MidSouth Aquatic Plant Management Society
42nd Annual Meeting

MIDSOUTH AQUATIC PLANT

MANAGEMENT SOCIETY

est. 1982

PROGRAM

October 24th-26th, 2023
Del'Avant Event Center
LaGrange, Georgia

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MidSouth APMS Meeting Agenda

October 24th-26th, 2023

Monday, October 23rd

5:00 pm - 7:00 pm Board of Directors Meeting (*County's Barbecue*)

Tuesday, October 24th

Tuesday's Agenda-at-a-Glance

8:00 am - 12:00 pm	Exhibits Setup (*Del'Avant Parlor*)
11:00 am - 5:00 pm	Meeting Registration (*Del'Avant Parlor*)
12:00 pm - 1:30 pm	Lunch (*on your own*)
12:00 pm - 5:00 pm	Exhibits Open (*Del'Avant Parlor*)
1:30 pm - 3:20 pm	General Session I (*Del'Avant Ballroom*)
3:20 pm - 3:40 pm	Refreshment Break (*Del'Avant Parlor*)
3:40 pm - 5:00 pm	General Session II (*Del'Avant Ballroom*)
5:30 pm - 7:00 pm	President's Reception – (*Wild Leap Brewery*)

Dinner on your own

12:00 pm **Lunch on your own**

General Session I (*Del'Avant Ballroom*)
Moderator: **Daniel C. Hill**, *LDWF, Lafayette, Louisiana*

1:30 pm **Opening Remarks and Announcements**
Daniel C. Hill
LDWF Lafayette, Louisiana

1:35 pm **Presidential Address**
Carl Della Torre
Orion Solutions, Greensboro, Georgia

1:45 pm **Keynote Address - Aquatic Plant Management: Where We've Been, and What Now?**
Dr. John Madsen
J D Madsen, LLC, Eads, Tennessee

2:30 pm **Seasonal Resource Allocation and Accumulated Degree Day Estimation for Cuban Bulrush (*Oxycaryum cubense*) in the Southeastern U.S.**
Maxwell Gebhart, Ryan M. Wersal, Allison Squires, Gray Turnage
Mississippi State University, Starkville, Mississippi

2:50 pm **Systemic herbicides for control of *Azolla* grown in mesocosms**
Dr. Gray Turnage
Mississippi State University, Starkville, Mississippi

3:10 pm **Refreshment Break** (*Del'Avant Parlor*)

General Session II *(Del'Avant Ballroom*)
Moderator: **Derek Smith**, *Aqua Services, Guntersville, AL.*

3:40 pm **Plant Biology and Management**
Dr. Jason Ferrell
Center for Aquatics and Invasive Plants, Gainesville, Florida

4:00 pm **Modern Algae Management – Critical Information for Managers of Freshwater Resources**
Dr. John Rodgers
Forestry and Environmental Conservation Department, Clemson, South Carolina

4:20 pm **Hydrilla Control Research Update**
Dr. Benjamin P. Sperry
U.S. Army Corps of Engineers Research and Development Center, Gainesville, Florida

4:40 pm **Knotgrass (*Paspalum distichum*) Reduction in Moist Soil Habitats**
Dr. Gray Turnage
Mississippi State University, Starkville, Mississippi

5:00 pm **Day 1 Sessions Conclude**

5:30 pm **Wild Leap Brewery President's Reception**

Dinner on your Own

Wednesday, October 25th - General Sessions

Wednesday's Agenda-at-a-Glance

7:00 am - 8:00 am	Continental Breakfast (*Del'Avant Ballroom*)
7:00 am - 5:00 pm	Meeting Registration (*Del'Avant Parlor*)
7:00 am - 5:00 pm	Exhibits Open (*Del'Avant Parlor*)
8:00 am - 10:00 am	Student Presentation Session (*Del'Avant Ballroom*)
10:00 am - 10:20 am	Refreshment Break (*Del'Avant Parlor*)
10:20 am - 12:00 pm	Regulatory Session (*Del'Avant Ballroom*)
12:00 pm - 1:30 pm	Lunch (*on your own*)
1:30 pm - 3:10 pm	General Session II (*Del'Avant Ballroom*)
3:10 pm - 3:30 pm	Refreshment Break (*Del'Avant Parlor*)
3:30 pm - 4:25 pm	General Session III (*Del'Avant Ballroom*)
4:25 pm. - 5:30 pm	Resource Managers Session (*Del'Avant Ballroom*)
5:05 pm - 5:30 pm	Business Meeting (*Del'Avant Ballroom*)
6:30 pm - 9:00 pm	Conference Social and Reception (*Del'Avant Ballroom and Rooftop*)

Dinner Provided at Reception

Student Presentation Session (*Del'Avant Ballroom)*
Moderator: **Gray Turnage**, *Mississippi State University, Starkville, Mississippi*

8:00 am ***Aetokthonos hydrillicola* Educational Outreach with Animal Ambassadors**
Jamie Ryann Heninger* and Susan Wilde
University of Georgia, Athens, Georgia

8:20 am **Molecular detection of *Aetokthonos hydrillicola* on Hydrilla and other potential niches within Southeastern U.S. reservoirs.**
Erika Klar*, Colton Meinecke, Dayton Wilde, Helen Bothwell, Susan Wilde, and Caterina Villari
University of Georgia, Athens, Georgia

8:40 am **Aetokthonotoxin in Florida Panthers and Bobcats with a Possible Connection to Feline Leukomyelopathy**
Tobias Haymes*, Mark Cunningham, Susan Wilde, Katy Callaghan, and Seth McWhorter
University of Georgia, Athens, Georgia

9:00 am **Aetokthonotoxin extraction from Hydrilla verticillata using a modified QuEChERS method**
Seth McWhorter
University of Georgia, Athens, Georgia

9:20 am **Evaluating Photosynthetic Efficiency of Parrotfeather (*Myriophyllum aquaticum*) at a Range of Temperatures to Determine Invasive Potential in the Midwest**
Alyssa Anderson*, Christopher T. Ruhland, and Ryan M. Wersal
Minnesota State University, Mankato, Minnesota

9:40 am **Testing New Chemical and Integrated Control Methods on Invasive Alligatorweed in the Southeast**
Samuel A. Schmid*, Gray Turnage, Gary N. Ervin
Mississippi State University, Starkville, Mississippi

10:00 am **Refreshment Break (***Del'Avant Parlor***)**

Regulatory Session - (*Del'Avant Ballroom***)**
Moderator: **Dean Jones**, *United Phosphorous, Auburndale, Florida*

10:20 am **Aquatic Plant Management Activities of the Mississippi Department of Marine Resources**
Mike Pursley
Mississippi Department of Marine Resources, Biloxi, Mississippi

10:40 am **Examining the potential for off target effects in Florida largemouth bass from aquatic invasive plant management using endothall and diquat**
Dr. Joseph Bisesi, J. Donaldson, F. Paneque, D. Love, J. P. Keller, Ben Sperry, and J. Ferrell
Department of Environmental and Global Health, University of Florida, Gainesville, FL

11:00 am **An Unpopular Rockstar: The Eelgrass Explosion in the Tennessee River System**
Stephen Turner
Tennessee Valley Authority, Guntersville, AL

11:20 am **Pesticide Product Stability and Shelf Life**
Dr. **Sonja Thomas**
Alabama Cooperative Extension, Auburn, Alabama

12:00 pm **Lunch on your own**

General Session II - (*Del'Avant Ballroom*)
Moderator: **Stephen Turner**, *Tennessee Valley Authority, Guntersville, Alabama*

1:30 pm **AERF Update**
John Madsen
Aquatic Ecosystem Restoration Foundation, Marietta, Georgia

1:50 pm **APMS Update**
Jeremy Slade
UPL NA OpenAg Environmental Solutions, Alachua, Florida

2:10 pm **Industry Updates - Platinum Sponsors**

2:40 pm **Industry Discussions from All Angles**
Stephen Turner, Daniel Hill, Gray Turnage, JJ Ferris, Matt Horton
Tennessee Valley Authority, Guntersville, AL

3:10 pm **Refreshment Break** (*Del'Avant Parlor*)

General Session III (*Del'Avant Ballroom*)
Moderator: **Adam Charlton**, *Aquatic Control, Elizabethtown, Kentucky*

3:30 pm **Keeping the Trailer Connected to the Truck**
Fred Whitford
Purdue University, West Lafayette, Indiana

Resource Managers Session (*Del'Avant Ballroom*)
Moderator: **Adam Charlton,** *Aquatic Control, Elizabethtown, Kentucky*

4:25 pm **Arkansas: Aquatic Invasive Plant Management**
Matthew Horton
Arkansas Game and Fish Commission, Mayflower, Arkansas

4:45 pm **Managing Bigleaf Pondweed (*Potamogeton amplifolius*) on the Lower Coosa River**
Tim McLean
Alabama Power Company, Calera, Alabama

5:05 pm **Business Meeting**

5:30 pm **General Sessions Conclude**

6:30 pm **Conference Social and Reception (***Del'Avant Ballroom and Rooftop***)**

Thursday, October 26th – Aquatic Plant Workshop Field Day

Thursday's Agenda-at-a-Glance

7:00 am - 8:30 am	Breakfast (*on your own*)
8:30 am - 11:45 am	Aquatic Plant Workshop Field Day (*Troup County Ag Center*)
11:45 am - 12:00 pm	Closing Remarks and Adjourn

Closing Session (***Troup County Ag Center – address and directions provided***)
Moderator: **Daniel Hill**, *LDWF, Lafayette, Louisiana*

8:30 am **Interactive Aquatic Plant Workshop**
Gray Turnage[1], John D. Madsen[2], and Tim McLean[3]
[1]*Mississippi State University, Starkville, Mississippi*
[2]*JD Madsen, LLC*
[3]*Alabama Power*

11:45 am **Closing Remarks**
Daniel Hill
LDWF, Lafayette, Louisiana

12:00 pm. **Adjourn**

Lunch on your own

Board of Directors Meeting (*TBD*)

MidSouth APMS Meeting Abstracts and Speaker Biographies

LaGrange, Georgia
October 24th-26th, 2023

PRESENTATION ABSTRACTS

Aquatic Plant Management: Where We've Been, and What Now? (Keynote)
Dr. John D. Madsen
J D Madsen LLC., Eads, Tennessee
Aquatic plant management has been successfully managing invasive aquatic plants long before the term "invasive species" was even used. Managing invasive aquatic and terrestrial plants should be the model for how to pursue other invasive species, yet all the attention is diverted elsewhere. Aquatic plant management has been successful in part because a partnership of government, industry, and stakeholders focused on these issues with a program of research, development, and implementation. Regulatory issues were addressed by engaging this partnership with regulatory agencies. Operational management was clearly the purpose and the goal of these efforts. I will discuss some key partners in this process historically and use this basis to consider what is next to address as we continue to manage aquatic plants. Key needs and issues in research, development, infrastructure, and organization will be addressed.

Seasonal Resource Allocation and Accumulated Degree Day Estimation for Cuban Bulrush (*Oxycaryum cubense*) in the Southeastern U.S.
Maxwell G Gebhart*, Allison Squires, Gray Turnage, Ryan M. Wersal, Christopher R. Mudge, Benjamin P. Sperry
Mississippi State University, Starkville, Mississippi
Cuban bulrush, Oxycaryum cubense (Poepp. & Kunth) Lye, is an invasive perennial epiphyte that is native to South America. Currently, the species is present in parts of Africa, Mexico, and the Southeastern United States from Texas to Florida. Cuban bulrush can form large floating islands, known as tussocks, which have begun invading numerous multi-use lakes and reservoirs which can inhibit flowing drinking water, hydro-electric power, and navigation for recreational and commercial military vehicles. Within the U.S., Cuban bulrush has been observed to form two inflorescence types: polycephalous (*O. cubense forma cubense*) and monocephalous (*O. cubense forma paraguayense*). A previous study described the basic phenology of this species in Lake Columbus, MS; however, the objective of this research is to expand on the resource allocation patterns of Cuban bulrush through quantification of starch and to predict the growth/emergence through accumulated degree day modeling (ADD) all at field sites in Mississippi, Louisiana, and Florida. Preliminary results show that the starch allocation patterns behave similarly amongst all sites with tissues typically storing less than 1.5% DW starch however, biomass has shown distinct trends between the poly- and monocephalous inflorescence forms. Prior research on Cuban bulrush ADD modeling has revealed a base threshold temperature of -4°C in Mississippi, with peak emergent biomass occurring in the late fall or winter months with current research showing similar affinities for low temperatures among all three states (Squires et al. in review).

Systemic herbicides for control of Azolla grown in mesocosms
Gray Turnage
Mississippi State University, Starkville, Mississippi
Mosquitofern (*Azolla* spp.) is a free-floating aquatic fern capable of covering waterbodies and killing submersed macrophytes which can lead to a loss of biodiversity. The purpose of this work was to determine efficacious aquatic labeled systemic herbicides applied as foliar sprays and submersed injections for mosquitofern control. Treatments consisted of reference plants and plants treated at the max and half-max label rates of 10 systemic herbicides labeled for aquatic use. The ALS inhibiting herbicides bispyribac-sodium and imazamox provided 100% reduction of azolla at all rates 12 WAT when applied to either foliage or water, both rates of imazapyr and fluridone also provided 100% reduction when applied to foliage. This work was the first to assess a broad suite of systemic herbicides for mosquitofern control and provides resource managers and private landowners needed information for controlling nuisance populations when they occur.

Plant Biology and Management
Jay Ferrell
Center for Aquatics and Invasive Plants, Gainesville, Florida
Water hyacinth is an introduced species from the riverine systems of South America. This plant is free-floating in the water column with long fibrous roots used to mine nutrients from the water column. Water hyacinth reproduces both sexually and asexually. Sexual reproduction occurs from self-fertilized flowers that emerge, open, pollinate, and close within one day. After fertilization, the flower stalk bends under the water where the seeds ripen for a period of weeks before release of mature seeds into the sediment. Seed germination occurs when previously flooded sites remain wet, but not totally inundated with water. The seedlings will root into the sediment and wait for water levels to rise, at which point they abscise their roots and become free-floating. The second mechanism of reproduction is asexual development of daughter-plants, or ramets. Ramets are produced every 10-45 days (or longer), depending on temperature and nutrient availability, comprising the most common way water hyacinth spreads within an ecosystem. Therefore, in times of drought when sediment becomes exposed to air, plant surveys should focus on these areas to determine if seedlings are germinating and adding to the overall population. A well-timed application can easily manage thousands of plants at this stage with great selectivity since other plants are often not present in these previously flooded sites. Additionally, water hyacinth management should focus on applications during the cooler months of the years when asexual reproduction is slow due to decreased temperature. These factors, and others, will be highlighted during this presentation.

Modern Algal Management – Critical Information for Managers of Freshwater Resources
John H. Rodgers, Jr., and Carlton Layne
Professor Emeritus, Clemson University
The increased incidence and intensity of harmful algal blooms in freshwater resources throughout the United States have concomitantly increased the challenges for managers of these resources. In recent times, it is often not acceptable to simply monitor and post HAB infested critical freshwater resources as the beneficial designated uses of those are lost or not accessible. Suggesting that there is nothing you can do or that can be done is also unacceptable. A decision to intervene to control HABs can be supported by science and risk assessment. This presentation will address subjects such as risk assessment supporting a decision to intervene, approaches available for HAB mitigation. proven tactics, and diversions such as leaky cells. I will cover some science I wish we had known 45 years ago.

Hydrilla Control Research Update
Ben Sperry
U.S. Army Corps of Engineers, Gainesville, Florida
Since its original introduction to the United States in the 1950s, hydrilla (Hydrilla verticillata) has been an extremely difficult aquatic plant management challenge. In addition, there are now multiple genotypes throughout the country invading a multitude of aquatic habitat types. Consequently, operations-driven hydrilla research has significantly increased in recent years in an attempt to improve management and restore public aquatic ecosystems. This presentation will provide an update on current hydrilla control research conducted by the US Army Engineer Research and Development Center.

Knotgrass (*Paspalum distichum*) Reduction in Moist Soil Habitats
Dr. Gray Turnage
Mississippi State University, Starkville, Mississippi
Knotgrass is becoming more prevalent in southeastern waterbodies and moist soil wetlands. This project assessed knotgrass reduction with 1) the use of herbicide and prescribed fire as an integrated management strategy (Trial 1) and 2) individual herbicides at multiple rates applied to foliage (Trial 2). Herbicides assessed included glyphosate, imazapyr, imazamox, and penoxsulam. In Trial 1, prescribed fire alone reduced knotgrass biomass 88% 4 weeks after treatment (WAT); however, herbicide, alone performed just as well (99 to 100% biomass reduction) as stand-alone treatments 16 WAT and the inclusion of prescribed fire post herbicide application was not found to enhance control 16 WAT compared to reference plants. In Trial 2, knotgrass height was reduced by imazapyr (3.0 and 1.5 pts/ac), glyphosate (4.0, 2.0, and 1.0 pts/ac), and penoxsulam (1.4 and 0.7 oz/ac) 12 WAT. Knotgrass cover was reduced 90% or greater 12 WAT by all treatments except glyphosate at 4.0 pts/ac, imazamox at 4.0 pts/ac, and imazamox at 1.0 pt/ac. This work provides information for resource manager utilization when selecting control options for knotgrass growing in habitats that may require herbicides labeled for use in aquatic habitats.

Aetokthonos hydrillicola Educational Outreach with Animal Ambassadors
Jamie Ryann Heninger
Wilde Lab Warnell, University of Georgia, Bogart, Georgia
This study provides outreach to schools and camps on Vacuolar Myelinopathy, a neurological disease that impacts animals that ingest Aetokthonotoxin, and the animals it impacts in the wild. Elementary aged students from 3rd through 5th grade will be given presentations about VM using Live animal ambassadors or rubber replica animals. Our objectives are to determine if live animals or rubber replica animals increase student retention and if live or replica animals are better at increasing engagement. Pre-surveys, lichert scale surveys, and Zoom interviews with class instructors will be used to gather data on student engagement and knowledge retention.

Molecular detection of Aetokthonos hydrillicola on Hydrilla and other potential niches within Southeastern U.S. reservoirs.
Erika Klar, Colton Meinecke, Dayton Wilde, Helen Bothwell, Susan Wilde, and Caterina Villari
University of Georgia, Athens, Georgia
Molecular detection of Aetokthonos hydrillicola on Hydrilla and other potential niches within Southeastern U.S. reservoirs. Vacuolar Myelinopathy (VM) is a neurological disease caused by exposure to Aetokthonotoxin (AETX) produced by the cyanobacteria Aetokthonos hydrillicola and is a major cause of death for Bald Eagles and other wildlife in the Southeastern United States. VM causes extensive vacuolation within the white brain matter and is characterized by symptoms such as lethargy and the inability to fly or evade predation. A. hydrillicola is an epiphytic cyanobacteria that grows on the underside of Hydrilla verticillata, an invasive aquatic plant species found growing throughout the continental United States and prolifically in the Southeast. It produces AETX, a lipophilic neurotoxin that passes through the food chain through ingestion of gut contents from primary consumers of impacted Hydrilla. Conventional PCR, qPCR, and LAMP (Loop-Mediated Isothermal Amplification) will be used to develop protocols for molecular detection and semi-quantification of A. hydrillicola for rapid in-field detection and guide management.

Aetokthonotoxin in Florida Panthers and Bobcats with a Possible Connection to Feline Leukomyelopathy.
Tobias Haymes, Mark Cunningham, Susan Wilde, Katy Callaghan, and Seth McWhorter
University of Georgia, Athens, Georgia
Feline leukomyelopathy (FLM) is a neurological disorder affecting Florida panthers (*Puma concolor coryi*) and bobcats (*Lynx rufus*) throughout their range in southwest Florida. The condition is characterized by ataxia and hind-limb paresis and confirmed through histologic observation of distinct symmetrical vacuolization throughout the spinal cord. In searching for a cause of FLM, the recently characterized cyanobacterial neurotoxin Aetokthonotoxin (AETX) was tested in the muscle and liver tissue of both panthers and bobcats. AETX is produced in the environment by the epiphytic cyanobacteria *Aetokthonos hydrillicola*, which is strongly associated with the presence of the invasive aquatic macrophyte *Hydrilla verticillata*. A blind case-control design was used to determine any connection between FLM and the presence of AETX in tissues. Further analysis of the current results is underway and continued investigation is warranted.

Aetokthonotoxin extraction from Hydrilla verticillata using a modified QuEChERS method.
Seth McWhorter
University of Georgia, Athens, Georgia
Aetokthonotoxin (AETX) is a novel cyanotoxin and a causative agent of vacuolar myelinopathy (VM) disease. *Aetokthonos hydrillicola* produces AETX on the underside of *Hydrilla verticillata* (hydrilla) leaves in reservoirs throughout the southeast United States. Quantification of AETX involves measuring extracts containing AETX using liquid chromatography tandem mass spectrometry (LC-MS/MS)—however, AETX extracts from hydrilla often result in significant carryover among samples. In this study, we propose a novel method of hydrilla extraction known as QuEChERS—meaning quick, easy, cheap, effective, rugged, safe. The modified QuEChERS method aims to provide a rapid extraction method that results in cleaner extracts, reducing carryover on LC-MS/MS.

Evaluating Photosynthetic Efficiency of Parrotfeather (Myriophyllum aquaticum) at a Range of Temperatures to Determine Invasive Potential in the Midwest

Alyssa Anderson, Christopher T. Ruhland, and Ryan M. Wersal
Department of Biological Sciences, Minnesota State University, Mankato

Parrotfeather (*Myriophyllum aquaticum*) is an invasive, heterophyllous, aquatic plant from South America. This plant is known to create large, dense mats on the water's surface that prohibit recreation, clog canals and waterways, and provide habitat for mosquito breeding. Emergent growth also shades out submersed, native vegetation resulting in a loss of habitat complexity. To date, parrotfeather has yet to establish itself in the Midwest. During Midwest winters when lakes are covered in ice, the water cannot mix which results in the majority of the hypolimnion being 4˚C. In order to gain a better understanding as to why parrotfeather has not been established in the Midwest, photosynthetic capabilities at a variety of temperatures were examined. Chlorophyll fluorescence was used on both leaf forms (emergent and submersed) to determine photosynthetic efficiency at temperatures between 0-45˚C. The maximum quantum efficiency of photosystem II in a dark-adapted state is approximately 0.83-0.84 and lower values typically indicate stress that may limit photosynthesis. Dark-acclimated (Fv/Fm) measurements, or measurements that depict photosynthetic potential, for submersed tissue yielded an average of 0.7270 and emergent tissue at 0.8010 at just above 0˚C. Light-acclimated (φPSII) measurements at the same temperature resulted in an average submersed photosynthetic efficiency of 0.0420 and an emergent efficiency of 0.4860. The submersed leaves' photosynthetic efficiency decreased by over 94% when going from dark to light acclimation and emergent leaves decreased by 39%; this is indicative of temperature stress. Preliminary results indicate that the temperature optimum for both leaf forms is around 20-25 ˚C. Efficiencies decline between 25˚C and 40˚C as the dark-acclimated submersed leaves' yield dropped by 20% and emergent leaves dropped by nearly 10%. This suggests that parrotfeathers have more potential to photosynthetically thrive in cooler temperatures. Future research will further assess the photosynthetic abilities of parrotfeather by conducting more chlorophyll fluorescence measurements at more temperatures and by looking at gas exchange analyses as well as accumulated degree day modeling for both the submersed and emergent forms.

Testing New Chemical and Integrated Control Methods on Invasive Alligator Weed in the Southeast.

Samuel A. Schmid, Gray Turnage, and Gary N. Ervin
Mississippi State University, Starkville, Mississippi

Alligator weed, is globally problematic, but particularly troublesome in California and the Southeastern United States and native to South America. In surveys of waterbodies in Mississippi, for example, alligator weed occurs more frequently than any other aquatic plant, native or non-native. Alligator weed has a long history of control in the United States where chemical and biological control showed initial success. This plant exhibits high mortality following foliar applications of common herbicides, but this period of successful biomass reduction is often followed by robust regrowth, likely facilitated by an extensive stolon network. With regards to biocontrol, the alligator weed flea beetle (*Agasicles hygrophila*) performs well at reducing large, dense populations of alligator weed by feeding on the shoots and defoliating the plants. Unfortunately, the flea beetle has a low tolerance for cold winters, and as alligator weed expands into increasingly temperate habitats, flea beetle control becomes decreasingly feasible. To address these shortcomings in current alligator weed management we designed a study to test in-water herbicide applications and a different biocontrol vector: the alligator weed thrips (*Amynothrips andersoni*). Alligator weed thrips are known to be highly tolerant of cold, but research on this vector is scarce. We designed mesocosm studies in two phases. Phase one assessed five herbicides (bispyribac-sodium, fluridone, imazamox, penoxsulam, and topramezone) applied as in-water treatments at high and low rates. Phase two compares these herbicide treatments to thrips biological control and combines them in integrated treatments. We found multiple herbicide treatments that were highly effective at reducing alligator weed biomass with some chemistries effective at high and low rates. As we continue our second phase, we will assess the efficacy of herbicides and thrips in an integrated control strategy. We present data on combination treatments of herbicides and thrips feeding.

Aquatic Plant Management Activities of the Mississippi Department of Marine Resources

Mike Pursley
Mississippi Department of Marine Resources, Biloxi, Mississippi

Overview of AIS species management in Coastal Mississippi. Species managed include giant salvinia, common salvinia, water hyacinth, alligatorweed, Eurasian watermilfoil, phragmites, beach vitex and others.

Examining the potential for off target effects in Florida largemouth bass from aquatic invasive plant management using endothall and diquat

Joseph Bisesi, J. Donaldson, F. Paneque, D. Love, J. P. Keller, Ben Sperry, and J. Ferrell
Department of Environmental and Global Health, University of Florida, Gainesville, FL

Invasive species are estimated to have cost over $1.2 trillion dollars worldwide over the past 4 decades. Aquatic invasive plants are among the most common invasive species and present a significant threat to commercial and recreational usage of US waterways. This is especially true in Florida, where aquatic systems are a primary driver of tourism throughout the state. While aquatic invasive plant management can consist of mechanical or biological control techniques, chemical control via the use of registered aquatic herbicides is very common. Despite efforts to ensure treatment of aquatic invasive plants do not cause off target effects in aquatic organisms, there is still tremendous trepidation among the public regarding the potential effects that these herbicides may have on fisheries. Of particular concern are potential off-target effects on the Florida Largemouth Bass (FLMB). The FLMB is a prized sportfish across the state as it has both recreational and economic value. While numerous concerns have been expressed regarding the effects of aquatic invasive plant herbicides treatments and the potential consequences for FLMB, no comprehensive studies have examined the impacts of this practice on this important Florida sportfish. The objective of this study was to examine the toxicity of the aquatic herbicides endothall and diquat on FLMB. Three different life stages (larvae, juveniles, and adults) of FLMB were exposed to endothall using maximum allowable application rates for endothall in simulated treatment experiments. Endpoints from experiments will include mortality, growth, histology, plasma hormone concentrations, and molecular markers of effect. Results of larval exposure studies indicate no impacts on mortality or growth following at current application rates for either herbicide. Results from the juvenile and adult studies are ongoing and will also be presented. Results from these studies are expected to provide a species-specific dataset that can be used by stakeholders to determine whether current management practices are safe for this recreationally and economically important sportfish.

An Unpopular Rockstar: The Eelgrass Explosion in the Tennessee River System

Stephen Turner
Tennessee Valley Authority

From a few colonies of *Vallisneria americana* scattered throughout the lower end of the Tennessee River system to a highpoint of near 40,000 acres of the 'Rockstar" hybrid in less than 20 years. In the early 2000's the 'Rockstar' hybrid (*V. spiralis X V. denseserrulata*) was introduced into the Tennessee River. This introduction, believed to have occurred in Guntersville Reservoir or Nickajack Reservoir, quickly expanded to cover large swaths of Kentucky, Pickwick, Wilson, Wheeler, Guntersville, and Nickajack Reservoirs. But with its minimal winter drawdown and plentiful shallow flats Guntersville reservoir quickly became its primary residence, at its pinnacle covering almost 20,000 acres of the 68,000-acre reservoir in 2022. How the TVA Aquatic Plant Management Program has managed and continues to manage the recent eelgrass explosion in the Tennessee Valley through herbicide treatments and multiple harvester and collection efforts.

Pesticide Product Stability and Shelf Life

Sonja Thomas
Alabama Cooperative Extension, Auburn, Alabama

We will discuss how the manufacturer determines pesticide shelf-life, product longevity, physical characteristics and how to develop a program that organizes your inventory and reduces waste.

AERF Update

John Madsen
Aquatic Ecosystem Restoration Foundation, Marietta, Georgia

APMS Update

Jeremy Slade
UPL NA OpenAg Environmental Solutions, Alachua, Florida

This presentation is an update for recent happenings in the National APMS chapter and what each regional chapter can expect to see in the coming months.

Industry Updates

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New products and technology for management of aquatic plants and resources will be previewed from various industry experts.

Industry Discussions from All Angles
Stephen Turner, Daniel Hill, Gray Turnage, JJ Ferris, and Matt Horton
Round table discussion and audience Q&A session regarding contemporary and innovative tools, technology, and future hurdles for aquatic plant management purposes. This discussion incorporates information from industry and academic perspectives. Topics will range from pesticide supply forecasts to incorporation of autonomous systems in aquatic plant management programs.

Keeping the Trailer Connected to the Truck
Fred Whitford
Purdue University, West Lafayette, Indiana
The purpose of this presentation is to bring to the forefront those factors that play a critical role in keeping a trailer attached to a truck. Understanding how these factors work together will reduce the likelihood that a trailer will come detached during transportation on busy highways. Hitches should not be viewed as simple mechanical devices. Just the opposite is true! Hitches are a complex integration of components working together to keep the trailer hooked to the truck. Hooking a trailer to a truck creates a "single" vehicle through a hitch mechanism, safety chains, emergency trailer brake, and load distribution and securement. Experienced drivers understand that the manner in which a truck steers, brakes, and turns can be altered by having a trailer pulled by a truck. The consequences of a trailer becoming unhitched from a truck on the highway is something we would rather not think about but must at all times understand that people are killed or injured each day from these types of accidents. In addition, pesticides and application equipment carried on a "run-away" trailer only leads to serious environmental concerns. Nobody would want to be that person whose trailer slams into a van carrying a family. Heed and follow the ratings of the truck, hitch, and trailer when towing so that accidents are prevented.

Arkansas: Aquatic Invasive Plant Management
Matthew Horton
Arkansas Game and Fish Commission, Mayflower, Arkansas
Over a dozen species of aquatic invasive plants have been introduced and established populations in Arkansas. Within the last decade, the three most problematic species include alligator weed (Alternanthera philozeroides), water hyacinth (Eichhornia crassipes), and giant salvinia (Salvinia molesta). Giant salvinia is the most recent invader (2017) and is considered a species of greatest concern. The Arkansas Game and Fish Commission (AGFC) manages aquatic plants in all waters owned by the agency, provides varying levels of management assistance for other state and federally owned public waters, and management advice to private pond owners. AGFC utilizes an integrated pest management strategy to prevent, control, and monitor invasive plants, however the lack of viable biological controls, funding, personnel, equipment, and inter- and intra-jurisdictional limitations have historically been barriers to effective control. Rising control costs, recreational impacts, and the increasing threat of new species introductions motivated a paradigm shift within the agency to address these barriers. Increasing staff and improving coordination of plant management, as well as developing a more efficient contract process for hiring herbicide applicators has significantly improved effectiveness of control efforts and reduced state-wide control costs. Currently, efforts are underway to improve public awareness, encourage prevention behaviors, increase early detection and rapid response capabilities, and better understand the potential threats posed by new and existing invasive species.

Managing Bigleaf Pondweed (*Potamogeton amplifolius*) on the lower Coosa River
Tim McLean
Alabama Power, Calera, Alabama
The Alabama Power Company (APC) aquatic plant team's challenges with bigleaf pondweed management on the lower Coosa. Application techniques that are working best for controlling the species.

Interactive Aquatic Plant Workshop
Gray Turnage
Mississippi State University, Starkville, Mississippi
Hands on opportunity for participants to learn plant ID, biology, and management techniques for invasive species common in the southeastern U.S.

SPEAKER BIOGRAPHIES (Alphabetized):

Alyssa Anderson
Alyssa Anderson is a graduate student at Minnesota State University, Mankato working towards her master's in biology. She acquired her bachelor's degree in environmental science in 2021 and worked in Dr. Ryan Wersal's Weed Science lab during her final summer and semester of undergraduate. She joined Dr. Wersal's lab as a graduate student. Her thesis research focuses on the ecophysiology of parrotfeather (*Myriophyllum aqiuaticum*) to determine if the invasive plant has the capability to photosynthesize at a wide variety of temperatures and light levels and in result survive and invade throughout the entirety of the United States.

Joseph Bisesi, PhD
Dr. Joseph Bisesi is an associate professor in the Department of Environmental and Global Health and a member of the Center for Environmental and Human Toxicology, the Center for Aquatic and Invasive Plants, and the Emerging Pathogens Institute at the University of Florida. Dr. Bisesi's is an environmental toxicologist who is focused on the study of waterborne contaminants and their potential to cause impacts on the health of humans and aquatic organisms. To this end, his research program has examined molecular and biological impacts of emerging and historical chemical contaminants, by utilizing small and large fish models that are recognized in the toxicological community as relevant for the study of both human health toxicology and ecotoxicology, enabling research across these important disciplines. Dr. Bisesi has conducted research on numerous chemical classes including nanomaterials, plasticizers, pharmaceuticals, pesticides, and heavy metals.

Jason Ferrell, PhD
Dr. Jason "Jay" Ferrell is the director of the UF/IFAS Center for Aquatic and Invasive Plants. Since 2017, Dr. Ferrell has led a multidisciplinary group of faculty and staff whose mission is to develop and disseminate strategies for addressing the impact of invasive plants. He also serves as the Director of the Pesticide Information Office where he works to ensure that pesticide applicators are trained and licensed in a relevant and timely manner. With degrees from the University of Kentucky and University of Georgia, Jay started at the UF in 2004 and focused on plant management and plant response to herbicides.

Maxwell G. Gebhart
Maxwell currently is an associate researcher with Dr. Gray Turnage at Mississippi State University studying the biology, ecology, and management of several aquatic invasive plant species. Maxwell has been involved in invasive plant research for the past 3 years and received his master's degree at Minnesota State University, Mankato studying invasive plant biology and ecology within wetland systems.

Tobias Haymes
Tobias Haymes is a graduate research assistant in the Warnell School of Forestry and Natural Resources at the University of Georgia. He is co-advised by Drs. Susan Wilde and Sonia Hernandez. His research interests include mammal susceptibility to Vacuolar Myelinopathy (VM), particularly Florida Panthers, bobcats, semi-aquatic mammals, and white-tailed deer. Tobias earned his bachelor's degree in Fisheries and Wildlife from the University of Georgia. During his time as an undergraduate, Tobias worked with Dr. Wilde on his senior thesis research that investigated the susceptibility of beavers to VM. He also worked for the UGA Deer Lab where he assisted with maintenance and animal husbandry, in addition to working on a coyote abundance project at the Savannah River Site and several wildlife management areas in South Carolina. Tobias has also worked for the Cesar Kleberg Wildlife Research Institute at Texas A&M University – Kingsville, where he assisted with white-tailed deer fawn research in south Texas. Currently, he also works as a student contractor for the U.S. Geological Survey and is collaborating with several state agencies to better understand the distribution of *Aetokthonos hydrillicola* across the country.

Jamie Ryann Heninger
Ryann Heninger attended Georgia Southern University as an undergraduate and graduated with a B.S. in Biology with an emphasis on Herpetology. She attends the Warnell School of Forestry and Natural Resources at the University of Georgia where she works under Dr. Susan Wilde. She does outreach for the Wilde Lab and uses animal ambassadors in presentations to the public.

Daniel Hill
Daniel has worked in private industry and state agencies controlling the worst aquatic weeds in the U.S. The U.S. Fish and Wildlife Service as well as state agencies in Arizona, California, Mississippi, and Arkansas have engaged him as a consultant for establishing giant salvinia management plans.

Mathew Horton
Matthew Horton received an undergraduate degree in Fisheries Management from Arkansas Tech University in 2006 and has worked for the Arkansas Game and Fish Commission since 2004. I was the District 10 Fisheries Habitat Biologist in central Arkansas for 14 years (2008-2021), where one of my duties included coordinating and conducting aquatic plant management in public waters. I have since worked as the statewide Aquatic Nuisance Species Program Coordinator, which encompasses prevention and control of all invasive aquatic flora and fauna.

Dean Jones
Dean Jones is an Aquatics Territory Manager for UPL NA covering the southeast United States. Dean has 26 years of experience in aquatic plant management and has served as Manager of the Polk County Aquatic Weed Control Section, Senior Biological Scientist with the University of Florida Center for Aquatic and Invasive Plants, and a contractor for the US Army Corps of Engineers. While working for UF and USACE, his focus was hydrilla control while assisting with evaluating new chemistries, developing novel management strategies for hydrilla, and utilizing new technologies for surveys and pre/post treatment evaluations.

Erika Klar
Erika is originally from Hamilton, Ga, Harris County. She has been a proud student at the University of Georgia since 2016 and graduated from Warnell School of Forestry and Natural Resources with a Bachelor of Science in Forest Resources and Wildlife Science emphasis and a minor in Biology in May 2021. She is currently pursuing a Master of Science in Natural Resources under the direction of Dr. Susan Wilde and Dr. Caterina Villari. Her research focuses on application of LAMP (Loop-Mediated Isothermal Amplificaton) to in field genetic detection of the cyanobacteria, Aetokthonos hydrillicola, that produces the neurotoxin that causes Vacuolar Myelinopathy (VM) in Bald Eagles and other wildlife throughout the Southeastern US.

John D. Madsen, PhD
Dr. John D. Madsen is a consulting scientist. He retired from federal service in December 2022 from his position as a Research Biologist with the US Department of Agriculture, Agricultural Research Service, Invasive Species and Pollinator Health Research Unit on the campus of University of California-Davis. Previously, he was a faculty member at Mississippi State University for eleven years, and a Research Biologist with the US Army Engineer Research and Development Center. Dr. Madsen has been researching the biology, ecology and management of aquatic weeds and their impact on native aquatic plants for over 30 years. Dr. Madsen is currently an associate editor for Journal of Aquatic Plant Management and is a past Editor as well as a former Director and Past-President of the Aquatic Plant Management Society. Dr. Madsen has a Bachelor of Science degree from Wheaton College, Wheaton, IL, and Master of Science and Doctor of Philosophy degrees in Botany from the University of Wisconsin-Madison.

Tim McLean
Tim currently works for Alabama Power Company (APC) in Environmental Affairs as their lead pesticide manager. Tim manages all pesticide applications for APC's reservoirs and assists other sections of APC with issues pertaining to aquatic plant management. Tim has been with Alabama Power's Aquatic Plant Management Team since 2017.

Seth McWhorter
Seth is a PhD candidate at Warnell School of Forestry and Natural Resources, University of Georgia in Susan Wilde's lab. He works as an ORAU National Student Services Contractor under Matthew Henderson at the EPA, where he performs analysis on environmentally relevant compounds, such as pesticides, cyanotoxins, engineered nanomaterials, and microplastics. While he started his career as an aquatic field biologist at Voyageurs National Park, he has transitioned to a laboratory career in organic chemistry—focusing on contaminant extraction and quantification, metabolomics, photodegradation, and kinetic partitioning.

Mike Pursley
Mike is the Invasive Species Program Manager at the Mississippi Department of Marine Resources. Mike has a B.S. in Environmental Science from the University of Arkansas and a M.S. in Fisheries Biology and Aquaculture from the Louisiana State University.

John H. Rodgers, Jr, PhD
Dr. John Rodgers is an Emeritus Professor in the Department of Forestry and Environmental Conservation and Emeritus College at Clemson University in South Carolina. Dr. Rodgers earned a B.S. in Botany and an M.S. in Aquatic Botany from Clemson University in 1974. He received a Ph.D. degree in Biology and Aquatic Toxicology from Virginia Polytechnic Institute and State University in 1977. Both Dr. Rodgers and his students have been involved with harmful algae management for several decades while he taught and conducted research in Mississippi, Texas, Tennessee, and Virginia. Dr. Rodgers served on the Board of Directors and as President of the Aquatic Plant Management Society and for the Society of Environmental Toxicology and Chemistry. Along with his students and colleagues, Dr. Rodgers has published numerous scientific papers regarding management of freshwater resources impacted by harmful algal blooms as well as noxious and invasive vascular and nonvascular plants. In retirement, he continues to work with private sector clients, governmental organizations (e.g., US EPA, SC DHEC) and NGOs (e.g., Aquatic Ecosystem Restoration Foundation, National Council for Air and Stream Improvement).

Samuel A. Schmid
Samuel is a biology Ph.D. student at Mississippi State University with an M.S. from Minnesota State University, Mankato. His dissertation studies the ecology and management of alligator weed and an associated phytophagous thrips. His most active study seeks to integrate chemical and biological control for effective alligator weed management. Recently, he published on rare production of seeds in invasive alligator weed. His research interests include several questions on the ecology and biogeography of alligator weed as well as invasion ecology in general. In the future he hopes to continue research at the ecological intersection of plants, insects, and invasive species.

Jeremy Slade
Jeremy has been active in aquatic plant management for over a decade and has held positions in academia, private industry, and government research programs. He is the current president elect of the National APMS society and has held multiple positions on the Board of Directors for multiple APMS chapters.

Ben Sperry, PhD
Dr. Ben Sperry is a research biologist for the US Army Engineer Research and Development Center stationed at the University of Florida's Center for Aquatic and Invasive Plants. He holds bachelor's and master's degrees from the University of Florida in agronomy and weed science, respectively. He received his PhD in weed science from Mississippi State University. His research focuses on invasive aquatic plant management techniques such as development and refinement of herbicide use patterns, application technology, operational management program optimization.

Sonja Thomas, PhD
Current Position: Extension Specialist
Coordinator Alabama Pesticide Safety Education Program,
Home Grounds, Gardens and Pest Team Coordinator
Alabama Cooperative Extension System, Auburn University
Sonja Thomas holds a Ph.D. in Structural Entomology from the University of Georgia and a M.S in Soybean Entomology from the University of Kentucky. She has worked for the United States Department of Agriculture, National Park Service, and the University of Georgia Cooperative Extension Service as an Ag and Natural Resources County Extension Agent.

She has conducted research in the area of Integrated Pest Management (IPM) in schools and federal buildings by developing an IPM plan for the Chattahoochee River National Recreational Area in Atlanta. Through her work in structural entomology, she has reviewed over 2,000 pesticide use records from Georgia's public schools in an effort to identify possible training for industry professionals and regulators.

As the Alabama Cooperative Extension Pesticide Safety Education Director, she is required to develop educational programs and materials related to commercial and private pesticide applicator training, pesticide use, and pesticide safety for Alabama applicators and to evaluate, revise and report the effectiveness of those programs for the state of Alabama. She currently serves as Treasurer for the American Association of Pesticide Safety Educators. As well as serving on many boards and committees. She currently lives in Auburn with her 17-year-old daughter Courtney and her two dogs Rocky and Charlie.

Carl Della Torre
Carl Della Torre currently works with Orion Solutions as the Director of Aquatics and Utility Services. He received his bachelor's in forestry and Natural Resources at the University of Georgia and his master in Agronomy with a focus in Weed Science at the University of Florida. After completing his masters, he worked as a senior scientist at the University of Florida in conjunction with the US Army Corps of Engineers, conducting and overseeing research projects in the IVM industry involving new and old chemistries on native and exotic plant species across the Southeast.

Gray Turnage, PhD
Gray has over a decade of research experience with invasive aquatic and wetland plants. He has been involved with several projects nationwide establishing control efforts and protocols for invasive aquatic and wetland plants as well as monitoring those efforts to analyze success of the protocols he has helped to develop (www.gri.msstate.edu). His projects range in size from entire watersheds to private ponds. This work regularly includes consulting with resource managers and landowners, writing management plans for public and private entities, monitoring plant community dynamics over time through vegetation surveys, as well as GIS mapping of treatment sites and plant species locations. He is a member of the MidSouth and National Aquatic Plant Management Societies (APMS).

Stephen Turner
Stephen is a Program Manager for the TVA Aquatic Plant Management Program in Guntersville, AL. He oversees the management of aquatic plants throughout the entire TVA system, provides treatment of around 2,500 acres of aquatic plants annually, harvesting on about 1,000 acres of reservoirs annually and works in partnership with multiple state agencies, local governments, and stakeholder groups to provide management on multiple waterbodies throughout TVA's footprint. Stephen has over 20 years of experience in the Pond and Lake Management industry prior to working with TVA.

Frederick "Fred" Whitford, PhD
Clinical Engagement Professor, Purdue University. Fred is the author of the Grand Old Man of Purdue University and Indiana Agriculture: A Biography of William Carroll Latta, The Queen of American Agriculture: A Biography of Virginia Claypool Meredith, and For the Good of the Farmer: A Biography of John Harrison Skinner, Dean of Purdue Agriculture, Enriching the Hoosier Farm Family: A Photo History of Indiana's Early County Extension Agents, Scattering the Seeds of Knowledge: The Words and Works of Indiana's Pioneer County Extension Agents, and Memories of Life on the Farm: Through the Lens of Pioneer Photographer J.C. Allen. He has authored more than 6,000 presentations given throughout Indiana and the United States. In recognition of his significant contributions to Extension outreach efforts, he has received numerous awards, including the Frederick L. Hovde Award of Excellence in Educational Service to Rural of Indiana, Excellence in Extension Award from the Association of Public and Land-grant Universities, and Honorary Master Farner by Indiana Prairie Farmer and the Purdue University College of Agriculture.