand of hydrilla occupying the entire water column. Photo credit Kelli Gladding.

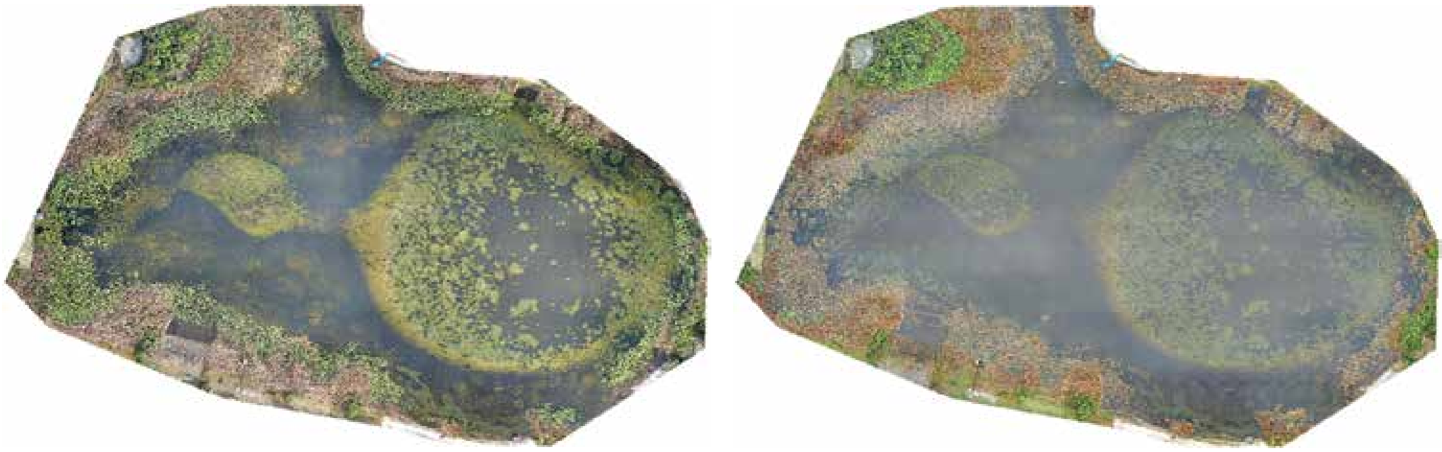


Figure 4. Orthomosaic of South Lake Eva pre-treatment (left) and two weeks post-treatment (right). Photo credit Kelli Gladding.

Biomass sampling, where all plant material in a predetermined area is completely harvested and weighed, can be used to provide more accurate abundance data but is more labor-intensive and may miss below-ground biomass. A PVC coring device is a good tool for sampling below-ground structures like tubers and turions, but it can require numerous samples to be harvested to acquire enough data (Madsen et al. 2007). Above-ground biomass can be captured using a twist rake, though dense hydrilla growth can lead to overestimation (Johnson and Newman 2011). SCUBA methods are also available for biomass collection with divers harvesting all the biomass within a quadrat (Madsen and Wersal 2019, Butrel et al. 2023).

Hydroacoustic Surveys

Hydroacoustic surveys have been used for the past four decades to map submersed aquatic plants like hydrilla, offering a cost-effective and efficient monitoring method (Maceiceda et al. 1984). Hydroacoustic surveys are often conducted along pre-designated transects loaded into a depth finder that were selected based on one of the sampling design methods with the boat moving at slow speeds (BioBase). Commercially available depth finders equipped with an internal GPS and transducer transmit signals that are recorded by the device (BioBase). Transducers in hydroacoustic devices convert electrical signals into sound waves, which travel through water and reflect off objects like vegetation, fish, or the lake bottom. The returning echoes are converted back into electrical signals, with their strength and return time recorded alongside GPS location data. These devices in conjunction with cloud computing software like BioBase can produce valuable data on vegetation biovolume (percentage of the water column that is vegetation), water depth, and bottom hardness, while allowing for consistent spatial mapping across large areas (Thomas et al. 1990). This data can be loaded into a mapping system and analyzed using geostatistical methods that predict missing information and create detailed maps of the lake (Valley et al. 2005).

Traditional biomass sampling is labor-intensive, limiting its scale, repeatability, and turnaround time for management. In contrast, hydroacoustic surveys only require one person and no physical sampling, making them ideal for large areas. These surveys provide quantitative, repeatable data for detailed biovolume analysis over time, supporting pre- and post-management monitoring. Unlike remote sensing, hydroacoustic surveys use sound waves instead of light, making them reliable regardless of water clarity, surface conditions, or cloud cover.

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Some limitations of hydroacoustic techniques are that they can overestimate biovolume under conditions of high-water velocity, wind, or waves, particularly for mid-range biovolume estimates (Helminen et al. 2019). Additionally, hydroacoustic surveys cannot differentiate between plant species, making them most effective in areas for monospecific hydrilla populations (Hohausova et al. 2008, Howell et al. 2019). To address the lack of species-specific data in hydroacoustic surveys, point intercept surveys can be conducted along the same transects to provide more detailed species information and biovolume estimates. One person manages sonar logging and navigation, while another collects presence-absence data along the transect, for comprehensive species composition and vegetation density data. Another limitation is that hydroacoustic methods are unable to obtain accurate readings when vegetation reaches the water surface. In these cases, the operator may infer that the biovolume is 100% (Howell et al. 2019). Despite these limitations, hydroacoustic surveys remain a reliable tool for mapping submerged aquatic vegetation and quantifying management outcomes.

Remote Sensing

Remote sensing is the acquisition of information about an object without making physical contact, typically through satellite or aerial imaging techniques. Resolution refers to the amount of detail an image can show; high resolution means the image is sharp and clear, with more detail, while low resolution means it's blurrier or less detailed. Sentinel-2 and Landsat 9 offer free multispectral imagery with 10 m and 30 m spatial resolutions and 5- and 8-day temporal resolutions, respectively. For higher spatial resolution, Planet provides 1 m imagery at a cost. Drones and aircraft equipped with RGB, multispectral, or hyperspectral- sensors offer customizable resolution, with RGB drones being the most affordable. Remote sensing is a valuable tool for monitoring emergent floating plants, but it is more complicated with submersed species due to water column complexity. Factors such as water transparency and turbidity vary between water bodies and even within the same water body, affecting depth of light penetration and the ability to remotely detect hydrilla (Silva et al. 2008).

Remote sensing using true color imagery captured from an airplane can be effective for delineating areas of large hydrilla infestations that form extensive mats on the water's surface (Everitt et al. 2003). To detect hydrilla deeper in the water, we need multispectral images because hydrilla reflects very little light in the visible range, but it reflects more light in the near-infrared range (Blanco et al. 2012).The biggest advantage with remote sensing is that there are no crews required, and generally the larger the study site the greater the advantage with remote sensing (Rice et al. 2012). To achieve higher accuracy in identifying hydrilla, remote sensing can be combined with hydroacoustic data collection and other survey methods. Deep learning, an advanced form of artificial intelligence, uses complex algorithms to process and learn from large datasets, like how the human brain analyzes information. Deep learning models have been used to classify hydrilla presence with over 80% accuracy using RGB UAS imagery and hydroacoustic survey data (Perrin et al. 2022). To further validate these classifications, ground-truthing with simplified presence-absence surveys can be conducted for greater accuracy.

Future Directions

Effectively managing hydrilla infestations requires adaptable, data-driven approaches that blend traditional and innovative techniques for monitoring and mapping. While biomass sampling provides high-accuracy data, newer methods like hydroacoustic surveys and remote sensing allow for broader, more cost-effective coverage in large or difficult-to-access areas (Madsen and Bloomfield 1993, Valley et al. 2005). Hydroacoustic methods, for instance, offer a reliable way to quantify biovolume and can be repeated over time for ongoing assessments, though they may overestimate in high-velocity areas or be less accurate for species-specific identification (Helminen et al. 2019, Howell et al. 2019). Remote sensing can provide expansive and efficient coverage for hydrilla-dominated areas, with deep learning models enhancing accuracy by integrating RGB and hydroacoustic data (Perrin et al. 2022, Stocks et al. 2019).

> *Effectively managing hydrilla infestations requires adaptable, data-driven approaches that blend traditional and innovative techniques for monitoring and mapping.*

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FAPMS 2025 Scholarship Announcements:

The Paul C. Myers Applicator Dependent Scholarship application due date is quickly approaching and needs to be submitted by June 1 st, 2025.

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Myers Scholarship – FAPMS

In addition to the Myers Dependent scholarship, the FAPMS Scholarship Foundation is also accepting applications for the William L. Maier Jr. Memorial Scholarship. This scholarship is designed to help support Graduate students attending a university in Florida with a broad focus on freshwater habitats. The deadline for submission is August 31st, 2025. Please share this information with your family and friends, it's another great opportunity to support conservation management of the next generation for our freshwater aquatic environments. Visit the FAPMS Maier Scholarship webpage for more information and qualifications.

Maier Scholarship – FAPMS

Since the establishment of the FAPMS Scholarship and Research Foundation in 1986, the FAPMS membership's children have been awarded $141,850.00, through the Paul C. Myers Applicator Dependent Scholarship. Plus, another $24,400.00 awarded to graduate students with the William Maier Jr. Memorial Scholarships. The primary mission of the Foundation is to continue to support the members of FAPMS as well as promote academic interest in the field of aquatic plant management in Florida. The primary fundraising events are during the FAPMS conference with raffle tickets, duck races, fishing and cornhole tournaments. However, you can support the Foundation all year long with your tax-deductible donations.

We look forward to receiving many applications over the next couple of months and please contact us if you, or your children, have any questions.

Sincerely, FAPMS Scholarship Foundation BOD.

24th Annual Conference Report

NEAPMS hosted our 24th annual conference in Saratoga Springs, NY in early January 2025. There was no horse racing, but plenty of excitement, including 20 presentations, 17 Posters, the Poster Slam, and more than 250 attendees. The membership comprises a broad coalition of folks from Academic, local Lake Associations and groups, State and Federal Agencies, Private Contractors, and Industry Suppliers. We're excited to have APMS next August in Providence, RI where we will talk in-depth about the CT River Hydrilla work and hope to have many members in attendance.

> *The NEAPMS conference included a session on the CT River strain of hydrilla.*

The NEAPMS conference included a session on the CT River strain of hydrilla. The team presented on the history of hydrilla in the Connecticut River; outreach and education efforts; research accomplishments; and the potential for biocontrol to manage the population. In 2024 the US Army Corps of Engineers, New England District and Engineer Research and Development Center, working with other Federal, State, and local organizations, completed the first year of field trials on the river and tributaries. The main purpose of the research is to determine the effectiveness of herbicides registered for aquatic use by the U.S. Environmental Protection Agency to safely reduce and control the spread of the Connecticut River hydrilla. The demonstration project and research began in 2023 and field trials began in 2024. Additional field demonstrations are being planned for 2025. Additional information on the project can be found at https://www.nae.usace.army.mil/Missions/Projects-Topics/Connecticut-River-Hydrilla/.

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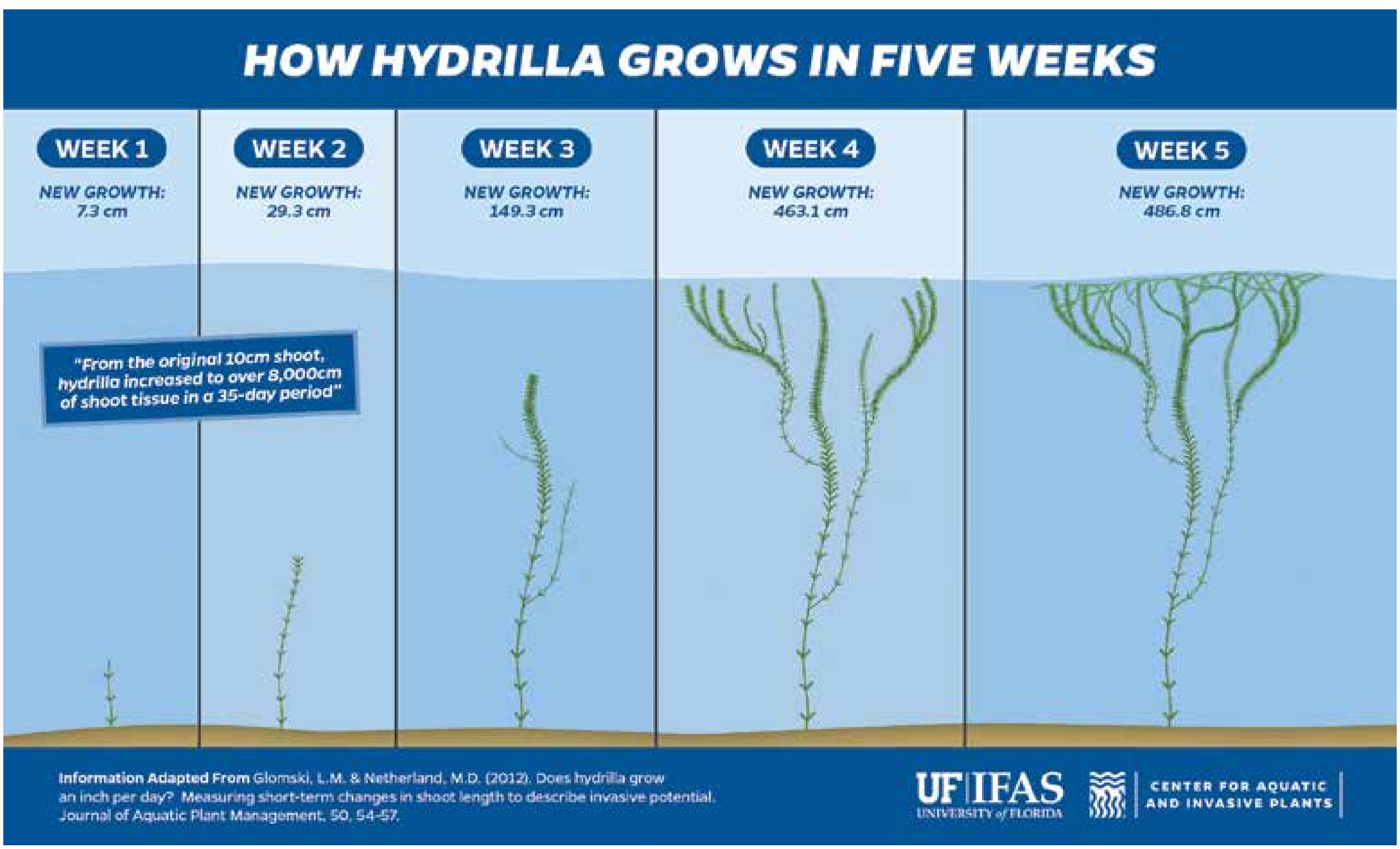
USACE, ERDC, Environmental Laboratory



Calendar of Events

March 17-19, 2025
Western Aquatic Plant Management Society Annual Conference
Sacramento, CA
https://wapms.org

July 14-17, 2025
Aquatic Plant Management Society 65th Annual Meeting
Omni Providence
Providence, RI
https://apms.org/2025-annual-meeting/

October 6-9, 2025
49th Annual Florida Aquatic Plant Management Society Annual Training Conference
Hilton St. Petersburg Bayfront
St. Petersburg, FL
https://fapms.org/2025-conference/

October 19-24, 2025
9th International Weed Science Congress
Nanjing, China
https://iacwsc2025.cn/

Call for Submissions

The Florida Aquatic Plant Management Society is preparing the Summer 2025 Issue of *Aquatics* magazine and is seeking articles from industry professionals, researchers, and other interested authors. Submissions can be directed to aquaticsmagazine@gmail.com.

Articles should be no longer than **2,500 words** in length and include photos, captions, author bio and email.

Want to write for us, but aren't sure what to write about? Below are some topics our readers are always interested in:

- Plant Identification (Native and Invasive)
- Research Updates
- Stories on the people of the aquatic and related industries
- Photo stories – Do you spend a lot of time on the water taking photos that tell a story of some particular plant or a part of Florida? Submit your series of photos with captions and we can share your story!
- Waterbody updates
- Agency Updates

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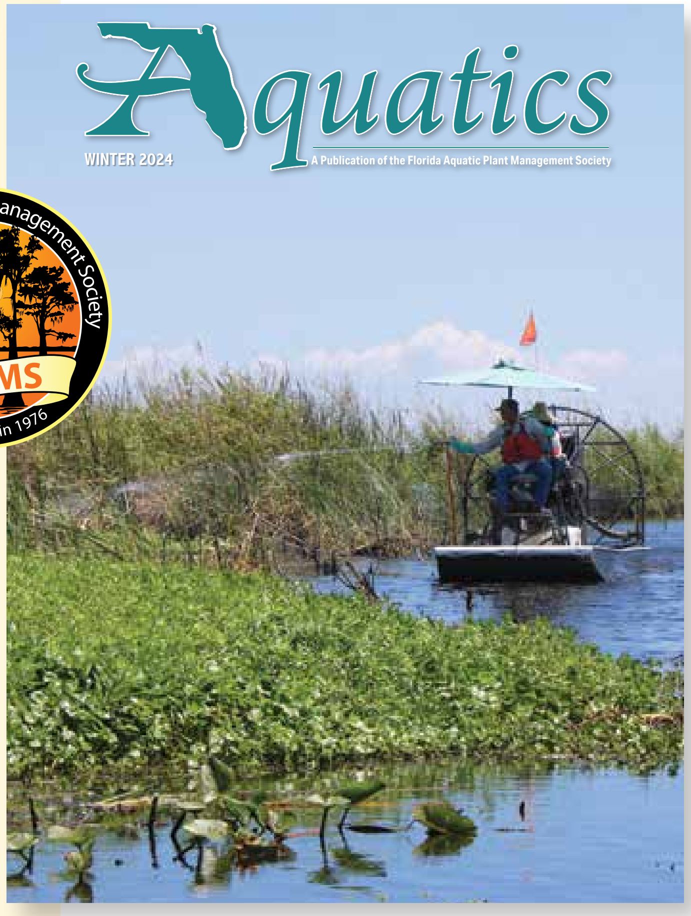

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